INTEGRATED COMMUNITY BASED MULTI-HAZARDS DISASTER RISK REDUCTION FRAMEWORK IN MALAYSIA

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

Razak Faculty of Technology and Informatics
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NOVEMBER 2021

DEDICATION

This thesis is dedicated to: The sake of Allah S.W.T., my Creator and my Master, my Great Teacher and Messenger, Mohammad S.A.W. (May Allah S.W.T. bless and grant Him), who taught us the purpose of life, my Mum (Hajah Jamiah Binti Mohd Said) and my Late Father (Allahyarham Haji Sardi Bin Haji Markam), who loves me unconditionally, my dearest wife (Norhana Binti Md Yusof), who lead me with light of hope and support; my beloved kids: Ili Nur Lyana Wafa, Lil Muhammad Waaiz and Ilmy Nur Wafiyya, whom I can't force myself to stop loving. To all my family (in-laws), my beloved brothers and sisters (in-laws), my symbol of love and giving, my friends who encourage and support me, all the people in my life who touch my heart, I dedicate this research.

ACKNOWLEDGEMENT

In the name of Allah s.w.t., the Most Merciful, the Most Compassionate, all praise be to Allah S.W.T., the Lord of the World; and prayers and peace be upon Prophet Muhammad His servant and Messenger. First and foremost, Alhamdulillah, thanks to Allah s.w.t., the Ever -Magnificent; the Ever-Thankful, for His guidance and bless.

I owe a deep debt of gratitude to Universiti Teknologi Malaysia (UTM) for giving me and opportunity to complete this research. I am grateful to some people, who worked hard with me from the beginning till the completion of the research particularly my supervisor Dr. Khamarrul Azahari Razak, who has been always generous during all phases of the research. I highly appreciate the opportunities expended by our research group members at Geohazard and Disaster Risk Laboratory, Razak Faculty of Technology and Informatics, UTM Kuala Lumpur. I also acknowledged technical input and financial support throughout the period of my PhD study by Malaysia Civil Defence Force (MCDF) and Public Service Department (JPA).

I would like to take this opportunity to say warm thanks to all my beloved friends and colleagues who have been so supportive along the way of doing my research. I also would like to express my wholehearted thanks to my family for their generous support they provided me throughout my entire life. Because of their unconditional love and prayers, I have completed this thesis.

ABSTRACT

Community-based approaches in managing and reducing disaster risk are important as stated in the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030. The absence of systematic bottom-up disaster risk reduction (DRR) initiatives in Malaysia has impacted the livelihood of some members of the society. The community-led disaster preparedness and risk reduction are poorly treated and the integrated framework is lacking. A multi-stakeholders and multi-hazard approach is still elusive due to the social complexity and local emerging risk. Study areas were selected based on multi-hazard scenarios (flood, landslide and earthquake) covering mountainous area (Cameron Highlands, Pahang), sub-urban setting (Serendah and Kuang, Selangor) and tectonically active region (Kundasang, Sabah) in Malaysia. Therefore, this study outlines three objectives with an overall aim to provide a new insight into the development of community resilience in Malaysia. Firstly, this study seeks the best practice and benchmarking at the international, regional and national level on DRR and determines the practical elements and local needs for the integrated DRR framework. Through an extensive literature review, a conceptual model for community resilient DRR framework was developed and assessed in the real field environment. Secondly, this study analyses the community resilience capitals in understanding local multi-hazard disaster risk. This study utilized the quantitative approach by using different tools for different study areas and different purposes for each assessment tools. Thirdly, this study formulates an integrated community based multi-hazards DRR framework. The descriptive and frequency analysis was used to determine the level of community resilience. The survey shows the need of the guideline for the community to implement basic and simple measures in developing a safer community. The overall Climate Disaster Resilience Index (CDRI) results for sub-district Kundasang, Sabah indicated an acceptable level with the overall community resilience score (3.40). Besides, the Torren Community Disaster Resilience Scorecard for Kuang, Selangor obtained an overall score of 93.63 (64.57 per cent) with some high indicators in the connectedness component. These findings were incorporated into the establishment of the operational framework, which was validated by DRR experts and stakeholders. Index analysis was adopted to determine the suitability of the established components of the integrated framework, which consists of eight components: (1) gathering past and current hazard information; (2) addressing disaster risks; (3) engaging DRR plans with authorities; (4) developing community disaster action plan; (5) prioritizing DRR measures; (6) allocating budget; (7) implementing DRR measures; and (8) establishing community emergency response teams. This study drives a new paradigm in promoting a transdisciplinary approach for developing a resilient society and establishing Local DRR Resilience Strategies in Malaysia as per Target E of SFDRR. With factors such as extreme climate, rapid urbanization, environmental degradation, and uniqueness of locality, this study will strengthen the risk governance through the Disaster Management Committee at the district- and state levels, empower the DRR local champions, and build the local capacity of disaster-resilient communities.

ABSTRAK

Pendekatan berasaskan komuniti dalam mengurus dan mengurangkan risiko bencana sangat penting seperti dinyatakan dalam Kerangka Sendai bagi Pengurangan Risiko Bencana (SFDRR) 2015-2030. Ketiadaan inisiatif pengurangan risiko bencana (DRR) dari bawah ke atas yang sistematik di Malaysia, telah memberi kesan kepada kehidupan sesetengah anggota masyarakat. Kesediaan menghadapi bencana yang diterajui komuniti dan pengurangan risiko bencana adalah sangat lemah serta kekurangan rangka kerja bersepadu yang berkaitan. Pendekatan pelbagai pemegang taruh dan pelbagai bahaya masih sukar difahami kerana kerumitan sosial dan risiko setempat yang akan muncul. Kawasan kajian dipilih berdasarkan senario pelbagai bahaya (banjir, tanah runtuh dan gempa bumi) yang meliputi kawasan pergunungan (Cameron Highlands, Pahang), kawasan pinggir bandar (Serendah dan Kuang, Selangor) dan wilayah aktif tektonik (Kundasang, Sabah) di Malaysia. Oleh itu, kajian ini menggariskan tiga objektif dengan tujuan keseluruhan untuk memberi gambaran baharu mengenai pembangunan daya tahan komuniti di Malaysia. Pertama, kajian ini melihat kepada amalan terbaik dan penanda aras di peringkat antarabangsa, serantau dan nasional mengenai DRR serta menentukan elemen praktikal dengan keperluan tempatan untuk rangka kerja bersepadu DRR. Melalui tinjauan literatur yang lebih meluas, konsep model bagi rangka kerja DRR komuniti berdaya tahan telah dibangunkan dan dinilai dalam persekitaran lapangan sebenar. Kedua, kajian ini menganalisis keupayaan daya tahan komuniti dalam memahami risiko bencana setempat pelbagai bahaya. Kajian ini memanfaatkan pendekatan kuantitatif dengan menggunakan alat kaji selidik yang berbeza untuk kawasan kajian yang berbeza dan tujuan yang berbeza untuk setiap alat penilaian. Ketiga, kajian ini merumuskan rangka kerja bersepadu DRR pelbagai bencana berasaskan komuniti. Analisis penjelasan dan kekerapan digunakan untuk menentukan tahap daya tahan komuniti. Tinjauan menunjukkan perlunya garis panduan bagi komuniti melaksanakan langkah-langkah asas dan mudah dalam usaha membangunkan komuniti yang lebih selamat. Hasil Indeks Daya Tahan Bencana Iklim (CDRI) bagi Kundasang, Sabah menunjukkan skor keseluruhan adalah (3.40) pada tahap yang dapat diterima. Disamping itu, Kad Skor Daya Tahan Bencana Komuniti Torren bagi Kuang, Selangor memperoleh skor keseluruhan 93.63 (64.57 peratus) dengan beberapa petunjuk tinggi dalam komponen keterhubungan. Penemuan ini diselaraskan bagi pembentukan rangka kerja operasi, yang telah disahkan oleh pakar DRR dan pihak berkepentingan. Analisis indeks diadaptasi untuk menentukan kesesuaian komponen kerangka bersepadu, yang terdiri dari lapan komponen: (1) mengumpulkan maklumat bahaya masa lalu dan semasa; (2) menangani risiko bencana; (3) mengadakan rancangan DRR dengan pihak berkuasa; (4) mengembangkan rancangan tindakan bencana komuniti; (5) mengutamakan langkah-langkah DRR; (6) memperuntukkan belanjawan; (7) melaksanakan langkah-langkah DRR; dan (8) menubuhkan pasukan tindak balas kecemasan komuniti. Kajian ini mendorong paradigma baharu untuk mengembangkan komuniti yang berdaya tahan serta mewujudkan Strategi Daya Tahan DRR Tempatan di Malaysia selaras dengan Sasaran E dalam SFDRR. Dengan faktor-faktor seperti iklim yang melampau, perbandaran pesat, kemerosotan alam sekitar, dan keunikan lokaliti, kajian ini akan mengukuhkan tadbir urus risiko melalui Jawatankuasa Pengurusan Bencana di peringkat daerah dan negeri, memperkasakan juara tempatan dalam DRR, serta membina kapasiti tempatan yang mempunyai komuniti berdaya tahan bencana.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AADMER	-	ASEAN Agreement on Disaster Management and Emergency Response
ADRC	-	Asian Disaster Reduction Centre
AHA Centre	-	ASEAN Coordinating Centre for Humanitarian Assistance
ADPC	-	Asian Disaster Preparedness Center
ASEAN	-	Association of Southeast Asian Nations
ASEAN-UN	-	Association of Southeast Asian Nations – United Nation
BNPB	-	*Badan Nasional Penanggulan Bencana Indonesia*
BRC	-	Building Resilient Communities
BOMBA	-	Malaysia Fire and Rescue Department
CBDM	-	Community-Based Disaster Management
CBDRM	-	Community-Based Disaster Risk Management
CBDRR	-	Community-Based Disaster Risk Reduction
CCA	-	Climate Change Adaptation
CDERT	-	Civil Defence Emergency Response Team
CDMC	-	Central Disaster Management Committee
CDRI	-	Climate Disaster Resilient Index
CFE-DMHA	-	Center for Excellence in Disaster Management and Humanitarian Assistance
COVID-19	-	Coronavirus disease (COVID-19) pandemic
CPX-Idaman	-	Command Post Exercise Taman Idaman, Serendah
CRED	-	Centre for Research on the Epidemiology of Disaster
CSOs	-	Civil Society Organizations
CSD	-	Commission on Sustainable Development
DDMC	-	District Disaster Management Committee
DID	-	Department of Irrigation and Drainage Malaysia
DRM	-	Disaster Risk Management
DRR	-	Disaster Risk Reduction
EM-DAT	-	Emergency Events Database
EMT	-	Emergency Management Training

ERP	-	Emergency Response and Planning
ERT	-	Emergency Response Team
EUoA1	-	Embedded Unit of Analysis 1
EWS	-	Emergency Warning System
FGD	-	Focus Group Discussion
GDP	-	Gross Domestic Product
GFDRR	-	Global Facility for Disaster Reduction and Recovery
GIS	-	Geographic Information System
HADR	-	Humanitarian Assistance and Disaster Relief
HFA	-	Hyogo Framework for Action
HiCBDRR	-	High Impact Community-Based Disaster Risk Reduction
ICT	-	Information and Communications Technology
IDNDR	-	International Decade for Natural Disaster Reduction
IDRM	-	International Workshop and Field Practice on Disaster Risk Management
IoT	-	Internet of Thing
IPCC	-	The Intergovernmental Panel on Climate Change
JKKK	-	*Jawatankuasa Keselamatan dan Kemajuan Kampung*
JMG	-	Department of Mineral and Geoscience Malaysia
JKM	-	Department of Social and Welfare Department
JPOI	-	Johannesburg Plan of Implementation
KM	-	Kilometre
LiDAR	-	Light Detection and Ranging
MCDF	-	Malaysia Civil Defence Force
MCO	-	Movement Control Order
MDCH	-	Majlis Daerah Cameron Highlands
MERCY Malaysia	-	Medical Relief Society Malaysia
MERP	-	Master of Emergency Response and Planning
MPKK	-	*Majlis Pengurusan Community Kampung*
MTCP	-	Malaysia Technical Cooperation Programme
MyIPO		Intellectual Property Corporation of Malaysia
NADMA	-	National Disaster Management Agency Malaysia

NGOs	-	Non-Government Organizations
NKVE	-	New Klang Valley Expressway
NPP-3	-	National Physical Plan 3
NPPC	-	National Physical Planning Council
NSC	-	National Security Council
NSMP	-	National Slope Master Plan
PBRC	-	*Projek Penghasilan Peta Bahaya dan Risiko Cerun*
PDA	-	Post-Disaster Analysis
PLANMalaysia	-	Federal Department of Town and Country Planning Peninsular Malaysia
PWD	-	Public Work Department of Malaysia
RFN	-	*Rancangan Fisikal Negara*
RII	-	Relative Importance Index Analysis
RM	-	Ringgit Malaysia
RO	-	Research Objective
RQ	-	Research Question
SAR	-	Search and Rescue
SASOP	-	Standard Operating Procedure for Regional Standby Arrangements and Coordination of Joint Disaster Relief and Emergency Response Operations
SDGs	-	Sustainable Development Goals
SDMC	-	State Disaster Management Committee
SDMU	-	Selangor Disaster Management Unit
SFDRR	-	Sendai Framework for Disaster Risk Reduction
SMART	-	Special Malaysia Disaster Assistance and Rescue Team
SOP	-	Standard Operating Procedure
SPSS	-	Statistical Package for the Social Sciences
SSCC	-	Smart Selangor Command Centre
SSDU	-	Smart Selangor Delivery Unit
TDRM	-	Total Disaster Risk Management
UMS	-	Universiti Malaysia Sabah
UMP	-	Universiti Malaysia Pahang
UPM	-	Universiti Putra Malaysia

UN	-	United Nation
UNDP	-	United Nations Development Programme
UNDRR	-	United Nations Office for Disaster Risk Reduction
UNESCO	-	United Nation Educational, Scientific and Cultural Organization
UNFCCC	-	United Nations Framework Convention on Climate Change
UNISDR	-	United Nations International Strategy for Disaster Reduction
USD	-	United States Dollars
USGS	-	United States Geological Survey
UTM	-	Universiti Teknologi Malaysia
WRI	-	World Risk Index
WSSD	-	World Summit on Sustainable Development

LIST OF SYMBOLS

e	-	Level of Error
f	-	Integration
n	-	Sample Size
A	-	Human Activity
D	-	Damage
E	-	Exposure
H	-	Hazard
N	-	Population Size
T	-	Time
V	-	Vulnerability
R	-	Resilient
Re	-	Reynolds Number

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Disaster events have resulted in the destruction of the property and the deplorable cause of the loss of human life. Economic losses suffered by the country affected by the disaster will undermine to achieve the 17 Sustainable Development Goals (UN, 2015a). The Asian Development Outlook 2019 report stated that from 2000 to 2018, more than four out of five people in the developed countries in Asia are affected by the disaster (ADB, 2019). Malaysia is also no exception to the threat of natural hazards such as flood, landslide, tsunami and earthquake (Khailani and Perera, 2013; Mat Said et al., 2011; Ooi and Ting, 2012). This catastrophic event has resulted in disruption to the daily lives of the locals. Property destruction, disease outbreaks, economic disturbances, and family deaths will have a negative impact on their lives. For example, one of the biggest natural hazards that has ever hit Malaysia is the flood in the East Coast of Peninsular Malaysia at the end of 2014 and early 2015. This has resulted in more than three hundred thousand people being evacuated. The 6.0 magnitude earthquake in Ranau, Sabah in June 2015 has resulted in hundreds of Mount Kinabalu climbers trapped, while 18 people died. The impact of this disaster has not only changed the local demographics but has also left long lasting trauma to the local community as well as the families of affected victims.

With the rising frequency of disaster occurrences and the destruction caused by their consequences, there is an urgent need to build a resilient community capable of coping, dealing with, and managing disaster impacts (Nakamura et al., 2017). Besides, since the end of 2019, an emergency has hit the world with the spread of Coronavirus disease (COVID-19) which has paralyzed social and economic sectors. It is also related to handling methods with new norms and strict compliance with standard operating procedure (SOP) to contain the spread of COVID-19 pandemic.

According to the Department of Statistics Malaysia (DOSM) statistics for the third quarter of 2020, Malaysia's GDP fell to 2.7 percent from 4.4 percent in the same quarter of 2019 (DOSM, 2020a). With this constraint, disaster management certainly needs a drastic change especially in ensuring the welfare of disaster victims is taken care of and SOP compliance to prevent transmission COVID-19 outbreaks among disaster victims.

The relevance of disaster risk management (DRM) capacity development for disaster resilience is definitely acceptable. It is a positive and obvious step forward in achieving a prepared, equipped, and resilient community. Improved social and organisational factors, such as increased wealth, widespread provision of disaster insurance, social network improvement, increased community engagement and participation, and local understanding of risk (Cutter et al., 2008), as well as improvements in natural system resilience, may help to reduce disaster impacts (Cutter et al., 2008). Communities in Malaysia should enhance their disaster resilience in the case of natural disasters. It might be accomplished by improved communication and cross-community cooperation, as well as by utilising chances to compare their planned, actions, and reactions to those described in research publications. Furthermore, connecting their community disaster management with internationally recognised best practises while recognising the necessity to adapt such methods to local contexts (Mohamed Ludin et al., 2016).

Disaster resilience is defined as a community's ability to proactively prevent disasters and in the event of weathering a disaster (Arbon, 2014; Chaskin, 2018). Capabilities to prevent damage from deteriorating and to implement restoration procedures through raising disaster resilience awareness among the community and building close relationships within the community. For the period between 2015 and 2030, the SFDRR has embraced a concept shift from disaster management to risk management. (UNISDR, 2015). In this regard, this research is founded on the understanding that environmental changes are unavoidable and have influenced the livelihoods of many individuals and communities despite numerous challenges and difficulties. Some communities can persevere and be resilient in times of disasters and uncertainties. Therefore, it is an important step to thoroughly examine the elements

which contribute towards building a resilient community hence contributing towards the achievement of a sustainable development agenda in the near future.

1.2 Problem Statement

1.2.1 Introduction

The world has suffered about USD 2.97 trillion economic losses and recorded 1.23 million people dead meanwhile more than 4.03 billion affected by the disaster, between 2000 and 2019 (CRED, 2020a). Although Malaysia is not a country listed in the Pacific Ring of Fire area, the impact of natural hazards is still felt as a result of some of the catastrophic events in neighbouring countries such as Indonesia and the Philippines. According to the National Disaster Management Agency (NADMA) Malaysia (2017), the country is not spared from the threats of existing natural hazards such as floods, landslides, droughts, storms, tsunamis and earthquakes. In addition, several incidents of human-caused disasters occur frequently such as haze, flash floods, forest fire and industrial disasters. Since then, the global warming situation as stated by the International Panel on Climate Change (IPCC), the expected increase of 1.0 Degrees Celsius was contributed by human activity above the pre-industrial level. This situation leads to global warming, which is expected to reach 1.5 degrees Celsius by 2052 (IPCC, 2018).

Furthermore, vulnerability to a variety of climate-related disasters has been amplified in recent years, owing in part to climate change. Weather extremes are becoming more frequent and more intense. Hazards become disasters when they harm vulnerable populations. A typhoon, for example, might travel across three Asian countries (Philippines, Indonesia and Malaysia) and have different impacts in each. The degree of its influence is determined by vulnerability. Disaster risk reduction (DRR) must overcome vulnerability in order to succeed in developing a resilient community. Based on the current global situation, the implementation of efficient disaster management efforts with emphasis on DRR approach is becoming increasingly important and critical (UNDRR, 2017). It is not only to reduce the risk of

fatality, property damage and economic loss, but it is important for the development of a disaster resilient community (UNISDR, 2012). Efforts to improve the level of disaster resilience are not a new thing to introduce, but it has already been adapted to the consensus within the Yokohama Strategy and Plan of Action for a Safer World: Guideline for Natural Disaster Prevention, Preparedness and Mitigation 1994-2000 that adopted in 1994 (UN, 1994) and the Hyogo Framework for Action 2005- 2015 (UNISDR, 2005). However, some previous studies have indicated that emphasis on implementing DRR has been adopted before the Yokohama Strategy and Hyogo Framework are introduced (Aitsi-Selmi et al., 2015; Djalante, 2012; Cohen et al., 2017; Khalili et al., 2015). Mainstreaming the DRR approach in society needs to be further streamlined with the involvement of all stakeholders and local communities. Various angles need to be looked at collectively in ensuring the safety of the community. Izumi et al. (2019) have listed 30 innovations in DRR that include holistic activities and approaches based on the direct involvement of the local communities.

As well as the enhancement of efforts towards adapting DRR approaches and mitigation efforts to enable local communities to cope with the many types of natural hazards they face, could be observed from various sites, ongoing and prospective developments effort globally as well as local government initiatives on DRR. Nonetheless, among the major gaps identified are the lack of study that identifies the influential factors for community resilience and the absence of a DRR framework that can guide the actions of the local communities in dealing with natural hazards. With the lack of inputs and information on the resilience of the local community and their ability to raise above adversity, the ‘build back better’ concepts or post disaster and recovery process will take longer (UNDRR, 2017; Orendain et al., 2019). It also makes it harder for local communities as a whole to become resilient.

1.2.2 Lack of Understanding and Implementation of Resilient Community

Given rapid urbanisation, environmental degradation, and extreme weather, it is critical for us to improve disaster preparedness by analysing our increased exposure and vulnerability to natural hazards. Malaysia's urbanisation rate is expected to reach

up to 85 percent by 2040, with a population of over 46 million (Statista, 2020). The concept of a resilient community has become a key priority at all levels of the global, regional, national, and local levels in all business planning and development strategies as outlined in the SFDRR and Sustainable Development Goals (SDGs) for DRR. The emphasis on the ability of the community to build stronger after the disaster becomes the major plan for each level. The 2030 Agenda for SDGs provides a new global policy for all countries and stakeholders, as a blueprint for action for achieving sustainable development. DRR is included in 10 of the 17 SDG Goals, with 25 targets, as a key development strategy.

Although so many DRR initiatives are held at various levels, the concept of a resilient community is still loosening its implementation involving local authorities as well as local communities. Therefore, the concept of a resilient community should be reinvigorated by creating 'DRR local champions' who are able to mobilize the community together in managing the DRR more effectively. The community-led DRR-driven movement is capable of enhancing the local community's disaster resilience against any disaster risk, whether they are able to accept the risk, reduce the risk, transfer the risk or avoid the risk (Jacobs et al., 2018; Sheehan, 2010). The implementation of a resilient concept into a local stakeholder needs to consider the local community capability, areas – geographical factors, and coordination management organization (Hu and Kapucu, 2016). The need for support from various angles for planning, implementation and evaluation in enhancing the concept of resilient community by enhancing communication networks in DRR as well as the involvement of all stakeholders (Djalante, 2012; Ruiz-Rivera and Melgarejo-Rodríguez, 2017).

Review of literature also indicated a research gap which highlighted in The National Disaster Management Policy and Mechanism for National Disaster and Relief Management is based on National Security Council Directives No. 20 - Policy and Mechanism of National Disaster Management and Relief (NSC Directive No. 20) with emphasis on the implementation of operations before, during and after the disaster. As well as outlining the operational directives or guidelines, the mitigation and preparedness elements are also taken into account to ensure the community is always

resilient to the disaster. Meanwhile, PLANMalaysia identified seven (7) key components for building Malaysia's cities that are resilient towards reducing disaster (Jamaludin and Sulaiman, 2018). Three of them are addressed by PLANMalaysia i.e. (i) the shared information; (ii) strong partnership; and (iii) fragmented and less coordinated initiatives. While remaining four (4) other key components namely social wellbeing, community-based process, community's connection to a place and community resilience, have not been thoroughly explored. Therefore, comprehensive research on building resilient communities is needed to fill the gap as mentioned by the NSC Directive No. 20 and PLANMalaysia, hence providing crucial inputs on the current trend on community resilience. From the point of view of the present study, the works carried out by the NADMA starting 2015, appear to focus on promoting responses phase and hard-measures mitigation activity (top-down approach), rather than the soft-measures activity on DRR (bottom-up approach). In accordance with the mandate for the formation of NADMA Malaysia, disaster management is regarded as being limited to the national level until district level. This gap provides a strong justification for this research to be carried out in order to address the issues involving the community in DRR hence connecting every level of stakeholders in disaster management.

1.2.3 Un-proportionate of DRR Approaches Between Stakeholders and Community in Building Resilient Community

Aware of the importance of disaster resilient concepts among all stakeholders at the federal, state and district level, starting 2015, national disaster management portfolio's under the responsible of NADMA Malaysia provides an official platform for the implementation of the DRR initiatives in Malaysia comprises of preparedness, prevention or mitigation, responses, and recovery phase (Shaluf, 2007; Rahman, 2012). Malaysian National Platform and Action Plan for Disaster Risk Reduction, known as myDRR, set up in 2013, is a nationally owned and led multi-stakeholder forum working on DRR. It reflects on federal government efforts and commitments to jointly implement DRR (top-down approach) and linkage globally (Bolanos et al., 2018). NADMA also serves as the Central Disaster Management Secretariat,

coordinated by the Central Disaster Management Committee chaired by the Honourable Prime Minister of Malaysia. Cooperation and coordination between various stakeholders at the federal, state and district levels in disaster management has been well implemented, based on their respective roles outlined in NSC Directive No. 20 (Chong et al., 2018). In addition, each agency involved has its own SOP that leads to the expertise of their respective agencies. However, the direction, command and control of the disaster management in NCS Directive No. 20 is stated only from the central, state and district levels only. Involvement at the community level is still seen as a void, and it needs to be given due attention. It could be seen that there is missing focus on the efforts to build and engage the disaster resilient community. But this effort has not been clearly understood until the grassroots, and requires a more comprehensive planning action plan especially to the local community.

Interview with relevant disaster management officials from NADMA, MCDF and Selangor Disaster Management Unit (SDMU), and also from technical agencies i.e. Department of Mineral and Geoscience Malaysia (*Jabatan Mineral dan Geosains Malaysia*, JMG) and Federal Department of Town and Country Planning (PLANMalaysia) were conducted by the researcher in 2018 to gather information about acknowledgment of government agencies on their role and the local community's preparation as the first responders during disaster (Che Mamat, 2018; Ismail, 2018; Mohd Yusof, 2018). Among the findings from the interview indicated that government agencies acknowledged the importance of the local community as the first responders and their roles in emergency response and mitigation, hence they need to be equipped and be more prepared in overcoming the complexity of emergency or disaster. This indicates that the local communities' active participation is vital in a DRM. Besides, building a resilient community is one of the focuses or strategies in reducing disaster risks and enabling better coping to future disasters. This is in line with the gap identified by NADMA and PLANMalaysia, previously discussed in section 1.2.2, which highlights the need to strengthen community resilience. These findings therefore justify the need for the present study to address the gaps of low resilience among community and awareness about the importance of DRR (Che Mamat 2018; Chong et al., 2018).

The review of literature also looked into the current initiatives for enhanced local community organization on managing the disaster under the establishment of Civil Defence Emergency Response Team (CDERT), which was initiated by Malaysia Civil Defence Force (MCDF) in 2016. CDERT establishment basically involves the local communities based on DRR bottom-up approach (MCDF, 2017a). Besides, MCDF responsible as the Secretariat of Disaster Management at the state and district level, has provided guidance on governance under the State and District Disaster Management Committee (MCDF, 2017b). MCDF is an agency at the federal agency directly involved in giving awareness and training for the community as stated in Malaysia Civil Defence Force Act 1951 (Act 221) – Section 7D.

> *'The Minister may from time to time make arrangements for the civilian population to be trained in matters of civil defence and for the conduct of exercises for the purposes of civil defence.'*
>
> (MCDF, 2015, p. 4)

MCDF aims at the establishment of a comprehensive CDERT across all targeted groups of people or organizations. However, the implementation of CDERT is not yet comprehensive to all communities in the country (MCDF, 2017c). CDERT convergence is directed at communities at risk or vulnerable to disaster risk. The review of CDERT however, it is not explicitly discuss the agenda for resilience community and/or highlighting any issues related to planning for resilient community event though there is an urgent need for the MCDF to initiate their plan by including the agenda for building resilient community in every administrative level (local community-, district-, state- and national level).

Review of the Slope Hazard and Risk Mapping project (*Projek Penghasilan Peta Bahaya dan Risiko Cerun*, PBRC) developed by the Department of Minerals and Geoscience Malaysia (JMG) is an initiative for reducing disaster risk of landslides. It's the result of a collaboration between experts and implementers, as well as stakeholder involvement and methods from many disciplines, in order to manage increasingly complex slope risks (JMG, 2017). After several years of implementation of the PBRC, the justification for reviewing with external or international experts is necessary to

gain a different perspective from third parties so that the use of PBRC could be improved and developed in the future. Co-engagement between the community and scientists need to be in place for this PBRC project to enhance the community's initial response to disaster (Community-Based Disaster Risk Reduction, CBDRR) capability and also as an added value to the local community's capacity to disaster management. From the physical planning point of view, the PLANMalaysia have started to highlight the importance for incorporating community resilient towards reducing disaster into the city planning and development plan discourse especially for preparation of the multi level administration at local-, state- and national-level (Khailani and Perera, 2013; PLANMalaysia, 2016).

In other initiatives, Melaka City was selected to join the 100 Resilient Cities to build sustainable cities in addressing increasing urbanization challenges, especially due to climate changes (Jamaludin and Sulaiman, 2018). Melaka City was chosen among 325 entries from 80 countries based on the readiness, capability and need to make a city resilient. Other selected cities i.e. Cape Town, South Africa; Jakarta, Indonesia; Seoul, South Korea; Toronto, Canada; and many more. This Melaka Resilient involves four (4) core areas: traffic and public transport; UNESCO heritage areas; water management; and public health (Mohd Ali, 2017). This effort is crucial for development, not only involving disaster resilient cities, but social components are also emphasized to ensure the preparedness of communities to address disaster risk.

Meanwhile at the state level, State of Selangor was the premier state in Malaysia that had a strategic plan '*To become the premier Smart State in ASEAN by 2025*', which listed Smart Disaster Management as the once of their twelve Focus Domains of Smart Selangor (SSDU, 2016a). This Smart Disaster Management enables the setup of Smart Selangor Command Centre (SSCC) with the target of beneficiary to State Government; Municipalities and District Officers; and citizens, from the SSCC Four Key Elements. The Selangor Smart initiative is beneficial for the enhancement of the quality of government service delivery which is more systematic and effective, but emphasis on the community's involvement in disaster risk reduction programs is less emphasized and requires more holistic action by the state government in the future (Kamarudin and Razak, 2018).

PLANMalaysia through its 12 branches (Peninsular Malaysia) in the state level already have a State Structure Plan that stated the policy and strategic planning with regard to the development and land used within urban and rural areas (PLANMalaysia, 2013a). This State Structure Plan emphasizes on the aspects of sustainable physical development planning to improve socio-economic and state governance levels, as well as translating the National Physical Plan 3 (NPP-3) policy by giving a priority to systematic and planned state land use and development (PLANMalaysia, 2016). This plan also does not ignore the precautionary and control factors for physical development that emphasizes sustainable elements in all aspects of modernization. Yet there is still room for this NPP-3 to be involved with the beneficiaries, the local community, which may be involved in disaster management and planning for the resilient cities in Malaysia.

At the local level, the Local Plan for Cameron Highland District was the first local plan report to mainstream disaster resilient attributes prior to the tragedy of landslide and mudslide occurred in November 2014 which has killed 3 people (MDCH, 2015b). This District Local Plan is a result of revised existing guidelines with improved land use planning and development which emphasized disaster resilience and reduced the risk of geological disasters in Cameron Highlands. This District Local Plan is also particularly emphasized for application by all local authorities at the district level, as a guideline containing detailed plans that translate the policies and general planning of development and land use contained in the State Structure Plan (PLANMalaysia, 2013b). Review of literature acknowledges the establishment of various initiatives related to DRR, including the initiatives on community-based disaster risk management (CBDRM) (CFE-DMHA, 2015, 2016; Zahari and Ariffin, 2013).

However, there is a gap or missing link since the element of community resilience was not emphasized clearly under the mentioned plan/procedure/guideline for DRR in Malaysia. A critical review on selected tools for assessing community resilience showed that there are 36 assessment tools developed by the governmental and non-governmental organizations and academic researchers to assess resilient communities as a whole system (refer to Appendix A: Basic Information Related To

the Selected Community Resilience Assessment Tools). Sharifi (2016) stated that from the 36 assessment tools, only 13 assessment tools were mainly developed by the international donor organizations in Australia, Canada, Japan, Africa, Korea, Saudi Arabia and South East Asia (including Malaysia). The significant finding from literature which justified the need for this research conducted is that, there is still a lack of community-based assessment tools developed or adopted by the local and community level. Especially in the developing countries based on the understanding and knowledge of the local geography and local culture context. Although conceptual models and assessment tools for resilient communities have been established globally, the absence of a local disaster resilient community would impede the monitoring of progress towards community recovery and rehabilitation phase – for them to 'build back better' (UNDRR, 2017). While the stakeholders have opted for a top-down approach (Chan, 2015; Parsons et al., 2016), a bottom-up – community-based approach is needed to ensure that the targeted community would agree to support and respond well to DRR programs or activities. This statement corresponds to the researcher's findings from the interview with agency officials (discussed in the previous section).

Therefore, building community resilient required a transdisciplinary approach from various angles of multi-stakeholder in the disaster risk management (Davies et al., 2015; Djalante, 2012; Gaillard J.C., 2013; Raungratanaamporn et al., 2014; Jabar and Lamberte, 2017). As noted, the local community possesses the local knowledge and social capital but shows limitations as the first responders following the lack of logistic support and equipment. Furthermore, community-level actors cannot always be left alone to guide their own resilience pathway with minimal assistance by the local stakeholder. This could be an ideal opportunity to build a resilient community towards reducing multi-hazard disaster risk in Malaysia, especially through an exploration research on a legitimate strategy and framework cross multi-stakeholder and through the incorporation of inputs from community-based perspectives.

1.2.4 Absent of Disaster Risk Reduction Framework for Resilient Community in Malaysia

Recent disasters and global reports show an increasing trend in the intensity and frequency of natural hazards, which have caused massive loss of life and damaged to properties. The vulnerability of communities to future disasters, and their capacity to cope and adapt to future natural hazards are questionable. Globally, the establishment of the United Nation Office for Disaster Risk Reduction (UNDRR), formerly known as the United Nation International Strategy for Disaster Risk Reduction (UNISDR), in 1999 was responsible for supporting and implementation of DRR context. An intense effort has been undertaken since the beginning, and in 1990, it was introduced with United Nation International Decade for Natural Disaster Reduction (IDNDR) 1990-2000, followed by Yokohama Strategy and Plan of Action for a Safer World: Guideline for Natural Disaster Prevention, Preparedness and Mitigation in 1994.

UNISDR in 2002 had developed guidelines on flood mitigation that implement the DRR concept and oriented to the needs of the decision-maker and provide a description of the range of mitigation options that need to be considered when making efforts to reduce losses from flooding (UNISDR, 2002). In 2002 the representatives of 191 governments gathered in Johannesburg, South Africa for the World Summit on Sustainable Development (WSSD) for the Johannesburg Plan of Implementation (JPOI), to reinvigorate the world's peoples toward true sustainable development (UN, 2002). These JPOI were extended review on CSD-112003 to put in place the stakeholders participation in intergovernmental matters on DRR implementation to address the new challenges and opportunities, and share lessons learned and best practice (CSD, 2003). UNISDR, currently known as UNDRR, is in charge of implementing the Hyogo Framework for Action (HFA) 2005-2015 and Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030, as well as its follow-up and monitoring. For Asian countries, implementation of the SFDRR is supported by the Asian Disaster Reduction Centre (ADRC) with the mission to enhance disaster resilience, building safe communities, and creating societies that practice sustainable development (ADRC, 2019). ADRC is an independent regional non-profit

organization, promoting resilient and enhanced capacity building of people and institutions to disaster and climate change impacts, amongst the country members. Malaysia is one of the member countries for the ADRC which is actively working on the systematic strategy to implement the DRR approach to its people.

With a strong commitment to translate the international and regional level of DRR strategies into the Malaysia context, the federal government has made amendments to the National Policies and Mechanisms of National Disaster Management and Relief (NSC Directive No. 20) (Rahman, 2012). The reviewed NSC Directive No. 20 will incorporate a new dimension on Disaster Management and is considered a Total Disaster Risk Management (TDRM) which embraces new clauses such as prevention, mitigation, preparedness other than the response and recovery. The NSC Directive No. 20 to be able to consolidate all the components of TDRM in facing disaster events for a more comprehensive approach (Khairilmizal et al., 2016). Moreover, it is concurred that the additional legislations, mandates and standard operating procedures should be made accessible to oversee and regulate specific types of disaster response (Chan, 2015; Khairilmizal et al., 2016).

As well as outlining the operational directives or guidelines, the mitigation and preparedness elements should be taken into account to ensure the community is always prepared and resilient to the future disaster (UNISDR, 2009). Members of the Committee specified in the NSC Directive No. 20 have duties and responsibilities in planning, implementing and evaluating based on the SOPs of their respective agencies. However, it could be seen that the NSC Directive No. 20 only emphasis on the implementation of operations before, during and after the disaster, and mostly focusing on promoting responses phase and hard-measures mitigation activity (top-down approach), rather than the soft-measures activity on DRR (bottom-up approach). Community involvement in a bottom-up approach is not emphasized in any of these directives and SOPs (Chan, 2015). Given this point, there is a gap in formulating a responsive policy and strategy that can promote a community resilient towards preventing future disaster risk. The integration of every level of stakeholders with disaster management knowledge and aspiration in a DRR has yet to be considered and interconnected (Gaillard J.C., 2013; Skarbek, 2014). In light of this shortcoming, an

establishment of a community that is resilient towards preventing future multi-hazard disaster risk based on a community-centric (bottom-up approach) framework would complement the existing top-down approach and practices by the government and relevant agencies (Baudoin et al., 2016; Aguiñaga et al., 2018; Mercer et al., 2010; Parsons et al., 2016).

The review of literature indicated that various frameworks, models, and tools from various countries on local research finding on community resilience have been developed, and improved, including the embrace (Kruse et al., 2017); PEOPLES Resilience Framework[1] (Renschler et al., 2011); DROP[2] (Cutter et al., 2008); Big Data (Abdullah et al., 2017), Delphi study (Alshehri et al., 2015); and climate disaster resilience index (CDRI) (Wan Mohd Rani et al., 2018); National Slope Master Plan (NSMP) (Gue See-Sew, 2009) etc. Among the common features or elements in these frameworks/models are the involvement of community resources/ capitals/ capacity and processes in the building of resilient communities (Chong et al., 2018). This indicates the importance of the resilience community framework/model as a tool for translating a policy to implementation at the local level, particularly among communities (see Kruse et al., 2017; Renschler et al., 2011; and Chong et al., 2018).

As stated, the CDRI has been expanded to the 12 cities in Malaysia, based on an international model that has been implemented at Kuala Lumpur (Wan Mohd Rani et al., 2017). The review of literature also found that similar observations did not occur in the Malaysian context, particularly for the resilience of a local community. The review of the existing framework/model provided a better understanding of the future framework that can suit the local needs and conditions. The review on the NPP-3 indicates that the policy addresses effective disaster risk management through two strategies: (1) preparing an effective disaster risk management system; and (2) increasing the preparedness level of the government agencies and local communities

[1] PEOPLES: Population and Demographics, Environmental/ Ecosystem, Organized Governmental Services, Physical Infrastructure, Lifestyle and Community Competence, Economic Development, and Social/Cultural Capital
[2] DROP: disaster resilience of place

(PLANMalaysia, 2017b). By highlighting the involvement of 'DRR local champions' among the local community in DRM, a resilience community framework/model could be used to guide the local community to actively engage and better respond to disaster events.

1.3 Research Questions

To address the research problems, issues, and challenges, below are some research questions, as follows:-

(a) What is the concept of the resilient community to multi-hazard disaster?

(b) What are the social and natural or environmental capitals for resilience which are currently possesed by communities in the study areas?

(c) How social related resilient indicators can take in place for understanding current risk and preparing future risk?

(d) How to determine the state of resilience using community capitals assessment?

(e) How to establish/formulate disaster resilient community integrated DRR framework that support local needs and conditions via incorporation of community capital, key drivers and key deliverables?

1.4 Research Objectives

The aim of the research is to determine the economic, social and natural or environmental capitals of a resilient community towards reducing multi-hazard disaster based on a top-down (government agencies and non-government organization) and bottom-up (local stakeholders) inputs. Results from the assessment of community capitals together with the key driven factors of resilience identified incorporated in formulating an operational framework for community resilient DRR towards

preventing future disaster risk in Malaysia. The research goals and objectives were listed below:

(a) To investigate the existing approach on community-based disaster risk reduction models or frameworks at international, regional and national level;

(b) To analyse community resilience capitals for multi-hazard disaster; and

(c) To develop an integrated community based multi-hazards disaster risk reduction framework in Malaysia.

1.5 Scope and Limitation of the Research

1.5.1 Scope of Research

The clarification of resilient community concepts consists of community capitals, key drivers and form of deliverables of resilient communities. To be carried out through review of relevant literature on resilient community concept towards reducing multi-hazard disaster, and how it can be related to the sustainable development theory in achieving sustainable development. Based on the review on literature, the researcher was able to critically evaluate the current frameworks/models of community resilience in developed and developing countries, which are prone to multi-hazard, and the researcher was also able to identify factors that contribute to community resilience. Various inputs from the literature review as presented in Chapter 2, were incorporated into the modification and improvement of a set of indicators and conceptual framework for a resilient community.

Data collection methods in this study is based on the list of specific selection criteria in order to ensure that the most suitable study cases are selected to meet the research objectives, and with careful consideration on research limitations, such as the Movement Control Order (MCO) issued by the government to halt the spread of the Coronavirus disease (COVID-19) pandemic. To enhance research credibility, a

screening process was implemented to identify and select a group of expert/government officials to be involved in experts' interviews for validating the framework. Quantitative data were obtained through a survey using a questionnaire targeting local stakeholders and community leaders. The survey requested information on profile study areas, respondents' perceptions of local disaster experiences and DRR practices, community capitals, key drivers, and key deliverables for a resilient community. The quantitative data analysis involves assessing the level of community capitals, and prioritizing the factors that lead to a resilient community. The data from the questionnaire survey were analysed using Statistical Package for the Social Sciences (SPSS), and the determinants for community resilience were chosen and ranked using the Relative Importance Index (RII).

The validation process for the community resilient DRR framework was carried out through face-to-face interviews with local informants and a group of experts in the area of DRR. The inputs, feedback, comments and consensus from experts during the validation stage include community capitals, key drivers and key deliverables. It is fundamental that the framework and factors are confirmed by the expert for the purpose of confirmation and generalization. The framework needs to be comprehensible and applicable by the local community in the future under the leadership of their local leaders.

1.5.2 Limitation of Research

Difficulties to obtain comprehensive cooperation from respondents during gathering of data on the fields. This may be due to the time constraints of respondents to participate in the interview sessions or surveys. Most of the respondents consisted of the secretariat, participants and players in the implementation of activities and community-based programs. Moreover, it is quite difficult to determine the selection of respondents who are truly committed to the survey. Especially for the target group of locals who are involved in community-based activities or programs. This is because locals are randomly invited to attend community-based activities or programs

organized. Besides, another challenge was first detected during the initial site visit session to the study area.

Preliminary discussions with local community leaders found that there was a current local leader election conflict. This is due to the change in the reins of local political leadership and the current government. Lack of local political stability has to some extent hampered the data collection process. The propagation of the COVID-19 pandemic has made face-to-face data gathering activities impossible at the end of the data collection procedure. This has resulted in the postponement of a series of meetings with respondents and experts for the validation process, which has resulted in longer periods of data collection.

1.6 Organizations of Thesis

This study is divided into five chapters, beginning with an outline of the implementation (Chapter 1), followed by an explanation of the issue description, research questions, and research goals. The notion of a resilient community in the context of catastrophe risk reduction is then explained (Chapter 2). The study's workflow was detailed in full in Chapter 3: Research Methodology. The collected field research data was evaluated and reviewed in Chapter 4 before the study result was detailed in the development of an operational model for a community resilient DRR framework in Chapter 5. The discussion is concluded with a summary and recommendations (Chapter 6). Figure 1.1 shows an overview of the thesis organization in this study.

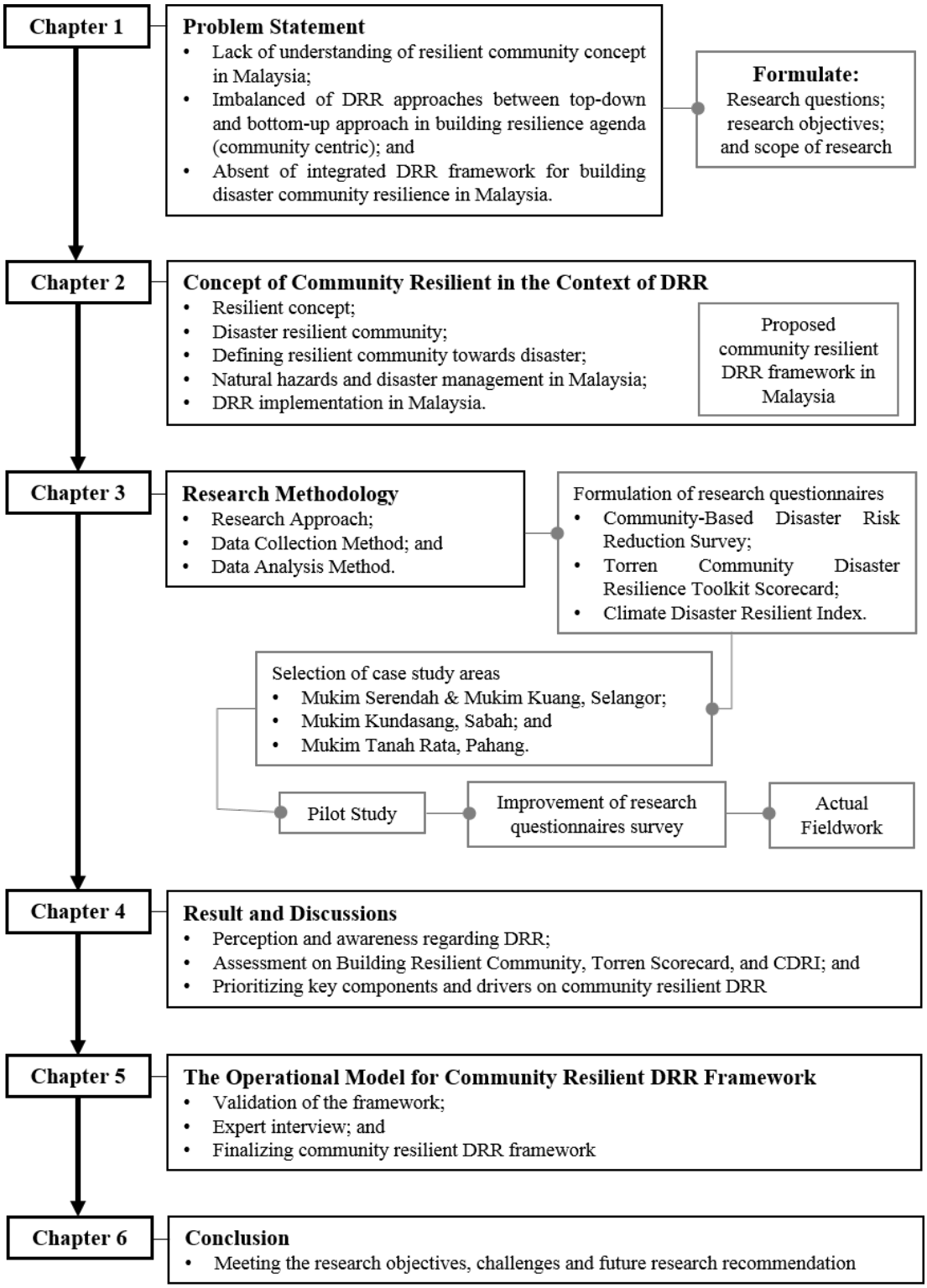

Figure 1.1 Organization of research

Chapter 1 – This chapter introduces the background of the study and states the statements of research problems and research questions, and research objectives in sequence.

Chapter 2 – This chapter provides a review of the related to the relation between climate change and disaster impacts; concept of resilience; disaster resilience; community resilience frameworks / models towards reducing disaster; local knowledge; disaster management cycle; adaptive capacity; social safety nets; integration of help network for disaster resilience (self-, mutual- and public-help); top-down and bottom-up approaches. This chapter provides an overview of the disaster risk reduction (DRR) initiatives in Malaysia; as well as the implementation of DRR in physical planning and disaster management agencies; as well as current DRR policy, disaster risk reduction policy and implementation, and disaster management in Malaysia.

Chapter 3 – This chapter provides detailed explanations on the methodology based on the review in Chapter 2. The chapter also describes the data collection techniques, data collection procedure, data analysis, triangulation, validity and reliability. Chapter 3 also describes the background of study areas.

Chapter 4 – This chapter describes the profile of the respondents, assessment and analyses the community resilience by using multiple tools / survey, analyses and synthesizes the perception and awareness on local DRR practices, assessment of community capitals for resilience, and perception on factors for disaster resilient communities. Using the relative importance index (RII), the key components and drivers to disaster resilient communities were identified.

Chapter 5 – Analysis and synthesis of the experts review of the proposed framework including the implementation process of the community resilient DRR framework.

Chapter 6 – This chapter provides the conclusion on the achievement of the research objectives, research contribution, research challenges and recommendation for future research.

1.7 Summary

This chapter discusses the foundation of this study and explicitly explains the issues and problems which justify the needs for the research. The research questions through this empirical research are listed in sequence, and followed by research objectives. The philosophy of the study determined that the mix-method would be utilised to perform this investigation based on the research topic. This technique is discussed, along with the scope and limitations of the research, and lastly the overall organisation of the investigation.

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Appendix A Basic information related to the selected community resilience assessment tools (Sharifi, 2016)

Tool	Year	Primary Developer(s)	Focus Area	Risk	Target Audience	Reference
CRC	2015	Bushfire and Natural Hazards CRC	AU	Natural	Local authorities and councils	Morley and Parsons (2015)
CRDSA	2015	Academia, Alshehri et al.	Saudi Arabia	Multiple	Local authorities	Alshehri et al. (2015)
DRI	2015	Earthquakes and Megacities Initiative (EMI)	Global	Multiple	Local, regional and national govt. agencies	Khazai et al. (2015)
CDR	2015	Academia, Yoon et al.	Korea	Multiple	Local authorities	Yoon et al. (2015)
NIST	2015	National Institute of Standard Technology	US	Multiple	Local authorities	NIST (2015)
RELi	2015	American National Standard Institute (ANSI)	US	Multiple	Developers	C3LD (2015)
TCRI	2015	Australia Netherlands Water Challenge	AU	Multiple	Local, state and national govt., international organizations	Perfrement and Lloyd (2015)
CoBRA	2014	UNDP|Drylands Development Centre	Horn of Africa	Drought	Community leaders/ governmental and NGO	UNDP (2014)
CRF	2014	The Rockefeller Foundation, Arup	Global	Multiple	Local AUthorities	TRF (2014)
FCR	2014	IFRC	Global	Multiple	IFRC programs and national society	IFRC (2014)
Grosvenor	2014	Grosvenor, real estate investor (industry)	Global	Multiple	Company officials, city authorities, aid agencies	Barkham et al. (2014)
ICLEI	2014	ACCCRN, The Rockefeller Foundation, ICLEI	Global	Natural	Local authorities	Gawler and Tiwari (2014)
UNISDR	2014	IBM and AECOM	Global	Natural	Local authorities, insurance company, private industry	UNISDR (2014)
CRS	2013	Community Regional Resilience Institute (CARRI); Meridian Institute; Oak Ridge National Laboratary	US	Multiple	Community leaders	CARRI (2013), White et al. (2014)
LDRI	2013	Academia, Orencio and Fujii	The Philippines	Multiple	Local authorities	Orencio and Fujii (2013)
USAID	2013	USAID	Global	Poverty	Government, NGOs, donors	Frankenberger et al. (2013)
CDRST	2012	Torrens Resilience Institute	AU	Multiple	Planner, Local authorities, community members	Arbon et al. (2012, 2016)
BCRD	2011	RAND corporation	US	Health	Community leaders, governmental and NGOs	Chandra et al. (2011)
CART	2011	TDC/University of Oklahoma	US	Health	Community-based organizations	Pfefferbaum et al. (2011)
ResilUS	2011	US, Resilience Institute is part of Western Washington University's Huxley College of the Environment	US, Japan	Mainly Earthquake	Local authorities	Miles and Chang (2011), based on a prototype developed in 2006
ICBRR	2012	Palang Merah Indonesia | Canadian Red Cross	Indonesia	Multiple	Local authorities and public	Kafle (2010, 2012)
BRIC	2010	Academia, Cutter et al.	US	Multiple	Local authorities	Cutter et al. (2008, 2010)
CDRI2	2010	Academia, Shaw et al.	South/South-East Asia	Multiple	Community leaders, Local authorities	Shaw et al. (2010)
CERI	2010	AWM Strategy Team	UK	Recession	Local authorities	Team (2010)
CDRI	2010	Coastal Services Center and The National Oceanic and Atmospheric Administration	US	Multiple	Community leaders	Peacock et al. (2010)
CRI2	2010	Academia, Sherrieb et al.	US	Multiple	Local authorities	Sherrieb et al. (2010)
CRI	2010	MS-AI, Sea Grant and The National Oceanic and Atmospheric Administration	US	Coastal (Natural)	Planners, policy makers, emergency services providers	Sempier et al. (2010)
PEOPLES	2010	NIST	US	Multiple	Planners and local authorities	Renschler et al. (2010)
CRT	2009	Bay Locallize Project of the Earth Island Institute	US	Recession, Natural	Planners, community organizations, individuals, training centers	Schwind (2009)
SPUR	2009	San Francisco Planning and Urban Research Association	US	Earthquake	Local authorities, builders and developers	Poland (2009)
DFID	2009	Department for International Development and other agencies	US	Natural	Academia, government and CSOs	Twigg (2009)
CARRI	2008	Community and Regional Resilience Institute	US	Multiple	Community-based organizations	Cutter et al. (2008)
Hyogo	2008	UN|OCHA and UNISDR	Global	Natural	Local and national authorities, Community-based organizations, NGOs	UNISDR (2008)
USIOTWT	2007	US Indian Ocean Tsunami Warning System Program and other institutes	South/South-East Asia	Coastal (natural)	Governmental and NGOs, international aid agencies, bank and donors	USIOTWSP (2007)
THRIVE	2004	Prevention institute	US	Racial health disparity	Local government, NGOs	THRIVE (2004)
CRM	2000	Canadian Center of Community Renewal	Canada	Recession	Local authorities, community members	Rowcliffe et al. (2000)

Appendix B Methodology for disaster risk reduction approach assessment

(adapted from Community Resilience Assessment Tools (Sharifi, 2016))

Author(s) / Source / Reference	**Focus Area**	**Risk** *(Natural / Man-made / Hybrid etc.)*	**Methodology for DRR Approach Assessment** *(Top-Down / Bottom-Up)*	**Level of Implementation / Target Audience** *(Global, National / State / District / Community)*
(Aitsi-Selmi et al., 2015)	Global	Public Health	Top-down	Global
(Aldunce et al., 2015)	Australia	Natural	Top-down	State (Queensland)
(Alexander, 2013)	Global	Natural	Top-down	Global
(Djalante, 2012)	Indonesia	Natural	Top-down	National
(Gaillard J.C., 2013)	Global	Natural	Top-down	Global
(Haynes and Tanner, 2015)	Philippines	Natural	Bottom-Up	District (Province of Eastern Samar)
(Khailani and Perera, 2013)	Malaysia	Natural	Top-down	District (Shah Alam)
(Komoo et al., 2011)	Malaysia	Natural	Top-down	National
(Lian et al., 2018)	Global	Natural	Top-Down	Global
(Pal and Bhatia, 2018)	Asia-Pacific	Natural	Top-Down	Asia-Pacific
(Pascapurnama et al., 2017)	Indonesia	Public Health	Top-Bottom	National
(Pereira, 2018)	Malaysia	Natural	Top-Bottom	National
(Pilli-Sihvola and Väätäinen-Chimpuku, 2016)	Zambia	Natural	Top-Down	National
(Poterie, 2017)	Africa	Natural	Top-Down	State (Malawi & Tanzania)
(Ruiz-Rivera and Melgarejo-Rodríguez, 2017)	Mexico	Natural	Top-Down	District (Municipalities)
(Shaluf et al., 2003)	Malaysia	Technological	Top-Down	National
(Shaw et al., 2018)	Asia	Natural	Top-Down	Asia
(Thampanishvong, 2013)	Thailand	Natural	Top-Down	National
(Twigg, 2015)	Global	Natural	Top-Down	Global
(UNISDR, 2005)	Global	Natural	Top-Down	Global
(UNISDR, 2015)	Global	Natural	Bottom-Up	Global
(UNDRR, 2017a)	Global	Natural	Top-Bottom	Global
(Van der Keur et al., 2016)	Southest Asia	Natural	Top-Bottom	Regional and Local
(Wen et al., 2018)	Taiwan	Natural	Top-Bottom	Local Government (Chiayi City, Changhua and Yunlin)
(Jabar and Lamberte, 2017)	Philippines	Natural	Top-Bottom	Local Government (Municipality of Hilongos)
(Kamarudin and Razak, 2018)	Malaysia	Natural	Bottom-Up	Local Government, State (Selangor)
(Nakamura et al., 2017)	Japan	Natural	Bottom-Up	Local Government (Kitakyushu City)
(Raungratanaamporn et al., 2014)	Thailand	Natural	Top-Bottom	National, provincial, municipality
(Tanwattana, 2018)	Thailand	Natural	Bottom-Up	National
(Zahari and Ariffin, 2013)	Malaysia	Natural	Bottom-Up	Local Government (Segambut)
(Aguiñaga et al., 2018)	Mexico	Natural	Top-Bottom Bottom-Up	Local Government (Nuevo Leon)
(Arbon, 2014)	Australia	Natural	Bottom-Up	National
(Brown, 2015)	United State	Natural	Bottom-Up	State (California)
(Evan et al., 2006)	Global	Natural	Top-Bottom Bottom-Up	National (Canada, Germany, UK), State (Botswana)
(Hajito et al., 2015)	Ethiopia	Natural	Bottom-Up	National
(Imperiale and Vanclay, 2016)	Italy	Natural	Bottom-Up	Province (L'Aquila)
(Mat Said et al., 2011)	Malaysia	Natural	Top-Bottom	District (Langkawi)
(Roosli et al., 2018)	Malaysia	Natural	Bottom-Up	Local Government (Kuala Muda and Tanjung Tokong)
(Saunders and Becker, 2015)	New Zealand	Natural	Top-Bottom	State (Christchurch)
(Sharifi, 2016)	Global	Natural	Top-Bottom Bottom-Up	Global
(Wright, 2016)	South Wales	Natural	Top-Bottom	State (Swansea)

Appendix C Questionnaires Community-Based Disaster Risk Reduction (Copyright MyIPO: LY2019005501)

KOMUNITI

Negeri ☐ Lokasi ☐

Kawasan ☐ No ID ☐

UTM
UNIVERSITI TEKNOLOGI MALAYSIA

PENGURANGAN RISIKO BENCANA BERASASKAN KOMUNITI

Tuan/Puan,

Objektif kajian ini adalah untuk mengkaji tahap kesediaan isi rumah bagi menghadapi bencana tanah runtuh.

Kejayaan penyelidikan ini memerlukan maklumbalas dan jawapan yang jujur semasa menjawab soal selidik ini. Segala maklumbalas dan jawapan anda adalah rahsia dan maklumat dari soal selidik hanya akan digunakan bagi kegunaan penyelidikan sahaja.

Terima Kasih di atas kerjasama dan sokongan anda.

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BAHAGIAN A.1: MAKLUMAT LATAR BELAKANG RESPONDEN

Sila tanda (√) untuk jawapan yang betul berkenaan diri anda.

1. Jantina:
   ☐ Lelaki ☐ Perempuan
2. Umur:_____tahun
3. Bangsa/Etnik (Nyatakan):_____
4. Status perkahwinan
   ☐ Berkahwin
   ☐ Bujang
   ☐ Balu/Duda/Berpisah
5. Pendidikan yang tertinggi
   ☐ Tidak bersekolah
   ☐ Sekolah rendah
   ☐ Sekolah Menengah Bawah (PMR/SRP)
   ☐ Sekolah Menengah Atas (SPM/LCE)
   ☐ Pra Universiti (Asasi/Diploma/Sijil/STPM)
   ☐ Universiti (Ijazah Sarjana Muda)
   ☐ Sarjana/PhD
   ☐ Lain –lain:……
6. Sudah berapa lama tinggal di sini?_____tahun
7. Bilangan ahli isi rumah (yang tinggal bersama anda) termasuk anda?_____orang.
8. Jenis **bahan binaan** rumah yang didiami:
   ☐ Batu ☐ Kayu ☐ Separa
9. Jenis rumah yang anda diami:
   ☐ Teres setingkat
   ☐ Teres bertingkat
   ☐ Lain-lain (Nyatakan): ……
   ☐ Rumah kampung
   ☐ Flat/apartmen/kondo
   ☐ Berkembar
   ☐ Banglo
10. Apakah status pekerjaan anda sekarang?
    ☐ Kakitangan kerajaan
    ☐ Kakitangan swasta
    ☐ Usahawan/bekerja sendiri
    ☐ Kerja kampung (upahan)
    ☐ Tidak bekerja
    ☐ Pesara
11. Sila nyatakan jenis pekerjaan anda: _____
12. Anggaran pendapatan **anda** sebulan: _____
13. Anggaran pendapatan **isi rumah** sebulan: _____
14. Pernahkah anda **MENERIMA** maklumat tentang bencana tanah runtuh daripada mana mana sumber
    ☐ Tidak ☐ Ya (sila ke soalan 15)

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15. Jika YA, anda pernah menerima maklumat tentang bencana tanah runtuh sila tandakan kotak di bawah. **ANDA BOLEH PILIH LEBIH DARI SATU JAWAPAN.**

i.	Rakan	
ii.	Keluarga	
iii.	Televisyen (TV)	
iv.	Radio	
v.	Internet	
vi.	Majalah	
vii.	Sekolah	
viii.	Surat khabar	
ix.	Risalah	
x.	Kempen/Ceramah	
xi.	Media social (contoh Whatsapp, Facebook dll.	
xii.	Buku	
xiii.	Lain-lain: _____	

BAHAGIAN A.2: PENGALAMAN MENGHADAPI BENCANA TANAH RUNTUH DAN PENEMPATAN DI PUSAT PEMINDAHAN BENCANA TANAH RUNTUH

1. Pernahkan anda terlibat dengan mana mana bencana tanah runtuh yang menyebabkan ada mangsa berpindah di kawasan anda?

☐ Tidak pernah ☐ Pernah (Nyatakan berapa kali semenjak 2014)

2. Nyatakan lokasi penempatan kecemasan yang anda pernah menetap (semasa bencana tanah runtuh) sebelum dibenarkan kembali pulang ke rumah (Boleh pilih lebih daripada satu).

☐ Dewan Orang Ramai
☐ Sekolah
☐ Balai Raya
☐ Khemah sementara
☐ Rumah Sanak Saudara
☐ Terkepung, tidak dapat kemana-mana
☐ Lain – lain (Nyatakan) .....

Jika anda telah ditempatkan di pusat pemindahan bencana tanah runtuh, sila jawab soalan dibawah.

3. Cara anda berpindah ke penempatan kecemasan? (Boleh pilih lebih daripada satu).

☐ Persendirian (jalan kaki)
☐ Persendirian (menaiki kenderaan)
☐ Bantuan agensi tempatan (Polis, Bomba, APM dan lain-lain)
☐ Lain-lain (Sila nyatakan):_____

4. Bagaimana anda menerima arahan perpindahan? (Anda boleh jawab lebih dari satu)

☐ Jiran
☐ Ketua Kampung/Penghulu
☐ Jawatankuasa Kemajuan & Keselamatan Kampung (JKKK/MPKK)
☐ Agensi tempatan (Polis, Bomba, APM dan lain-lain)
☐ Radio
☐ Lain-lain (Sila nyatakan):_____

5. Barang yang anda bawa ke penempatan kecemasan (anda boleh jawab lebih dari satu)

☐ Dokumen penting (Kad pengenalan, geran, surat beranak dan lain-lain)
☐ Bekalan pakaian
☐ Bekalan makanan
☐ Haiwan peliharaan (Kucing, burung dan lain-lain)
☐ Haiwan ternakan (lembu, kambing, ayam dan lain-lain)
☐ Bekalan ubatan (Panadol, plaster dan lain-lain)
☐ Ubat peribadi (asthma, sakit jantung, kencing manis dan lain-lain)
☐ Peralatan kecemasan (lampu suluh, pembuka tin, pemutar skrew)

6. Secara amnya, tandakan tahap kepuasan pusat pemindahan yang pernah anda alami.

	Kepuasan Pusat Pemindahan	**Sangat tidak berpuas hati**	**Tidak berpuas hati**	**Neutral**	**Berpuas hati**	**Sangat berpuas hati**
a	Keselesaan pusat pemindahan.	1	2	3	4	5
b	Keselamatan pusat pemindahan.	1	2	3	4	5
c	Ruangan tempat tidur.	1	2	3	4	5
d	Ruangan solat.	1	2	3	4	5
e	Tempat membasuh pakaian.	1	2	3	4	5
f	Bekalan elektrik.	1	2	3	4	5
g	Bekalan air bersih.	1	2	3	4	5
h	Bekalan air minuman.	1	2	3	4	5
i	Tandas yang disediakan.	1	2	3	4	5
j	Bilangan tandas yang disediakan.	1	2	3	4	5
k	Perhubungan diantara penghuni di pusat pemindahan.	1	2	3	4	5
l	Perhubungan dengan pengurus pusat pemindahan.	1	2	3	4	5
m	Ruang peribadi di pusat pemindahan patuh syariah untuk menukar pakaian, penyusuan bayi dan lain-lain.	1	2	3	4	5
n	Kadar seliaan dan penyelenggaraan pusat pemindahan apabila sebarang kerosakan dilaporkan.	1	2	3	4	5
o	Perkhidmatan/seliaan perubatan yang disediakan.	1	2	3	4	5

BAHAGIAN B: KESEDARAN TERHADAP BENCANA TANAH RUNTUH

Sehubungan dengan bencana tanah runtuh yang berlaku dalam komuniti anda, sila nyatakan sejauh mana anda setuju atau tidak setuju dengan setiap pernyataan berikut. **Sila tanda (√) bagi yang berkenaan.**

	KESEDARAN TERHADAP BENCANA	Sangat tidak berpuas hati	Tidak berpuas hati	Neutral	Berpuas hati	Sangat berpuas hati
1	Saya mengambil berat tentang masalah bencana tanah runtuh di tempat saya.	1	2	3	4	5
2	Saya berbincang masalah dan isu-isu berkenaan bencana tanah runtuh dengan orang lain di tempat saya.	1	2	3	4	5

BAHAGIAN C: SIKAP TERHADAP KESEDIAAN BENCANA TANAH RUNTUH

Sila bulatkan jawapan yang sesuai.

	SIKAP TERHADAP KESEDIAAN BENCANA TANAH RUNTUH	Sangat tidak berpuas hati	Tidak berpuas hati	Neutral	Berpuas hati	Sangat berpuas hati
1	Persediaan menghadapi bencana tanah runtuh menyusahkan saya.	1	2	3	4	5
2	Persiapan menghadapi bencana tanah runtuh dapat mengurangkan kerosakan besar pada rumah saya.	1	2	3	4	5
3	Persiapan menghadapi bencana tanah runtuh dapat memperbaiki kehidupan seharian.	1	2	3	4	5
4	Tidak perlu bersedia menghadapi bencana tanah runtuh kerana pihak berkuasa akan memberi bantuan.	1	2	3	4	5
5	Persediaan menghadapi bencana tanah runtuh akan meningkatkan keupayaan saya untuk menangani kegangguan terhadap keluarga/komuniti.	1	2	3	4	5
6	Persediaan menghadapi bencana tanah runtuh akan menyelamatkan nyawa.	1	2	3	4	5
7	Saya tidak tahu bagaimana saya boleh bersedia menghadapi bencana tanah runtuh.	1	2	3	4	5
8	Saya rasa susah untuk membuat persediaan menghadapi bencana tanah runtuh.	1	2	3	4	5

BAHAGIAN D: NORMA SUBJEKTIF

Sila bulatkan bagi yang berkenaan

	***Keluarga merujuk kepada ibubapa, suami, isteri, adik beradik dll** ***Ahli masyarakat bermaksud jiran, ahli masjid, ahli komuniti yang lain**	**[1] Sangat Tidak Berpuas Hati; [2] Tidak Berpuas Hati; [3] Neutral; [4] Berpuas Hati; [5]Sangat Berpuas Hati**									
		Ahli keluarga						**Ahli masyarakat**			
1	Kemungkinan mereka berikut akan mengambil langkah berjaga-jaga terhadap bencana tanah runtuh dengan baik.	1	2	3	4	5		1	2	3	4	5
2	Kemungkinan mereka berpendapat bahawa sesuatu boleh dilakukan untuk mengelakkan kerosakan dan kecederaan sekiranya bencana tanah runtuh berlaku.	1	2	3	4	5		1	2	3	4	5
3	Keputusan saya dipengaruhi oleh pendapat mereka	1	2	3	4	5		1	2	3	4	5
4	Pendapat mereka penting untuk saya membuat tindakan tertentu.	1	2	3	4	5		1	2	3	4	5
5	Merekat tidak menggalakkan keputusan saya untuk mengambil langkah berjaga-jaga terhadap.	1	2	3	4	5		1	2	3	4	5
6	Saya tidak mengambil langkah berjaga-jaga terhadap bencana tanah runtuh sekiranya mereka merasakan langkah berjaga- jaga tidak perlu.	1	2	3	4	5		1	2	3	4	5

BAHAGIAN E: TANGGAPAN RISIKO

Sila nyatakan sejauh mana anda setuju atau tidak setuju dengan setiap pernyataan berikut. Sila bulatkan jawapan yang sesuai.

	TANGGAPAN RISIKO	Sangat tidak berpuas hati	Tidak berpuas hati	Neutral	Berpuas hati	Sangat berpuas hati
1.	Saya rasa bencana tanah runtuh boleh memberi ancaman kepada keselamatan diri saya.	1	2	3	4	5
2.	Saya rasa bencana tanah runtuh boleh menjejaskan aktiviti harian saya (seperti kerja, aktiviti masa lapang).	1	2	3	4	5
3.	Bencana tanah runtuh yang mungkin berlaku di sini akan mendatangkan kemudaratan yang teruk sangat.	1	2	3	4	5
4.	Bencana tanah runtuh akan menjejaskan kawasan ini.	1	2	3	4	5
5.	Bencana tanah runtuh akan menjejaskan diri saya.	1	2	3	4	5
6.	Kemungkinan bencana tanah runtuh besar akan berlaku di sini benar.	1	2	3	4	5
7.	Bencana tanah runtuh boleh menimbulkan ancaman kepada	1	2	3	4	5

	komuniti saya.					
8.	Saya akan terjejas sekiranya bencana tanah runtuh berlaku di kawasan ini pada masa hadapan.	1	2	3	4	5

BAHAGIAN F: KEPERCAYAAN DENGAN AGENSI
Sila bulatkan bagi yang berkenaan.

	KEPERCAYAAN DENGAN AGENSI	Sangat tidak berpuas hati	Tidak berpuas hati	Neutral	Berpuas hati	Sangat berpuas hati
1	Sekiranya saya menghadapi risiko bencana tanah runtuh saya pasti akan menggunakan panduan daripada agensi-agensi kerajaan.	1	2	3	4	5
2	Apabila isu atau masalah bencana tanah runtuh timbul, saya lebih selesa bergantung kepada maklumat yang diberikan oleh agensi-agensi kerajaan.	1	2	3	4	5
3	Saya merasakan bahawa saya boleh bergantung pada agensi-agensi kerajaan untuk menyampaikan berita tentang isu/insiden bencana tanah runtuh.	1	2	3	4	5
4	Adalah jelas bahawa agensi-agensi kerajaan amat prihatin terhadap kebajikan saya.	1	2	3	4	5
5	Saya berasa yakin bahawa agensi-agensi kerajaan melakukan kerja dengan baik dalam membangunkan polisi-polisi untuk melindungi masyarakat.	1	2	3	4	5

BAHAGIAN G: NIAT UNTUK MEMBUAT PERSEDIAAN BENCANA TANAH RUNTUH
Sila bulatkan bagi yang berkenaan.

	NIAT UNTUK MEMBUAT PERSEDIAAN BENCANA TANAH RUNTUH *Dalam masa yang terdekat, anda.	Sangat tidak berpuas hati	Tidak berpuas hati	Neutral	Berpuas hati	Sangat berpuas hati
1	Berniat untuk menyemak tahap kesediaan saya bagi menghadapi bencana tanah runtuh.	1	2	3	4	5
2	Berniat untuk merancang bentuk pelan pemindahan sekiranya bencana tanah runtuh besar berlaku.	1	2	3	4	5
3	Berniat untuk melibatkan diri dengan komuniti bagi membincangkan cara-cara mengurangkan kerosakan atau kerugian akibat bencana tanah runtuh.	1	2	3	4	5
4	Berniat untuk mendapatkan maklumat tentang risiko bencana tanah runtuh	1	2	3	4	5

BAHAGIAN H: SEMANGAT KEMASYARAKATAN
Sila bulatkan bagi yang berkenaan.

	SEMANGAT KEMASYARAKATAN	Sangat tidak berpuas hati	Tidak berpuas hati	Neutral	Berpuas hati	Sangat berpuas hati
1	Saya rasa setia kepada ahli komuniti ini.	1	2	3	4	5
2	Saya percaya jiran-jiran saya akan membantu jika ada kecemasan.	1	2	3	4	5
3	Jika boleh saya akan menetap terus di sini untuk beberapa tahun lagi.	1	2	3	4	5
4	Saya rasa adalah sebahagian daripada komuniti ini.	1	2	3	4	5
5	Saya bekerjasama dengan jiran tetangga untuk menambah baik kampung/taman saya.	1	2	3	4	5
6	Saya mengambil bahagian dalam kegiatan-kegiatan aktiviti tempatan. (Contoh: majlis keraian, kenduri)	1	2	3	4	5
7	Saya menyumbang kepada komuniti saya. (Contoh: duit, makanan, tenaga atau pakaian).	1	2	3	4	5
8	Saya menghadiri mesyuarat umum berkenaan isu komuniti.	1	2	3	4	5
9	Saya terlibat dalam aktiviti sukarelawan yang bertujuan untuk memanfaatkan komuniti saya. (Contoh: kutipan amal, aktiviti gotong-royong, lain-lain aktiviti berkumpulan)	1	2	3	4	5

BAHAGIAN I: KESEDIAAN BENCANA TANAH RUNTUH
Sila tandakan *(√)* bagi yang berkenaan.

	KESEDIAAN BENCANA TANAH RUNTUH	Ya	Tidak
1	Saya telah mengumpulkan dokumen-dokumen penting (seperti polisi insuran, wasiat, kad pengenalan, geran rumah) di satu tempat selamat dan mudah diambil.		
2	Saya telah rancang pakaian dan barang-barang yang hendak dibawa jika saya perlu berpindah semasa bencana tanah runtuh.		

KESEDIAAN BENCANA TANAH RUNTUH		Ya	Tidak
3	Saya kenalpasti lokasi selamat untuk meletakkan kenderaan semasa bencana tanah runtuh.		
4	Saya telah kenal pasti beberapa jalan keluar untuk digunakan semasa bencana tanah runtuh.		
5	Saya tahu pusat pemindahan kecemasan yang berdekatan dengan rumah saya.		
6	Menyimpan lampu suluh		
7	Saya ada menyediakan tempat untuk barang yang mudah pecah		
8	Saya ada menyediakan tempat untuk selamatkan barangan elektrik		
9	Menggunakan almari yang berpintu		
10	Menyimpan barangan yang beracun ditempat yang selamat		
11	Simpan air bersih yang boleh diminum untuk tiga hari		
12	Menyimpan radio mudah alih dan bateri gantian		
13	Saya ada menyimpan gaji untuk sekurang-kurangnya 3 bulan perbelanjaan		
14	Ada ahli keluarga saya yang telah belajar cara-cara bantuan pernafasan mulut		
15	Mempunyai kotak pertolongan cemas		
16	Ada ahli keluarga yang telah belajar cara-cara menyelamatkan diri		
17	Ada ahli keluarga yang telah belajar cara-cara untuk memberi pertolongan cemas		
18	Saya menukar permaidani kepada tikar getah atau jubin		
19	Saya mendapatkan vaksin penyakit berjangkit		
20	Saya membeli insuran hayat/takaful hayat		
21	Saya membeli insuran kereta tambahan yang merangkumi kerosakan akibat bencana.		
22	Saya membeli insuran rumah dan harta benda tambahan yang merangkumi kerosakan akibat bencana.		

Sila nyatakan pandangan atau cadangan and jika ada.

_____

_____

----------**TERIMA KASIH**----------

-oooMFSooo-

Appendix D Questionnaires Torrens Community Disaster Resilience Scorecard (Copyright MyIPO: LY2020004218)

KOMUNITI

Negeri _____ Lokasi _____

Kawasan _____ No ID _____

UTM
UNIVERSITI TEKNOLOGI MALAYSIA

KAD SKOR TAHAP DAYA TAHAN KOMUNITI TERHADAP BENCANA

Tuan/Puan,

Objektif kajian ini adalah untuk mengkaji tahap kesediaan isi rumah bagi menghadapi bencana banjir berdasarkan Kad Skor Tahap Daya Tahan Komuniti Terhadap Bencana yang diadaptasikan daripada Torrens Resilience Institute (2015) dan disesuaikan dengan Malaysia. Kejayaan penyelidikan ini memerlukan maklumbalas dan jawapan yang jujur semasa menjawab soal selidik ini. Segala maklumbalas dan jawapan anda adalah rahsia dan maklumat dari soal selidik hanya akan digunakan bagi kegunaan penyelidikan sahaja.

Terima Kasih di atas kerjasama dan sokongan anda.

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1. Keterhubungan : Bagaimana tingkat keterhubungan komuniti anda?

	Pertanyaan	Skor					Komen
1.1	Berapa peratusan penglibatan komuniti dalam jawatankuasa kampung?	1 < 20%	2 21% - 40%	3 41% - 60%	4 61% - 80%	5 > 81%	
1.2	Apakah komuniti mendapat akses ke pelbagai sistem komunikasi bagi mendapat dan berkongsi maklumat (terutama semasa kecemasan)?	1 Tidak ada / akses yang sangat terbatas	2 Memiliki akses terbatas ke berbagai komunikasi	3 Memiliki akses yang baik ke berbagai komunikasi tetapi ketahanan terhadap kerosakan tidak diketahui	4 Memiliki akses yang baik ke berbagai komunikasi tetapi ketahanan terhadap kerosakan adalah sederhana	5 Memiliki pelbagai akses pada komunikasi yang mempunyai ketahanan terhadap kerosakan	
1.3	Bagaimana tahap komunikasi antara komuniti dan kerajaan?	1 Pasif	2 Perbincangan	3 Keterlibatan	4 Kerjasama	5 Aktif dari kedua pihak	
1.4	Bagaimana hubungan antara komuniti dengan kerajaan diperingkat mukim / daerah / negeri?	1 Hubungan normal	2 Perwakilan rendah pada peringkat negeri	3 Beberapa wakil di peringkat negeri	4 Perancangan dan kegiatan dengan mukim / daerah lain	5 Kerjasama dan penglibatan aktif dengan mukim / daerah lain	
1.5	Bagaimana tahap keterhubungan antara komuniti (melibatkan perbezaan jurang umur, agama, bangsa dan keluarga yang baru berpindah)?	1 Sedikit / tiada kerjasama	2 Penglibatan yang rendah dalam kerjasama	3 Kerjasama biasa	4 Kerjasama aktif	5 Kerjasama dan perlibatan aktif dalam merancang kegiatan tahunan	
1.6	Bagaimana tahap keterhubungan antara komuniti dalam inisiatif kesiapsiagaan (persediaan) semasa kecemasan dan fasa pemulihan (setelah bencana)?	1 Sedikit / tiada kerjasama	2 Penglibatan yang rendah dalam kerjasama	3 Kerjasama biasa	4 Kerjasama aktif	5 Kerjasama dan perlibatan aktif dalam merancang kegiatan tahunan	

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2. Risiko Keterancaman : Bagaimana tingkat risiko dan keterancaman komuniti anda?

Pertanyaan		Skor					Komen
2.1	Apakah risiko yang sudah dikenalpasti di kampung / kawasan anda?	1 Tidak ada pemetaan risiko dilakukan	2 Fokus pada risiko tunggal (misalnya : banjir) tapi tidak ada pemetaan	3 Pemetaan risiko tunggal	4 Pemetaan tersedia dengan banyak dari berbagai sumber potensi risiko	5 Pemetaan tersedia dengan banyak dan meliputi kemungkinan peristiwa berimpak tinggi / rendah	
2.2	Berapakah peratusan populasi penduduk (tetap dan tidak tetap)?	1 Populasi penduduk tetap adalah < 20% dari populasi di siang hari (populasi pekerja)	2 Populasi penduduk tetap adalah 21% - 40% dari populasi di siang hari (populasi pekerja)	3 Populasi penduduk tetap adalah 41% - 60% dari populasi di siang hari (populasi pekerja)	4 Populasi penduduk tetapadalah 61% - 80% dari populasi di siang hari (populasi pekerja)	5 Populasi penduduk tetap adalah > 80% dari populasi di siang hari (populasi pekerja)	
2.3	Berapakah peratusan perubahan populasi penduduk dalam 5 tahun terakhir?	1 > 30%	2 20% - 29%	3 13% - 19%	4 6% - 12%	5 < 5%	
2.4	Berapakah kadar penduduk yang memiliki keupayaan mandiri / sendiri untuk berpindah ke tempat yang lebih selamat	1 < 20%	2 21% - 40%	3 41% - 60%	4 61% - 80%	5 > 81%	
2.5	Berapakah perkadaran populasi penduduk yang memerlukan keperluan/ perhatian istimewa (misalnya orang kurang upaya dan warga emas)	1 > 20%	2 15%	3 10%	4 < 5%	5 Tiada	
2.6	Adakah komuniti setempat telah dimasukkan / dilibatkan dalam pelan tindakan dan pemulihan bencana?	1 Tiada	2 Penglibatan minima	3 Penglibatan sederhana	4 Penglibatan yang baik dan berupaya menyebar maklumat	5 Penglibatan aktif dan pertimbangan diambil kira	
2.7	Adakah populasi tidak kekal (misalnya pelancong, golongan pekerja) dimasukkan dalam pelan tindakan dan pemulihan?	1 Populasi tidak kekal tidak disertakan	2 Populasi tidak kekal dikenal-pasti	3 < 50% perancangan termasuk populasi tidak kekal	4 51% - 75% perancangan termasuk populasi tidak kekal	5 Semua perancangan sudah termasuk populasi tidak kekal	
2.8	Apakah tahap kemudahsampaian jalan raya semasa normal dan bencana?	1 Tiada akses dan tidak mudah sampai semasa normal dan bencana	2 Kemudah-sampaian sangat terhad dan sukar	3 Mudah sampai dan akses semasa normal sahaja	4 Mudah sampai dan akses semasa normal tetapi terhad semasa bencana	5 Sangat mudah sampai dan mudah diakses semasa normal dan bencana	

3. Langkah-langkah: Langkah-langkah apa yang menyokong pengurusan bencana, respon dan pemulihan?

Pertanyaan		Skor					Komen
3.1	Sejauh manakah golongan isi rumah didalam komuniti terlibat dalam perancangan semasa kecemasan / bencana?	1 Tidak pernah	2 Tahu dan sedar	3 Terdapat kerjasama	4 Penglibatan aktif dalam pelan tindakan bencana	5 Penglibatan yang tinggi	
3.2	Adakah sebarang program yang dirancang untuk mencapai daya tahan komuniti terhadap bahaya (melibatkan semua lapisan komuniti dan semua jenis kemungkinan bahaya dan bencana)?	1 Tiada	2 Komuniti digalakkan menganjurkan program	3 Ada	4 Ada dan dikongsi serta melibatkan kumpulan berisiko	5 Penambahbaikan keupayaan secara berterusan	
3.3	Apakah komuniti telah mengambil langkah-langkah persediaan bencana (misalnya mempunyai pelan komunikasi semasa bencana, latihan simulasi berkala)?	1 Tahap kesedaran komuniti tidak diketahui	2 Garis panduan telah tersedia tetapi tidak tersebar dalam kalangan komuniti	3 Komuniti telah dimaklumkan secara berkala	4 Langkah persediaan diambil hanya apabila diperlukan	5 Persediaan bencana menjadi amalan harian	
3.4	Pengajaran daripada bencana lalu	1 Tidak diambil pengajaran	2 Hanya menyedarkan sebahagian sahaja	3 Pengajaran menyedarkan diri dan meningkatkan tahap kesedaran	4 Pengajaran lepas menjadikan lebih bersedia	5 Pengajaran lepas menjadikan lebih bersedia dan berdaya tahan	
3.5	Adakah wujud garis panduan tentang pengurusan bencana, respon dan kerja pemulihan bencana sebagai rujukan?	1 Tiada	2 Pelan pengurusan bencana tidak berfungsi seperti yang dirancang	3 Hanya sebahagian pelan pengurusan bencana yang dapat dipraktikkan	4 Pelan pengurusan bencan berfungsi tetapi tidak efisien	5 Pelan pengurusan bencana berfungsi sepenuhnya dan efisien	

4. Sumber Daya: Perancangan kecemasan, tindakan dan pemulihan menurut sumber daya yang tersedia dalam komuniti anda?

	Pertanyaan	Skor					Komen
4.1	Kelengkapan perancangan perlindungan pada komponen fizikal (misalnya bekalan eletrik, air, sistem kumbahan, kemudahan infrastruktur) sekitar kampung anda?	1 Tiada	2 Dikenalpasti tetapi tiada perancangan perlindungan	3 Kebanyakan komponen fizikal mempunyai perlindungan semasa kecemasan	4 Semua komponen fizikal mempunyai perlindungan semasa kecemasan	5 Semua sistem bersepadu dalam perancangan perlindungan komponen fizikal alam sekitar	
4.2	Berapakah peratusan masyarakat yang mempunyai keupayaan tertentu (misalnya skil pertolongan cemas, pengendalian makanan yang selamat) serta dapat membantu sekiranya diperlukan	1 < 20%	2 21% - 40%	3 41% - 60%	4 61% - 80%	5 > 81% mewakili sub-kumpulan	
4.3	Sejauh mana komuniti di daerah anda terlibat dalam persiapan bencana?	1 < 20%	2 21% -40%	3 41% - 60%	4 61% - 80%	5 > 81%	
4.4	Bagaimana sumber daya sedia ada dapat dilibatkan dalam pengurusan bencana	1 Tidak tahu/ tidak mempunyai sumber	2 Sumber daya yang minima	3 Beberapa sumber daya tempatan terlibat dalam pengurusan bencana	4 Semua sumber daya tempatan terlibat secara aktif dalam pengurusan bencana	5 Semua sumber aktif terlibat dalam pengurusan bencana daerah	
4.5	Fungsi dan kapasiti fasiliti kesihatan	1 Kapasiti yang sangat terhad dan berisiko untuk gagal jika bencana	2 Kapasiti kurang dari keperluan dan tidak berfungsi dengan baik	3 Mempunyai kapasiti dan berfungsi pada tahap sederhana baik	4 Kapasiti memenuhi keperluan masyarakat dan berfungsi dengan baik	5 Kapasiti melebihi keperluan masyarakat dan berfungsi dengan sangat baik	
4.6	Adakah institusi pendidikan terlibat dalam persediaan bencana?	1 Tidak tahu/ belum pasti	2 Sebahagian besar sekolah menyediakan informasi tentang persediaan bencana kepada guru dan pelajar	3 Sebahagian besar sekolah memberikan pendidikan berkaitan persediaan bencana kepada guru, pelajar dan ibu bapa	4 Terdapat aktiviti pendidikan berkaitan persediaan bencana di kebanyakan sekolah melibatkan guru, pelajar dan ibu bapa	5 Sebahagian besar sekolah terlibat secara aktif dalam pendidikan tentang persediaan bencana di peringkat komuniti	
4.7	Keupayaan komuniti untuk mencapai kesepakatan dan terlibat dalam proses membuat keputusan (sebelum, semasa, selepas bencana)	1 Tidak berupaya dan sangat bergantung dengan agensi	2 Kurang keupayaan dan masih bergantung dengan agensi	3 Berupaya sederhana dan mengharapkan bantuan agensi	4 Berupaya namun masih bergantung dengan agensi	5 Sangat berupaya tanpa bantuan agensi	
4.8	Apakah tahap ketersediaan sumber makanan/ air/ bahan bakar untuk kegunaan semasa bencana?	1 Tidak tahu	2 Sebahagian besar keluarga bergantung pada bantuan kerajaan	3 Sebahagian besar keluarga mempunyai bekalan untuk 2 hari	4 Sebahagian besar keluarga mempunyai bekalan untuk 4 hari	5 Sebahagian besar keluarga mempunyai bekalan untuk seminggu	
4.9	Kerjasama dengan bandar berjiran	1 Tiada	2 Jalinan dibuat selepas berlaku sesuatu dan tiada kesedaran	3 Kerjasama tertumpu pada perkara yang dianggap penting sahaja	4 Kerjasama terjalin erat	5 Kerjasama terjalin sangat erat secara keseluruhan	
4.10	Kecekapan sistem amaran awal	1 Tidak berfungsi dan tidak tepat	2 Tidak berfungsi sebaiknya dan lambat	3 Berfungsi tetapi kurang tepat	4 Sentiasa berfungsi apabila disetkan	5 Sentiasa berfungsi dengann tepat	

Sila nyatakan pandangan atau cadangan anda jika ada.

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----------TERIMA KASIH----------

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Appendix E Questionnaires - Disaster Resilient City (Copyright MyIPO: LY2020004220)

(Adaptation and modification of the Climate Disaster Resilience Initiative (CDRI))

NAMA AGENSI/JABATAN: …… KUMPULAN: …… TARIKH: ……..

Kaji selidik garis panduan perancangan tahap daya tahan bencana adalah untuk menilai tahap daya tahan semasa. Komponen dan indikator yang digunapakai merupakan adaptasi daripada CDRI yang disesuaikan dengan kajian di Malaysia. Sila tanda (/) bagi pilihan jawapan anda.

KOMPONEN	SOALAN BERKENAAN INDIKATOR	RANKING TAHAP DAYA TAHAN					INPUT / MAKLUM BALAS
		1 Sangat Rendah	2 Rendah	3 Sederhana	4 Memuaskan	5 Tinggi	
Fizikal	**F1-Apakah tahap daya tahan bekalan elektrik bagi bandar ini?**						
	***F1A** -Akses*	Tiada akses	Akses terhad sering terputus	Akses dicatu mengikut tempoh	Akses penuh tapi kawasan terhad	Akses penuh seluruh kawasan	
	***F1B** -Kemudahdapatan*	Tiada kemudahan disediakan	Menggunakan sumber sendiri	Hanya pada waktu tertentu sahaja	Bekalan penuh hanya di bandar dan pekan	Mudahdapat diseluruh kawasan	
	***F1C** -Bekalan*	Tiada bekalan	Bekalan terhad	Bekalan disediakan pada waktu tertentu sahaja	Bekalan banyak di bandar dan pekan	Terdapat diseluruh kawasan	
	***F1D** -Kebergantungan pada bekalan luar*	Sangat bergantung pada bekalan luar	Masih mengharap pada bekalan luar	Separuh bekalan yang adalah adalah dari luar	Bekalan telah disediakan dan masih menerima bantuan	Tidak bergantung pada bekalan luar	
	***F1E** -Bekalan alternatif*	Tiada bekalan alternatif	Bekalan alternatif sangat minimum	Bekalan alternatif cukup untuk keperluan sahaja	Lengkap namun tidak mencukupi untuk kelangsungan	Lengkap dan mencukupi untuk kelangsungan	
	F2-Apakah tahap daya tahan bekalan air bagi bandar ini?						
	***F2A** -Akses*	Tiada akses bekalan	Akses bekalan bukan dari talian grid elektrik	Bekalan sering terputus	Bekalan hanya dikawasan tumpuan seperti bandar dan pekan	Akses bekalan terdapat diseluruh kawasan	
	***F2B** -Kemudahdapatan*	Tiada kemudahan disediakan	Menggunakan sumber sendiri	Hanya pada waktu tertentu sahaja	Bekalan penuh hanya di bandar dan pekan	Mudahdapat diseluruh kawasan	
	***F2C** -Bekalan*	Tiada bekalan	Bekalan terhad	Bekalan disediakan pada waktu tertentu sahaja	Bekalan banyak di bandar dan pekan	Terdapat diseluruh kawasan	
	***F2D** -Kebergantungan pada bekalan luar*	Sangat bergantung pada bekalan luar	Masih mengharap pada bekalan luar	Separuh bekalan yang adalah adalah dari luar	Bekalan telah disediakan dan masih menerima bantuan	Tidak bergantung pada bekalan luar	
	***F2E** -Bekalan alternatif*	Tiada bekalan alternatif	Bekalan alternatif sangat minimum	Bekalan alternatif cukup untuk keperluan sahaja	Lengkap namun tidak mencukupi untuk kelangsungan	Lengkap dan mencukupi untuk kelangsungan	
	F3-Apakah tahap daya tahan sisa kumbahan dan pengurusan sisa pepejal bagi bandar ini?						

KOMPONEN	SOALAN BERKENAAN INDIKATOR	RANKING TAHAP DAYA TAHAN					INPUT / MAKLUM BALAS
		1 Sangat Rendah	2 Rendah	3 Sederhana	4 Memuaskan	5 Tinggi	
	***F3A** -Akses kepada sanitasi*	Tiada sistem sanitasi dibina	Sistem sanitasi tidak bersepadu	Sistem sanitasi bersepadu terdapat di kawasan bandar	Sistem sanitasi bersepadu terdapat di kawasan bandar dan pekan	Sistem sanitasi bersepadu diseluruh kawasan	
	***F3B** -Tandas*	Tiada tandas disediakan	Tandas curah tanpa sistem	Tandas curah dilengkapi sistem hanya di kawasan bandar	Tandas curah dilengkapi sistem terdapat di kawasan bandar dan pekan	Tandas moden digunapakai diseluruh kawasan	
	***F3C** -Pengurusan sisa pepejal*	Tiada tempat pengumpulan khas	Kaedah korek dan timbus oleh individu	Sisa dikumpul diluar kawasan atau daerah dalam jadual tertentu	Sisa pengumpulan dibuat berjadual	Terdapat kawasan khas pengumpulan dengan jadual yang efisien	
	***F3D** -Rawatan sisa kumbahan*	Tiada sistem rawatan sisa	Menggunakan kaedah tradisional diseluruh kawasan	Rawatan sisa hanya dikawasan bandar	Rawatan sisa dikawasan bandar dan pekan serta sekitarnya	Menggunakan teknologi dan kaedah terkini diseluruh kawasan	
	***F3E** -Kitar semula*	Tiada program diwujudkan	Dilakukan oleh kelompok kecil masyarakat	Hanya dilakukan di kawasan bandar sahaja	Program dilakukan di bandar dan sekitarnya	Program dibuat berjaya dan mendapat sambutan	
	F4-Apakah tahap daya tahan kemudahsampaian jalanraya bagi bandar ini?						
	***F4A** -Jaringan pengangkutan*	Tiada sistem jalanraya yang efisien	Hanya terhubung antara jalan utama sahaja	Hanya terhad dalam kawasan bandar sahaja	Terdapat jaringan antara bandar dengan sekitarnya	Mudahsampai dan saling berhubungan ke semua kawasan	
	***F4B** -Turapan jalan*	Tidak berturap	Hanya tertumpu pada jalan utama sahaja	Hanya terhad dalam kawasan bandar sahaja	Terdapat jaringan antara bandar dengan sekitarnya	Turapan jalan diseluruh kawasan	
	***F4C** -Kemudahsampaian semasa normal dan dilanda bencana*	Tiada akses dan tidak mudahsampai semasa normal dan dilanda bencana	Kemudahsampaian sangat terhad dan sukar	Mudahsampai dan akses semasa normal sahaja	Mudahsampai dan akses semasa normal dan terhad semasa dilanda bencana	Sangat mudahsampai dan mudah diakses semasa normal dan dilanda bencana	
	***F4D** -Bahu jalan*	Tidak terdapat dan jalan sempit	Bahu jalan disediakan namun sempit	Hanya jalan utama dan terhad di bandar	Disediakan pada jalan-jalan utama sahaja	Disediakan dan sangat berguna semasa kecemasan	
	***F4E** -Longkang tertutup*	Tidak disediakan penutup	Penutup disediakan sangat terhad dan dikawasan terpilih	Tertutup di jalan-jalan utama sahaja	Tertutup di jalan utama dan dalam bandar	Tertutup di seluruh kawasan dan diselenggara	
	F5-Apakah tahap daya tahan perumahan dan guna tanah bagi bandar ini?						
	***F5A** -Kod bangunan* *Kod bangunan berkaitan rekabentuk dan kejuruteraan bangunan (bukan zoning)*	Tiada maklumat	Maklumat tidak lengkap untuk bangunan utama sahaja seperti pentadbiran dan komersial	Terhad untuk bangunan utama dan komersial dalam bandar sahaja	Terhad untuk bangunan utama dalam bandar dan perumahan	Maklumat yang lengkap dan berguna dengan efisien	
	***F5B** -Struktur tidak tetap,*	Sangat banyak diseluruh kawasan	Terdapat banyak dikawasan bandar dan luar bandar	Banyak dikawasan tumpuan seperti komersial dan tepi jalan	Masih banyak terdapat dalam bandar	Hampir tiada dan minimum	

KOMPONEN	SOALAN BERKENAAN INDIKATOR	RANKING TAHAP DAYA TAHAN					INPUT / MAKLUM BALAS
		1 Sangat Rendah	2 Rendah	3 Sederhana	4 Memuaskan	5 Tinggi	
	***F5C** -Rumah yang berada dikawasan berisiko mendap*	Keseluruhan rumah berada pada kawasan risiko mendap	Sebahagian kawasan berada dikawasan berisiko mendap	Sebahagian kawasan berada dikawasan mendap	Sebilangan kecil yang berada di kawasan berisiko mendap	Bebas daripada kawasan mendap	
	***F5D** -Pemilikan rumah*	Penghuni rumah keseluruhan adalah penyewa	Penghuni rumah sebahagian besar merupakan penyewa	Penghuni rumah separuh daripadanya merupakan penyewa	Penghuni rumah sebilangan kecil adalah penyewa	Penghuni rumah merupakan pemilik rumah	
	***F5E** -Populasi yang tinggal dalam lingkungan industri tercemar*	Penghuni sangat terdedah kepada industri tercemar	Sebilangan besar terdedah kepada industri tercemar	Separuh daripada keseluruhan penghuni berada dalam kawasan terdedah	Sebilangan kecil terdedah kepada industri tercemar	Tiada penghuni dalam kawasan industri tercemar	
Sosial	**S1-Apakah tahap daya tahan populasi bagi bandar ini?**						
	***S1A** -Kadar pertumbuhan tahunan*	Berlaku penurunan setiap tahun	Berlaku penurunan pada tahun-tahun tertentu	Tidak menampakkan peningkatan yang ketara	Mencatatkan peningkatan pada tahun tertentu	Mencatatkan peningkatan setiap tahun	
	***S1B** -Populasi bawah 14 tahun dan atas 65 tahun*	Lebih 70% populasi bawah 14 tahun dan atas 65 tahun	51% - 69% populasi bawah 14 tahun dan atas 65 tahun	50% populasi bawah 14 tahun dan atas 65 tahun	31% - 49% populasi bawah 14 tahun dan atas 65 tahun	Kurang 30% populasi bawah 14 tahun dan atas 65 tahun	
	***S1C** -Penduduk setinggan*	Lebih 70% adalah bukan penduduk tempatan asal	51% - 69% adalah bukan penduduk tempatan asal	50% penduduk tempatan asal dan bukan asal	31% - 49% adalah bukan penduduk tempatan asal	Kurang 30% adalah bukan penduduk tempatan asal	
	***S1D** -Kepadatan populasi*	Sangat padat	Padat	Sederhana padat	Kurang padat	Tidak padat	
	S2-Apakah tahap daya tahan kesihatan penduduk bagi bandar ini?						
	***S2A** -Penderitaan penduduk daripada bawaan air / penyakit bawaan,*	Lebih 70% menderita masalah bawaan air	Lebih 51% menderita masalah penyakit bawaan air	50% penduduk menderita penyakit bawaan air	Lebih 51% tiada masalah derita penyakit bawaan air	Lebih 70% tiada masalah derita penyakit bawaan air	
	***S2B** -Akses kepada kemudahan kesihatan,*	Aksesibiliti sangat rendah lebih 20km	Aksesibiliti rendah 15km-20km	Aksesibiliti sederhana tinggi 10km-15km	Aksesibiliti tinggi 5km-10km	Aksesibiliti sangat tinggi kurang 5km	
	***S2C** -Fungsi dan kapasiti fasiliti kesihatan,*	Kapasiti sangat kurang daripada keperluan dan tidak berfungsi baik	Kapasiti kurang daripada keperluan dan tidak berfungsi baik	Kapasiti dan fungsi berada pada sederhana baik	Kapasiti memenuhi keperluan dan berfungsi baik	Kapasiti melebihi keperluan dan berfungsi sangat baik	
	***S2D** -Kesiapsiagaan bencana*	Kesiapsiagaan tidak mantap dan tidak berfungsi dengan efisien	Kesiapsiagaan tidak mantap namun berfungsi	Program kesiapsiagaan berada pada sederhana mantap	Kesiapsiagaan mantap dan efisien	Kesiapsiagaan sangat mantap dan berfungsi sangat efisien	
	S3-Apakah tahap daya tahan pendidikan dan kesedaran bagi bandar ini?						
	***S3A** -Kadar celik huruf (mana-mana bahasa)*	91%-100% tidak celik huruf	51%-90% tidak celik huruf	50% tidak celik huruf	51%-90% adalah celik huruf	91%-100% adalah celik huruf	
	***S3B** -Kesedaran bencana*	91%-100% tiada kesedaran bencana	51%-90% tiada kesedaran bencana	50% mempunyai kesedaran bencana	51%-90% mempunyai kesedaran bencana	91%-100% mempunyai kesedaran bencana	
	***S3C** -Ketersediaan program kesedaran awam*	Tiada langsung program kesedaran awam	Program kesedaran awam jarang diadakan	Program kesedaran dibuat mengikut keperluan	Banyak disediakan program kesedaran awam	Sangat banyak disediakan program kesedaran awam	

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	***S3D** -Akses kepada internet*	Tiada akses langsung	Terdapat akses namun sangat terhad	Akses hanya terdapat di kawasan bandar	Akses terdapat di kawasan bandar dan pinggir bandar	Akses meluas 100% seluruh kawasan	
	***S3E** -Fungsi sekolah selepas bencana*	Tidak dapat berfungsi langsung selepas banjir	Pulih 100% selepas bencana mengambil masa bertahun-tahun	Pulih 100% selepas setahun berlaku bencana	Pulih 100% selepas bencana dalam jangka masa 3 hingga 6 bulan	Pulih 100% selepas banjir dalam jangka masa singkat kurang 3 bulan	
	S4-Apakah tahap daya tahan modal sosial bagi bandar ini?						
	***S4A** -Penyertaan komuniti dalam aktiviti dan kelab*	Tidak mendapat sambutan mengalakkan serta penyertaan	Penyertaan adalah kurang daripada 50% daripada komuniti	Hanya 50% penyertaan daripada komuniti	Penyertaan antara 51%-90% daripada komuniti	Penyertaan adalah 91%-100% daripada komuniti	
	***S4B** -Keupayaan komuniti untuk membina kesepakatan dan terlibat dalam proses membuat keputusan bandar*	Tidak berkeupayaan kerana sangat bergantung kepada agensi atau luar	Kurang berkeupayaan kerana masih bergantung kepada agensi atau luar	Keupayaan sederhana dan mengharapkan bantuan agensi	Berkeupayaan namun masih bergantung kepada bantuan luar	Sangat berkeupayaan tanpa bantuan agensi atau luar	
	***S4C** -Percampuran dan rangkaian kelas sosial*	Percampuran tidak berlaku dan mengamalkan pangasingan	Percampuran tidak berlaku sepenuhnya dan jelas ciri-ciri pengasingan	Percampuran berlaku pada sesuatu kumpulan komuniti sahaja	Percampuran adalah semulajadi dan kurang harmoni	Percampuran adalah semulajadi dan sangat harmoni	
	S5-Apakah tahap kesiapsiagaan komuniti semasa bencana bagi bandar ini?						
	***S5A** -Kesiapsiagaan dari segi logistik*	Tahap kesiapsiagaan logistik kurang 10%	Tahap kesiapsiagaan logistik pada tahap 49%-11%	Tahap kesiapsiagaan logistik pada tahap 50%	Tahap kesiapsiagaan logistik hanya pada paras 51%-90%	Tahap kesiapsiagaan logistik pada tahap 91%-100%	
	***S5B** -Bahan dan pengurusan*	Bahan dan pengurusan pada tahap sangat minimum dan tidak lengkap	Bahan dan pengurusan pada tahap yang minimum	Bahan dan pengurusan hanya 50% daripada yang sepatutnya	Bahan dan pengurusan pada tahap maksimum dan masih terdapat kekurangan	Bahan dan pengurusan pada tahap maksimum dan lengkap sepenuhnya	
	***S5C** -Penglibatan dalam kerja-kerja sukarela*	Tidak mendapat penglibatan langsung daripada komuniti dalam kerja sukarela	Penglibatan langsung komuniti sangat terhad	Penglibatan komuniti dalam kerja sukarela adalah sederhana	Penglibatan komuniti tidak sepenuhnya	Mendapat penglibatan penuh daripada komuniti dalam kerja sukarela	
	***S5D** -Penyediaan tempat berlindung bagi komuniti terjejas*	Tempat perlindungan tidak disediakan langsung	Tidak disediakan tempat perlindungan yang bersesuaian	Tempat perlindungan disediakan namun lewat	Tempat perlindungan disediakan namun tidak sepenuhnya	Tempat perlindungan disediakan bagi keseluruhan komuniti	
	***S5E** -Sokongan daripada NGO*	Tiada sokongan	Sokongan tidak berterusan	Sokongan sekiranya berlaku bencana	Sokongan positif namun tidak berterusan	Sokongan sangat positif dan berterusan	
	***S5F** -Sukarelawan memindahkan komuniti*	Tiada sukarelawan daripada komuniti	Sebilangan kecil komuniti menjadi sukarelawan	Sukarelawan daripada komuniti hanya sebahagian	Ramai dikalangan komuniti menjadi sukarelawan	Majoriti daripada komuniti menadi sukarelawan memindahkan komuniti	
Ekonomi	**E1-Apakah tahap daya tahan pendapatan bagi bandar ini?**						
	***E1A** -Populasi dibawah paras kemiskinan*	Lebih 70% populasi dibawah paras kemiskinan	51%-69% populasi dibawah paras kemiskinan	50% populasi dibawah paras kemiskinan	31%-49% populasi dibawah paras kemiskinan	Kurang daripada 30% populasi dibawah paras kemiskinan	

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	***E1B** -Jumlah sumber pendapatan*	Kurang 30% berpendapatan diatas garis kemiskinan	31%-49% berpendapatan diatas garis kemiskinan	50% berpendapatan sederhana diatas garis kemiskinan	51%-69% berpendapatan diatas garis kemiskinan	Lebih 70% berpendapatan diatas garis kemiskinan	
	***E1C** -Isi rumah yang bergantung hanya pada satu sumber pendapatan*	Kurang 30% mempunyai lebih satu sumber pendapatan	31%-49% mempunyai lebih satu sumber pendapatan	50% mempunyai lebih satu sumber pendapatan	51%-69% mempunyai lebih satu sumber pendapatan	Lebih 70% mempunyai lebih satu sumber pendapatan	
	***E1D** -Jurang perbezaan pendapatan*	Jurang pendapatan sangat besar	Jurang pendapatan besar	Jurang pendapatan sederhana	Jurang pendapatan kecil	Jurang pendapatan sangat kecil	
	***E1E** -Pendapatan daripada aktiviti tidak formal*	Menyumbang kurang 30% keseluruhan pendapatan	Menyumbang 31%-49% keseluruhan pendapatan	Menyumbang 50% keseluruhan pendapatan	Menyumbang 51%-69% keseluruhan pendapatan	Menyumbang 70% keseluruhan pendapatan	
	E2-Apakah tahap daya tahan pekerjaan bagi bandar ini?						
	***E2A** -Pengangguran dalam sektor formal*	Lebih 70% jumlah pengangguran dalam sektor formal	51%-69% jumlah pengangguran dalam sektor formal	50% jumlah pengangguran dalam sektor formal	51%-31% jumlah pengagguran dalam sektor formal	Kurang 30% jumlah pengangguran dalam sektor formal	
	***E2B** -Pengangguran belia*	Lebih 70% jumlah belia menganggur	51%-69% jumlah belia menganggur	50% jumlah belia menganggur	31%-49% jumlah belia menganggur	Kurang 30% jumlah belia menganggur	
	***E2C** -Pekerjaan wanita*	Kurang 30% sektor pekerjaan semasa menerima pekerja wanita	31%-49% sektor pekerjaan semasa menerima pekerja wanita	50% sektor pekerjaan semasa menerima pekerja wanita	51%-69% sektor pekerjaan semasa menerima pekerja wanita	Lebih 70% sektor pekerjaan semasa menerima pekerja wanita	
	***E2D** -Pekerja yang datang dari luar kota*	02Kurang 30% pekerja dibandar adalah datang dari luar kota	31%-49% pekerja dibandar adalah datang dari luar kota	50% pekerja dibandar adalah datang dari luar kota	51%-69% pekerja dibandar adalah datang dari luar kota	Lebih 70% pekerja dibandar adalah datang dari luar kota	
	***E2E** -Pekerjaan dalam sektor tidak formal*	Lebih 70% pekerjaan dalam sektor tidak formal	51%-69% pekerjaan dalam sektor tidak formal	50% pekerjaan dalam sektor tidak formal	31%-49% pekerjaan dalam sektor tidak formal	Kurang 30% pekerjaan dalam sektor tidak formal	
	E3-Apakah tahap daya tahan asset isi rumah bagi bandar ini?						
	***E3A** -Isi rumah dengan television dan radio*	Kurang 30% mempunyai television dan radio	31%-49% mempunyai television dan radio	50% mempunyai television dan radio	51%-69% mempunyai television dan radio	Lebih 70% mempunyai television dan radio	
	***E3B** -Telefon*	Kurang 30% mempunyai telefon	31%-49% mempunyai telefon	50% mempunyai telefon	51%-69% mempunyai telefon	Lebih 70% mempunyai telefon	
	***E3C** -Kenderaan bermotor*	Lebih 70% mempunyai kenderaan bermotor	51%-69% mempunyai kenderaan bermotor	50% mempunyai kenderaan bermotor	31%-49% mempunyai kenderaan bermotor	Kurang 30% mempunyai kenderaan bermotor	
	***E3D** -Kenderaan bukan bermotor*	Kurang 30% mempunyai kenderaan bukan bermotor	31%-49% mempunyai kenderaan bukan bermotor	50% mempunyai kenderaan bukan bermotor	51%-69% mempunyai kenderaan bukan bermotor	Lebih 70% mempunyai kenderaan bukan bermotor	
	***E3E** -Perabot asas*	Kurang 30% mempunyai perabot asas	31%-49% mempunyai perabot asas	50% mempunyai perabot asas	51%-69% mempunyai perabot asas	Lebih 70% mempunyai perabot asas	

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	E4-Apakah tahap daya tahan kewangan dan simpanan bagi bandar ini?						
	E4A *-Ketersediaan kemudahan kredit bagi mengelak bencana*	Kurang 30% kemudahan kredit bagi mengelak bencana tersedia	31%-49% kemudahan kredit bagi mengelak bencana tersedia	Terdapat 50% kemudahan kredit bagi mengelak bencana tersedia	51%-69% kemudahan kredit bagi mengelak bencana tersedia	Lebih 70% kemudahan kredit bagi mengelak bencana tersedia	
	E4B *-Kebolehsampaian kemudahan kredit kepada miskin bandar*	Kebolehsampaian sangat rendah	Kebolehsampaian rendah	Kebolehsampaian sederhana tinggi	Kebolehsampaian tinggi	Kebolehsampaian sangat tinggi	
	E4C *-Simpanan isi rumah*	Simpanan isi rumah kurang 10% daripada pendapatan	Simpanan isi rumah anatara 11%-14% daripada pendapatan	Simpanan isi rumah 15% daripada pendapatan	Simpanan isi rumah antara 16%-29% daripada pendapatan	Simpanan isi rumah lebih 30% daripada pendapatan	
	E4D *-Insurans hartanah isi rumah*	Kurang 30% penduduk mempunyai insurans hartanah isi rumah	31%-49% penduduk mempunyai insurans hartanah isi rumah	50% penduduk mempunyai insurans hartanah isi rumah	51%-69% penduduk mempunyai insurans hartanah isi rumah	Lebih 70% penduduk mempunyai insurans hartanah isi rumah	
	E4E *-Kewujudan kaedah pembiayaan risiko*	Sangat sedikit kaedah pembiayaan risiko	Sedikit kaedah pembiayaan risiko	Sederhana banyak kaedah pembiayaan risiko	Banyak kaedah pembiayaan risiko	Sangat banyak kaedah pembiayaan risiko	
	E5-Apakah tahap daya tahan bajet dan subsidi bagi bandar ini?						
	E5A *-Bajet tahunan bandar bagi Disaster Risk Reduction (DRR) dan Climate Change Adaptation (CCA)*	Kurang 10% bajet tahunan diperuntukan bagi DRR dan CCA	11%-14% bajet tahunan diperuntukan bagi DRR dan CCA	15% bajet tahunan diperuntukan bagi DRR dan CCA	16%-29% bajet tahunan diperuntukan bagi DRR dan CCA	Lebih 30% bajet tahunan diperuntukan bagi DRR dan CCA	
	E5B *-Ketersediaan subsidi bagi membina semula rumah*	Sangat sedikit subsidi bagi membina semula rumah	Sedikit subsidi bagi membina semula rumah	Sederhana banyak subsidi bagi membina semula rumah	Banyak subsidi bagi membina semula rumah	Sangat banyak subsidi bagi membina semula rumah	
	E5C *-Alternatif mata pencarian*	Sangat sedikit alternatif mata pencarian	Sedikit alternatif mata pencarian	Sederhana banyak alternatif mata pencarian	Banyak alternatif mata pencarian	Sangat banyak alternatif mata pencarian	
	E5D *-Penjagaan kesihatan selepas bencana*	Sangat sedikit penjagaan kesihatan selepas bencana	Sedikit penjagaan kesihatan selepas bencana	Sederhana banyak penjagaan kesihatan selepas bencana	Banyak penjagaan kesihatan selepas bencana	Sangat banyak penjagaan kesihatan selepas bencana	
Institusi	**I1-Apakah tahap daya tahan mengarusperdanakan DRR dan CCA bagi bandar ini?**						
	I1A *-Mengarusperdanakan pelan guna tanah bandar*	Pelan guna tanah bandar tidak berinformasi dan tidak lengkap	Pelan guna tanah bandar sedikit berinformasi dan lengkap	Pelan guna tanah bandar sederhana berinformasi dan lengkap	Pelan guna tanah bandar berinformasi dan lengkap	Pelan guna tanah bandar sangat berinformasi dan lengkap	
	I1B *-Dasar perumahan*	Tiada dasar perumahan	Dasar perumahan tidak mengambilkra DRR dan CCA	Dasar perumahan tidak sepenuhnya mengambilkira DRR dan CCA	Dasar perumahan mengambilkira sedikit DRR dan CCA	Dasar perumahan menyeluruh dan inklusif	
	I1C *-Kurikulum pendidikan sekolah*	Kurikulum pendidikan sekolah tidak memasukkan keseluruhan DRR dan CCA	Kurikulum pendidikan sekolah kurang menyentuh DRR dan CCA	Kurikulum pendidikan sekolah memasukkan sebahagian DRR dan CCA	Kurikulum pendidikan sekolah bahagian-bahagian penting DRR dan CCA sahaja	Kurikulum pendidikan sekolah memasukkan keseluruhan DRR dan CCA	

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	***I1D** -Dasar pengangkutan*	Dasar pengangkutan mengabaikan untuk mengambil kira keseluruhan DRR dan CCA	Dasar pengangkutan kurang menyentuh DRR dan CCA	Dasar pengangkutan mengambilkira sebahagian DRR dan CCA	Dasar pengangkutan menyentuh bahagian-bahagian penting DRR dan CCA sahaja	Dasar pengangkutan mengambilkira keseluruhan DRR dan CCA	
	***I1E** - Dasar alam sekitar*	Dasar alam sekitar tidak mengambilkira keseluruhan DRR dan CCA	Dasar alam sekitar kurang menyentuh DRR dan CCA	Dasar alam sekitar mengambilkira sebahagian DRR dan CCA	Dasar alam sekitar mengambilkira bahagian penting dalam DRR dan CCA	Dasar alam sekitar mengambikira keseluruhan DRR dan CCA	
	I2-Apakah tahap daya tahan kecekapan rangka pengurusan krisis bagi bandar ini?						
	***I2A** -Pelan pengurusan bencana sedia ada*	Pelan pengurusan bencana tidak berfungsi seperti yang dirancang	Pelan pengurusan berfungsi dan tidak berfungsi seperti dirancang	Pelan pengurusan bencana berfungsi hanya sebahagian	Pelan pengurusan berfungsi namun tidak efisien	Pelan pengurusan bencana berfungsi sepenuhnya dan efisien	
	***I2B** -Ketidaktentuan perubahan iklim*	Ketidaktentuan iklim melumpuhkan kecekapan pengurusan krisis	Ketidaktentuan iklim menyebabkan pengurusan krisis terganggu	Ketidaktentuan iklim melemahkan sebahagian pengurusan krisis	Ketidaktentuan mengurangkan sedikit kecekapan pengurusan krisis	Ketidaktentuan iklim tidak mengurangkan kecekapan pengurusan krisis	
	***I2C** -Kecekapan pasukan kecemasan semasa dan selepas bencana*	Kecekapan pasukan pada tidak efisien dan sangat minimum	Kecekapan pasukan tidak efisien	Kecekapan pasukan tidak bertindak dengan efisien sepenuhnya	Kecekapan pasukan berada pada tahap bersedia sentiasa	Kecekapan pasukan pada tahap maksimum dan efisien	
	***I2D** -Kesediaan individu pembuat keputusan (pengerusi JPBD)*	Kesediaan pada tahap sangat minimum dan tiada informasi	Kesediaan dan informasi pada tahap minimum	Kesediaan pada tahap separa dan kurang informasi	Kesediaan pada tahap tinggi dan berinformasi	Kesediaan pada tahap maksimum dan penuh informasi	
	I3-Apakah tahap daya tahan kecekapan institusi bagi bandar ini terhadap tindakan kepada bencana?						
	***I3A** -Institusi formal dan tidak formal*	Tahap kecekapan institusi formal dan tidak formal tidak maksimum dan tidak bersedia	Tahap kecekapan institusi formal dan tidak formal adalah minimum	Tahap kecekapan institusi formal dan tidak formal pada tahap separa sedia	Tahap kecekapan institusi formal dan tidak formal pada tahap bersedia	Tahap kecekapan institusi formal dan tidak formal pada tahap maksimum dan sentiasa bersedia	
	***I3B** -Petugas kecemasan yang terlatih*	Petugas tidak terlatih dan tidak bersedia	Petugas kurang terlatih dan kurang bersedia	Petugas terlatih dan bersedia	Petugas sangat terlatih dan bersedia	Petugas sangat terlatih dan sentiasa bersedia	
	***I3C** -Program latihan bencana*	Tiada program latihan bencana	Program latihan kurang dilakukan dalam satu tempoh lama	Program latihan apabila diperlukan	Program latihan cukup dan memadai	Program latihan bencana sangat kerap	
	***I3D** -Pengajaran daripada bencana lalu*	Pengajaran lepas tidak diambil pengajaran	Pengajaran lepas hanya menyedarkan sebilangan sahaja	Pengajaran lepas menyedarkan diri dan mula meningkatkan tahap kesedaran	Pengajaran lepas menjadikan lebih bersedia	Pengajaran lepas menjadikan lebih bersedia dan berdaya tahan	
	I4-Apakah tahap daya tahan kerjasama institusi bersama organisasi dan pihak berkepentingan/*stakeholders* bagi bandar ini?						
	***I4A** -Kebergantungan terhadap institusi luaran*	Sangat bergantung pada institusi luaran	Bergantung bagi mengurangkan beban namun masih terdapat sisi berdikari	Sebahagian perkara terpaksa bergantung pada institusi luaran	Tidak bergantung namun masih memerlukan untuk menampung kekurangan	Tidak bergantung pada institusi luaran	

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	***I4B** -Kerjasama dengan bandar berjiran*	Tiada jalinan kerjasama dibuat	Jalinan dibuat selepas berlaku sesuatu dan tiada kesedaran	Kerjasama hanya tertumpu dalam perkara dianggap penting sahaja	Kerjasama terjalin erat dan berfungsi baik	Kerjasama terjalin sangat erat secara keseluruhan	
	***I4C** -Kerajaan persekutuan dan negeri*	Tiada jalinan kerjasama dibuat	Jalinan dibuat selepas berlaku sesuatu dan tiada kesedaran	Kerjasama hanya tertumpu dalam perkara dianggap penting sahaja	Kerjasama terjalin erat dan berfungsi baik	Kerjasama terjalin sangat erat secara keseluruhan	
	***I4D** -NGO,*	Tiada jalinan kerjasama dibuat	Jalinan dibuat selepas berlaku sesuatu dan tiada kesedaran	Kerjasama hanya tertumpu dalam perkara dianggap penting sahaja	Kerjasama terjalin erat dan berfungsi baik	Kerjasama terjalin sangat erat secara keseluruhan	
	***I4E** -Organisasi swasta*	Tiada jalinan kerjasama dibuat	Jalinan dibuat selepas berlaku sesuatu dan tiada kesedaran	Kerjasama hanya tertumpu dalam perkara dianggap penting sahaja	Kerjasama terjalin erat dan berfungsi baik	Kerjasama terjalin sangat erat secara keseluruhan	
	I5-Apakah tahap daya tahan tadbir urus terbaik bagi bandar ini?						
	***I5A** -Pelaksanaan pelan DRR*	Pelaksanaan DRR sangat tidak efisien dan tidak digunapakai	Pelaksanaan DRR tidak efisien dan tidak digunapakai	Pelaksanaan DRR dijalankan sebahagian sahaja	Pelaksanaan DRR efisien secara keseluruhan	Pelaksanaan DRR sangat efisien pada tahap maksimum	
	***I5B** -Akauntabiliti dan ketelusan kerajaan tempatan*	Akauntabiliti dan ketelusan tidak telus dan sangat cuai	Akauntabiliti dan ketelusan tidak telus	Akauntabiliti dan ketelusan separa telus terdapat kecuaian	Akauntabiliti dan ketelusan telus	Akauntabiliti dan ketelusan sangat telus tiada kecuaian	
	***I5C** -Pelaksanaan kod bangunan* *Kod bangunan berkaitan rekabentuk dan kejuruteraan bangunan (bukan zoning)*	Kod bangunan tidak digunapakai sepenuhnya dan tidak disediakan	Kod bangunan tidak digunapakai sepenuhnya	Kod bangunan digunapakai pada sebahagian kawasan sahaja	Kod bangunan digunapakai sepenuhnya	Kod bangunan digunapakai sepenuhnya dan efisien	
	***I5D** -Kecekapan sistem amaran awal*	Sistem amaran sentiasa tidak berfungsi dan tidak tepat	Sistem amaran sentiasa tidak berfungsi sebaiknya dan lambat	Sistem amaran berfungsi dan kurang tepat	Sistem amaran sentiasa berfungsi apabila disetkan	Sistem amaran sentiasa berfungsi dan tepat	
	***I5E** -Kekerapan latihan bencana*	Tidak pernah menjalankan latihan	Latihan sangat kurang dan dibuat bila berlaku bencana	Latihan dibuat kurang 5 kali setahun	Latihan dibuat kerap setiap 3 bulan	Latihan dibuat secara kerap dalam setahun setiap bulan	
Alam Sekitar	**AS1-Apakah tahap daya tahan intensiti bahaya alam sekitar bagi bandar ini?**						
	***AS1A** -Banjir*	Intensiti sangat tinggi	Intensiti Tinggi	Intensiti Sederhana	Intensiti Rendah	Tiada berlaku bencana	
	***AS1B** Tsunami*	Intensiti sangat tinggi	Intensiti Tinggi	Intensiti Sederhana	Intensiti Rendah	Tiada berlaku bencana	
	***AS1C** - Tanah runtuh*	Intensiti sangat tinggi	Intensiti Tinggi	Intensiti Sederhana	Intensiti Rendah	Tiada berlaku bencana	
	***AS1D** -Kenaikan paras laut*	Intensiti sangat tinggi	Intensiti Tinggi	Intensiti Sederhana	Intensiti Rendah	Tiada berlaku bencana	
	***AS1E** -Hakisan pantai*	Intensiti sangat tinggi	Intensiti Tinggi	Intensiti Sederhana	Intensiti Rendah	Tiada berlaku bencana	
	***AS1F** -Gempa bumi*	Intensiti sangat tinggi	Intensiti Tinggi	Intensiti Sederhana	Intensiti Rendah	Tiada berlaku bencana	
	AS2-Apakah tahap daya tahan kekerapan bahaya alam sekitar bagi bandar ini?						

KOMPONEN	SOALAN BERKENAAN INDIKATOR	RANKING TAHAP DAYA TAHAN					INPUT / MAKLUM BALAS
		1 Sangat Rendah	2 Rendah	3 Sederhana	4 Memuaskan	5 Tinggi	
	***AS2A** -Banjir*	Sangat kerap berlaku banjir lebih 2 kali setahun	Kerap berlaku banjir sekurang-kurangnya setahun sekali	Berlaku banjir kadang-kadang atas faktor manusia	Berlaku banjir atas faktor perubahan iklim	Tiada berlaku banjir	
	***AS2B** -Tsunami*	Sangat kerap berlaku tsunami lebih 2 kali setahun	Kerap berlaku tsunami sekurang-kurangnya setahun sekali	Berlaku tsunami sekali dalam 5 tahun	Berlaku tsunami atas faktor perubahan iklim	Tiada berlaku tsunami	
	***AS2C** - Ttanah runtuh*	Sangat kerap berlaku tanah runtuh lebih 2 kali setahun	Kerap berlaku tanah runtuh sekurang-kurangnya setahun sekali	Berlaku tanah runtuh kadang-kadang atas faktor manusia	Berlaku tanah runtuh atas faktor perubahan iklim	Tiada berlaku tanah runtuh	
	***AS2D** -Kenaikan paras laut*	Sangat kerap berlaku kenaikan paras laut lebih 2 kali setahun	Kerap berlaku kenaikan paras laut sekurang-kurangnya setahun sekali	Berlaku kenaikan paras laut kadang-kadang atas faktor manusia	Berlaku kenaikan paras laut atas faktor perubahan iklim	Tiada berlaku kenaikan paras laut	
	***AS2E** - Hakisan pantai*	Sangat kerap berlaku hakisan pantai lebih 2 kali setahun	Kerap berlaku hakisan pantai sekurang-kurangnya setahun sekali	Berlaku hakisan pantai kadang-kadang atas faktor manusia	Berlaku hakisan pantai atas faktor perubahan iklim	Tiada berlaku hakisan pantai	
	***AS2F** -Gempa bumi*	Sangat kerap berlaku gempa bumi lebih 2 kali setahun	Kerap berlaku gempa bumi sekurang-kurangnya setahun sekali	Berlaku gempa bumi sekali dalam 5 tahun	Berlaku gempa bumi atas faktor aktiviti seismik	Tiada berlaku gempa bumi	
	AS3-Apakah tahap daya tahan perkhidmatan ekosistem bagi bandar ini?						
	***AS3A** -Kualiti biodiversiti bandar*	Sangat rendah	Rendah	Sederhana	Tinggi	Sangat tinggi	
	***AS3B** -Tanah*	Sangat rendah	Rendah	Sederhana	Tinggi	Sangat tinggi	
	***AS3C** -Udara*	Sangat rendah	Rendah	Sederhana	Tinggi	Sangat tinggi	
	***AS3D** -Air*	Sangat rendah	Rendah	Sederhana	Tinggi	Sangat tinggi	
	***AS3E** -Kelembapan/ kemasinan bandar* *Bergantung kepada lokasi bandar*	Sangat rendah	Rendah	Sederhana	Tinggi	Sangat tinggi	
	AS4-Apakah tahap daya tahan guna tanah dari segi alam sekitar bagi bandar ini?						
	***AS4A** -Kawasan yang terdedah kepada bahaya berkaitan cuaca*	Sangat terdedah bahaya	Terdedah kepada bahaya	Sederhana bahaya	Tidak terdedah bahaya	Terhindar dari terdedah bahaya	
	***AS4B** -Morfologi bandar*	Morfologi bandar berubah pesat	Morfologi bandar berubah secara kerap	Morfologi bandar berubah pada kawasan / jalan-jalan tumpuan	Morfologi bandar terpelihara terutama memiliki nilai warisan	Morfologi bandar masih terpelihara seluruh bandar	
	***AS4C** -Petempatan dalam kawasan bahaya*	Keseluruhan berada dalam kawasan bahaya	70% petempatan terdedah kepada kawasan bahaya	50% sahaja dalam kawasan bahaya	Sebahagian kecil 30 sahaja dalam kawasan bahaya	Tiada petempatan	
	***AS4D** -Kawasan hijau dalam bandar sedia ada*	Hasil diekploitasi	Kawasan hijau semakin sedikit	Hanya sebahagian sahaja yang tinggal	Terdapat banyak disesetengah kawasan sahaja	Kekal dan terpelihara	

KOMPONEN	SOALAN BERKENAAN INDIKATOR	RANKING TAHAP DAYA TAHAN					INPUT / MAKLUM BALAS
		1 Sangat Rendah	2 Rendah	3 Sederhana	4 Memuaskan	5 Tinggi	
	***AS4E** -Kehilangan ruang hijau bandar dalam tempoh 50 tahun sebelum*	Kehilangan secara pesat dan pantas	Kehilangan berlaku setiap tahun	Masih terkawal dan disediakan kawasan simpan	Berlaku disesetengah kawasan sahaja bukan dalam bandar	Sangat minimum dan terpelihara	
	AS5-Apakah tahap daya tahan dasar alam sekitar dan keselamatan makanan bagi bandar ini?						
	***AS5A** -Pematuhan terhadap polisi alam sekitar*	Tidak mematuhi dan patuh	Tidak mematuhi namun masih mempertimbangkan	Mematuhi polisi yang berkaitan sahaja	Mematuhi sebahagian besar polisi bagi tujuan melindungi	Sangat patuh dengan ketat	
	***AS5B** -Kewujudan dasar pemeliharaan alam sekitar*	Tidak membantu untuk tujuan pemeliharaan	Tidak membantu namun tidak melanggar dasar	Membantu bagi perkara yang berkaitan dikawasan	Membantu bagi sebahagian besar dasar yang dinyatakan	Sangat membantu untuk berdaya tahan	
	***AS5C** -Sistem pengurusan sisa*	Tidak efisien dan tidak berfungsi	Tidak efisien namun berfungsi	Efisien namun kadang-kadang tidak	Efisien mengikut jadual	Sangat efisien dan berkala	
	***AS5D** -Kemerosotan pencemaran udara*	Pencemaran udara berpunca daripada kenderaan, pembinaan dan pembakaran terbuka	Pencemaran udara teruk	Berlaku dalam bandar sahaja	Berlaku pencemaran mengikut kes kemarau atau pembakaran hutan	Tiada kes pencemaran udara	
	***AS5E** -Bekalan makanan semasa bencana*	Tidak disediakan bekalan dan berlaku terputus bekalan	Bekalan disediakan namun tidak mencukupi	Bekalan hanya mencukupi untuk mangsa dalam tempoh bencana	Bekalan yang mencukupi untuk keperluan mangsa	Sangat mencukupi dan memenuhi keperluan semasa mangsa	

----------TERIMA KASIH----------

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Appendix F Ranking of indicators or factors for resilience community using RII value/score

In this research, the RII method was used to determine the relative importance of the indicators for all the three community capitals of economic, social and natural or environmental that contribute to disaster resilience community. The RII for each factor was calculated using the formula discussed in section 3.6. The RII value ranges from 0 to 1 (0 not inclusive); the higher is the RII score, the more important is the factor of disaster resilience community. The RII was then ranked one (1) to forty-four (44) cross capitals (economic, social and natural or environmental). The resilience factors based on RII were assesses for each of the case-study areas.

a) Mukim Serendah and Mukim Kuang, Selangor

A detailed calculation was performed of the RII values for community capital indicators as assessed by the respondents from Mukim Serendah and Mukim Kuang (refer Table F-01).

Table F-01 Ranking of indicators or factors for resilience community using RII value/score by the respondents from Mukim Serendah and Mukim Kuang (n=64)

Resilience Factors Components	Indicators / Factors Contribute to Resilience	Respondents Scores (A)					Total (a)	Population, n (b)	A*n (c)	RII (a)/(c)	Rank
		[1] Very low importance	[2] Low importance	[3] Medium importance	[4] High importance	[5] Very high importance					
Economic	Household income	0	0	0	27	37	293	64	320	0.9156	2
	Diversified income streams / sources of income	0	0	2	36	26	280	64	320	0.8750	34
	Aid recipient from government and CSOs/NGOs	0	0	2	33	29	283	64	320	0.8844	19
	Diversified local businesses	0	0	0	42	22	278	64	320	0.8688	38
	Unemployment rate	0	0	2	35	27	281	64	320	0.8781	31
	Job opportunities	0	0	0	31	33	289	64	320	0.9031	6
	Individual savings	0	0	0	32	32	288	64	320	0.9000	7
	Community fund	0	0	1	39	24	279	64	320	0.8719	35
	Community own resources	0	0	2	32	30	284	64	320	0.8875	17
	Business continuity plan	0	0	4	29	31	283	64	320	0.8844	19
	Disaster insurance	0	0	3	27	34	287	64	320	0.8969	9
	Emergency fund	0	0	0	33	31	287	64	320	0.8969	9
	Inward investment	2	0	8	38	16	258	64	320	0.8063	44
	Connection with regional economic	1	0	9	39	15	259	64	320	0.8094	43
Social	House ownership	0	0	1	30	33	288	64	320	0.9000	7
	Close interaction among people	0	0	0	28	36	292	64	320	0.9125	3
	Neighbours are reliable during the time of crisis	0	0	2	34	28	282	64	320	0.8813	27
	Possession of skills of DRR through training and education	0	0	2	33	29	283	64	320	0.8844	19
	Provision of health services and sanitation	0	0	0	37	27	283	64	320	0.8844	19
	Accessibility of local services	0	0	0	39	25	281	64	320	0.8781	31
	Level of corruption	0	0	0	30	34	290	64	320	0.9063	5
	Communication between stakeholder groups	0	0	0	26	38	294	64	320	0.9188	1
	Empowerment of ethnic / religious minorities / female	0	0	4	33	27	279	64	320	0.8719	35
	Open minded community	0	0	2	34	28	282	64	320	0.8813	27
	Transparent land ownership regulations	0	0	0	37	27	283	64	320	0.8844	19
	Control of development trajectories by stakeholders	0	0	3	32	29	282	64	320	0.8813	27
	Governance structure at multiple geographical scale	0	0	0	37	27	283	64	320	0.8844	19

Resilience Factors Components	Indicators / Factors Contribute to Resilience	Respondents Scores (A)					Total (a)	Population, n (b)	A*n (c)	RII (a)/(c)	Rank
		[1] Very low importance	[2] Low importance	[3] Medium importance	[4] High importance	[5] Very high importance					
	Community support system and social institution	0	0	1	27	36	291	64	320	0.9094	4
	Safety and wellbeing	0	0	0	35	29	285	64	320	0.8906	13
	Leadership and participation	0	0	0	33	31	287	64	320	0.8969	9
Natural or Environmental	Local biodiversity status	0	0	2	35	27	281	64	320	0.8781	31
	Water availability and accessibility	0	0	0	37	27	283	64	320	0.8844	19
	Sustainable soil management	0	0	4	42	18	270	64	320	0.8438	40
	Predictable agricultural yields	0	0	3	29	32	285	64	320	0.8906	13
	Supply of energy from local source	0	0	3	48	13	266	64	320	0.8313	42
	Multifunctional environmental resources	0	0	2	30	32	286	64	320	0.8938	12
	Infrastructure redundancy-alternative road for accessibility to avoid stranded	0	0	1	35	28	283	64	320	0.8844	19
	ICT infrastructure	0	0	1	40	23	278	64	320	0.8688	38
	Local transportation system	0	0	1	33	30	285	64	320	0.8906	13
	Land-use planning and urban design	0	0	0	35	29	285	64	320	0.8906	13
	Availability of contingency, emergency, and recovery planning	0	0	0	41	23	279	64	320	0.8719	35
	Equity and diversity	0	0	0	36	28	284	64	320	0.8875	17
	Availability of research and development for DRM	2	0	1	41	20	269	64	320	0.8406	41
	Land regulation and enforcement	0	0	1	36	27	282	64	320	0.8813	27

Source: research fieldwork in 2018/2019

The ten (10) least important factors contributing to the disaster resilience of community are listed in Table F-02.

Table F-02 The least important indicators or factors contributing to disaster resilience community as ranked by the respondents from Mukim Serendah and Mukim Kuang

No.	Key Component	Least Important Indicators / Factors	RII	Rank
1	Economic	Inward investment	0.8063	44
2	Economic	Connection with regional economic	0.8094	43
3	Natural or Environmental	Supply of energy from local source	0.8313	42
4	Natural or Environmental	Availability of research and development for DRM	0.8406	41
5	Natural or Environmental	Sustainable soil management	0.8438	40
6	Economic	Diversified local businesses	0.8688	38
7	Natural or Environmental	ICT infrastructure	0.8688	38
8	Economic	Community Fund	0.8719	35
9	Social	Empowerment of ethnic / religious minorities / female	0.8719	35
10	Natural or Environmental	Availability of contingency, emergency, and recovery planning	0.8719	35

Source: research fieldwork in 2018/2019/2020

However, based on RII score, very small differences were noted between the RII scores of these factors (i.e. with only + 0.05 difference). Therefore, it is worth considering, at least from the researcher's point of view, that the ten least important factors also be included in the discussions of result and in the later phase of implementation of this study. Among the ten least important factors (due to indicators

sharing the same RII value) in building disaster resilience community as identified by the respondents, five (5) are from natural or environmental capitals, four (4) are from the economic and social capitals, and one (1) from social capitals. This economic capitals received less attention due to the adequate supply of economic support due to the geographical location being near to the greater Kuala Lumpur. Interestingly, the least important indicator ranked by the respondents in Mukim Serendah and Mukim Kuang for social capitals is 'empowerment of ethnic / religious minorities / female'. Based on the field observation and survey interview, the respondents in Mukim Serendah and Mukim Kuang are facing with the issues of empowerment of target interest groups. This small target group is not directly involved in local disaster management, although they are also vulnerable to disaster. The local issues and needs received more attention by the respondents compared to regional economic issues, including inward investment.

b) Mukim Kundasang, Ranau District, Sabah

A detailed calculation was performed of the RII values for community capital indicators as assessed by the respondents from Mukim Kundasang (refer Table G-03).

Table F-03 Rank of indicators or factors for resilience community using RII value / score by respondents of Mukim Kundasang (n=27)

Resilience Factors Components	Indicators / Factors Contribute to Resilience	Respondents Scores (A)					Total (a)	Population, n (b)	A*n (c)	RII (a)/(c)	Rank
		[1] Very low importance	[2] Low importance	[3] Medium importance	[4] High importance	[5] Very high importance					
Economic	Household income	0	0	1	13	13	120	27	135	0.8889	13
	Diversified income streams / sources of income	1	0	3	17	6	108	27	135	0.8000	43
	Aid recipient from government and CSOs/NGOs	0	0	0	13	14	122	27	135	0.9037	7
	Diversified local businesses	0	0	1	15	11	118	27	135	0.8741	19
	Unemployment rate	0	0	1	18	8	115	27	135	0.8519	26
	Job opportunities	0	0	0	15	12	120	27	135	0.8889	13
	Individual savings	0	0	1	9	17	124	27	135	0.9185	3
	Community fund	0	0	1	19	7	114	27	135	0.8444	29
	Community own resources	0	0	3	16	8	113	27	135	0.8370	33
	Business continuity plan	0	0	1	21	5	112	27	135	0.8296	37
	Disaster insurance	0	0	4	17	6	110	27	135	0.8148	40
	Emergency fund	0	0	2	17	8	114	27	135	0.8444	29
	Inward investment	1	0	2	14	10	113	27	135	0.8370	33
	Connection with regional economic	0	0	1	22	4	111	27	135	0.8222	38
Social	House ownership	0	0	0	12	15	123	27	135	0.9111	6
	Close interaction among people	0	0	0	9	18	126	27	135	0.9333	2
	Neighbours are reliable during the time of crisis	0	0	0	5	22	130	27	135	0.9630	1
	Possession of skills of DRR through training and education	0	0	2	12	13	119	27	135	0.8815	16
	Provision of health services and sanitation	0	0	3	16	8	113	27	135	0.8370	33
	Accessibility of local services	0	0	2	23	2	108	27	135	0.8000	43
	Level of corruption	1	0	4	14	8	109	27	135	0.8074	42
	Communication between stakeholder groups	0	0	0	11	16	124	27	135	0.9185	3

Resilience Factors Components	Indicators / Factors Contribute to Resilience	Respondents Scores (A)					Total (a)	Population, n (b)	A*n (c)	RII (a)/(c)	Rank
		[1] Very low importance	[2] Low importance	[3] Medium importance	[4] High importance	[5] Very high importance					
	Empowerment of ethnic / religious minorities / female	0	0	1	18	8	115	27	135	0.8519	26
	Open minded community	0	0	0	18	9	117	27	135	0.8667	22
	Transparent land ownership regulations	0	0	0	16	11	119	27	135	0.8815	16
	Control of development trajectories by stakeholders	0	0	2	13	12	118	27	135	0.8741	19
	Governance structure at multiple geographical scale	0	0	0	11	16	124	27	135	0.9185	3
	Community support system and social institution	0	0	0	13	14	122	27	135	0.9037	7
	Safety and wellbeing	0	0	1	12	14	121	27	135	0.8963	10
	Leadership and participation	0	0	0	14	13	121	27	135	0.8963	10
Natural or Environmental	Local biodiversity status	0	0	0	19	8	116	27	135	0.8593	24
	Water availability and accessibility	0	0	0	18	9	117	27	135	0.8667	22
	Sustainable soil management	0	0	7	11	9	110	27	135	0.8148	40
	Predictable agricultural yields	0	0	0	21	6	114	27	135	0.8444	29
	Supply of energy from local source	0	0	3	18	6	111	27	135	0.8222	38
	Multifunctional environmental resources	0	0	0	20	7	115	27	135	0.8519	26
	Infrastructure redundancy-alternative road for accessibility to avoid stranded	0	0	3	13	11	116	27	135	0.8593	24
	ICT infrastructure	0	0	4	14	9	113	27	135	0.8370	33
	Local transportation system	0	0	3	15	9	114	27	135	0.8444	29
	Land-use planning and urban design	0	0	3	11	13	118	27	135	0.8741	19
	Availability of contingency, emergency, and recovery planning	0	0	0	13	14	122	27	135	0.9037	7
	Equity and diversity	0	0	0	16	11	119	27	135	0.8815	16
	Availability of research and development for DRM	1	0	0	11	15	120	27	135	0.8889	13
	Land regulation and enforcement	0	0	0	14	13	121	27	135	0.8963	10

Source: research fieldwork in 2018/2019/2020

The twelve (12) least important factors contributing to the resilience of community towards reducing disaster are listed in Table F-04. However, in terms of the RII scores, very small differences were noted between the factors (i.e. with only + 0.05 difference). The difference is also considered quite marginal compared to the twelve (12) most important factors listed in Table 4.30. Therefore, it worth considering, at least from the researcher's point of view, that the twelve (12) least important factors be included in the discussions of result and the later phase of implementation of this study. Among the twelve (12) least important factors in building disaster resilience community as identified by the respondents, six (6) are from economic capitals; and three (3) are from both social capitals and natural or environmental capitals each. Economic capitals indicators that received a less RII value are ‘diversified income streams / source of income’, ‘disaster insurance’, ‘connection with regional economy’, ‘business continuity plan’, ‘inward investment’, and ‘community own resources’.

Table F-04 Ranking of the 12 least important indicators or factors contributing to disaster resilience community by the respondents from Mukim Kundasang

No.	Key Component	Least Important Indicators / Factors	RII	Rank
1	Social	Accessibility of local services	0.8000	43
2	Economic	Diversified income streams / sources of income	0.8000	43
3	Social	Level of corruption	0.8074	42
4	Natural or Environmental	Sustainable soil management	0.8148	40
5	Economic	Disaster insurance	0.8148	40
6	Natural or Environmental	Supply of energy from local source	0.8222	38
7	Economic	Connection with regional economic	0.8222	38
8	Economic	Business continuity plan	0.8296	37
9	Natural or Environmental	ICT infrastructure	0.8370	33
10	Social	Provision of health services and sanitation	0.8370	33
11	Economic	Inward investment	0.8370	33
12	Economic	Community own resources	0.8370	33

Source: research fieldwork in 2018/2019/2020

Consistence with the overall ranking of least important factors, 'connection with regional economic' and 'inward investment' was given less consideration by the respondents of Mukim Kundasang as they focus more on local issues and needs. Mukim Kundasang has abundant local resources, hence less emphasis is given to long-term planning. While 'diversified income streams / source of income' is less important in the respondents' opinion because majority of respondents are among the government servant, therefore, there is less intention to increase household income through a diversified income stream. Interestingly, the respondents of Mukim Kundasang gave less priority to 'community own resources' in building disaster resilience community. One possible reason is the small income generated by the community own resources, which is inadequate to be used for disaster management. And lastly, for the social capitals factors falls in the least important factor, namely 'accessibility of local services', 'level of corruption', and 'provision of health services and sanitation'. The respondents considered 'level of corruption' as being less important because they believed that in a disaster management, the stakeholders shall work hand in hand to prepare, respond, and recover together inclusively notwithstanding the differences in religion, ethnic, and race. Overall, the local respondents are satisfied with the availability of public facilities, and no further suggestion was made for improvement. The three (3) natural or environment indicators are 'sustainable soil management', 'supply of energy from local source', and 'ICT infrastructure'. Sustainable soil management are viewed as less important factors since Mukim Kundasang do not face any environmental issue, such as pollution. Therefore, land-use planning was given less consideration as a means to ensure sustainable development. Mukim Kundasang is a seismic-prone area and has experienced multi-hazards disaster such as earthquake, landslide, and debris flow (and contributed to the floods in the neighboring districts - Kota Belud district). As such, the respondents from Mukim Kundasang have experience and control in dealing with multi-hazard in pre,

during, and post-disaster events. Thus, the need for contingency, emergency, and recovery planning is given less consideration.

c) Mukim Tanah Rata, Cameron Highlands District, Pahang

A detailed calculation was performed of the RII values for community capital indicators as assessed by the respondents from Mukim Tanah Rata (refer Table F-05)

Table F-05 Ranking of indicators or factors for resilience of community using RII value/score as rated by the respondents from Mukim Tanah Rata (n=65)

Resilience Factors Components	Indicators / Factors Contribute to Resilience	Respondents Scores (A)					Total (a)	Population, n (b)	A*n (c)	RII (a)/(c)	Rank
		[1] Very low importance	[2] Low importance	[3] Medium importance	[4] High importance	[5] Very high importance					
Economic	Household income	0	0	0	21	44	304	65	325	0.9354	1
	Diversified income streams / sources of income	0	0	2	35	28	286	65	325	0.8800	30
	Aid recipient from government and CSOs/NGOs	0	0	1	31	33	292	65	325	0.8985	13
	Diversified local businesses	0	0	0	31	34	294	65	325	0.9046	8
	Unemployment rate	0	0	2	24	39	297	65	325	0.9138	4
	Job opportunities	0	0	1	30	34	293	65	325	0.9015	11
	Individual savings	0	0	0	37	28	288	65	325	0.8862	24
	Community fund	0	0	3	25	37	294	65	325	0.9046	8
	Community own resources	1	0	4	26	34	287	65	325	0.8831	27
	Business continuity plan	0	0	4	33	28	284	65	325	0.8738	39
	Disaster insurance	0	0	2	33	30	288	65	325	0.8862	24
	Emergency fund	0	0	1	25	39	298	65	325	0.9169	3
	Inward investment	0	0	4	29	32	288	65	325	0.8862	24
	Connection with regional economic	0	0	2	41	22	280	65	325	0.8615	42
Social	House ownership	0	0	2	36	27	285	65	325	0.8769	37
	Close interaction among people	0	0	0	35	30	290	65	325	0.8923	17
	Neighbours are reliable during the time of crisis	0	0	1	30	34	293	65	325	0.9015	11
	Possession of skills of DRR through training and education	0	0	3	32	30	287	65	325	0.8831	27
	Provision of health services and sanitation	0	0	2	26	37	295	65	325	0.9077	7
	Accessibility of local services	0	0	1	32	32	291	65	325	0.8954	15
	Level of corruption	0	0	1	29	35	294	65	325	0.9046	8
	Communication between stakeholder groups	0	0	0	39	26	286	65	325	0.8800	30
	Empowerment of ethnic / religious minorities / female	0	0	2	32	31	289	65	325	0.8892	21
	Open minded community	0	0	3	29	33	290	65	325	0.8923	17
	Transparent land ownership regulations	0	0	0	39	26	286	65	325	0.8800	30
	Control of development trajectories by stakeholders	0	0	5	30	30	285	65	325	0.8769	37
	Governance structure at multiple geographical scale	0	0	1	32	32	291	65	325	0.8954	15
	Community support system and social institution	0	0	0	33	32	292	65	325	0.8985	13
	Safety and wellbeing	0	0	2	35	28	286	65	325	0.8800	30
	Leadership and participation	0	0	0	29	36	296	65	325	0.9108	6
Natural or Environmental	Local biodiversity status	0	0	1	34	30	289	65	325	0.8892	21
	Water availability and accessibility	0	0	0	39	26	286	65	325	0.8800	30
	Sustainable soil management	0	0	6	27	32	286	65	325	0.8800	30
	Predictable agricultural yields	0	0	0	42	23	283	65	325	0.8708	41
	Supply of energy from local source	0	0	1	26	38	297	65	325	0.9138	4
	Multifunctional environmental resources	0	0	1	33	31	290	65	325	0.8923	17
	Infrastructure redundancy-alternative road for accessibility to avoid stranded	0	0	3	30	32	289	65	325	0.8892	21

Resilience Factors Components	Indicators / Factors Contribute to Resilience	Respondents Scores (A)					Total (a)	Population, n (b)	A*n (c)	RII (a)/(c)	Rank
		[1] Very low importance	[2] Low importance	[3] Medium importance	[4] High importance	[5] Very high importance					
	ICT infrastructure	0	0	2	34	29	287	65	325	0.8831	27
	Local transportation system	0	0	3	39	23	280	65	325	0.8615	42
	Land-use planning and urban design	0	0	2	41	22	280	65	325	0.8615	42
	Availability of contingency, emergency, and recovery planning	0	0	0	41	24	284	65	325	0.8738	39
	Equity and diversity	0	0	0	21	44	304	65	325	0.9354	1
	Availability of research and development for DRM	0	0	0	39	26	286	65	325	0.8800	30
	Land regulation and enforcement	0	0	0	35	30	290	65	325	0.8923	17

Source: research fieldwork in 2020

The fifteen (15) least important factors contributing to a resilient community towards reducing disaster are listed in Table F-06. However, based on the RII scores, very small differences were noted in the RII score between the factors (i.e. + 0.05 difference). The difference is also considered quite marginal compared to the 10 most important factors listed in Table 4.32. Therefore, it worth considering, at least from the researcher's point of view, that the 15 least important factors be included in the discussions of result and to be included in the later phase of implementation of this study.

Table F-06 The least important indicators or factors contributing to disaster resilience community as ranked by the respondents of Mukim Tanah Rata

No.	Key Component	Least Important Indicators / Factors	RII	Rank
1	Economic	Connection with regional economic	0.8615	42
2	Natural or Environmental	Local transportation system	0.8615	42
3	Natural or Environmental	Land-use planning and urban design	0.8615	42
4	Natural or Environmental	Predictable agricultural yields	0.8708	41
5	Natural or Environmental	Availability of contingency, emergency, and recovery planning	0.8738	39
6	Economic	Business continuity plan	0.8738	39
7	Social	Control of development trajectories by stakeholders	0.8769	37
8	Social	House ownership	0.8769	37
9	Economic	Diversified income streams / sources of income	0.8800	30
10	Social	Communication between stakeholder groups	0.8800	30
11	Social	Transparent land ownership regulations	0.8800	30
12	Social	Safety and wellbeing	0.8800	30
13	Natural or Environmental	Water availability and accessibility	0.8800	30
14	Natural or Environmental	Sustainable soil management	0.8800	30
15	Natural or Environmental	Availability of research and development for DRM	0.8800	30

Source: research fieldwork in 2020

Among the fifteen (15) least important factors (due to indicators sharing the same RII value) in building disaster resilience community as identified by the respondents, three (3) are from the economic capitals; five (5) from social capitals; and seven (7) from natural or environmental capitals. The three (3) economic capitals indicators with less RII value are 'connection with regional economic', 'businesses continuity plan', and 'diversified income stream / source of income'. Obviously, the respondents from Mukim Tanah Rata are more concerned with the local issue rather than with the regional and investment issues in the area. Furthermore, majority of the respondents from Mukim Tanah Rata are government servants and therefore considered 'diversified income stream / source of income' as not a focus. However, the respondents foresee the challenges in establishing and managing the 'community own resources' to strengthen the local economic of Mukim Tanah Rata. Meanwhile, the five (5) social capitals factors with lower RII score are 'control of development trajectories by stakeholders', 'house ownership', 'communication between stakeholder groups', 'transparent land ownership regulations', and 'safety and wellbeing'.

The respondents from Mukim Tanah Rata also do not have any issue with 'communication between stakeholder groups' and therefore, less consideration was given to the factor. The seven (7) natural or environment indicators are 'local transportation system', 'land-use planning and urban design', 'predictable agricultureal yields', 'availability of contingency, emergency, and recovery planning', 'water availability and accessibility', 'sustainable soil management', and 'availability of research and development for DRM'. The respondents from Mukim Tanah Rata viewed the 'availability of research and development for DRM' as the least important due to their experience in CBDRM training. They opined that the agencies in disaster risk management (including government, privates, academics and CSOs/NGOs) are highly trained and have ample scientific knowledge in DRM. Therefore, transfer of knowledge to the local community is adequate. The other natural or environmental capitals also given less consideration due to the knowledge of the respondents on agricultural-related activities where they are able to predict agricultural yield (indeed impacted by monsoon season) and limitation and potential of local environmental resources, and have practiced best practice of land-use planning.

d) Overall RII Score and Rank of Community Capital Indicators or Factors

The overall RII score and rank of community capital indicators or factors for four case study areas are shown in Table F-07.

Table F-07 Ranking of indicators or factors for resilience community using RII value / score for overall case study areas (n=156)

Resilience Factors Components	Indicators / Factors Contribute to Resilience	Respondents Scores (A)					Total (a)	Population, n (b)	A*n (c)	RII (a)/(c)	Rank
		[1] Very low importance	[2] Low importance	[3] Medium importance	[4] High importance	[5] Very high importance					
Economic	Household income	0	0	1	61	94	717	156	780	0.9192	1
	Diversified income streams / sources of income	1	0	7	88	60	674	156	780	0.8641	40
	Aid recipient from government and CSOs/NGOs	0	0	3	73	80	701	156	780	0.8987	9
	Diversified local businesses	0	0	1	88	67	690	156	780	0.8846	20
	Unemployment rate	0	0	5	77	74	693	156	780	0.8885	13
	Job opportunities	0	0	1	76	79	702	156	780	0.9000	8
	Individual savings	0	0	1	78	77	700	156	780	0.8974	10
	Community fund	0	0	5	83	68	687	156	780	0.8808	25
	Community own resources	1	0	9	74	72	684	156	780	0.8769	31
	Business continuity plan	0	0	9	83	64	679	156	780	0.8705	36
	Disaster insurance	0	0	9	77	70	685	156	780	0.8782	28
	Emergency fund	0	0	3	75	78	699	156	780	0.8962	11
	Inward investment	3	0	14	81	58	659	156	780	0.8449	43
	Connection with regional economic	1	0	12	102	41	650	156	780	0.8333	44
Social	House ownership	0	0	3	78	75	696	156	780	0.8923	13
	Close interaction among people	0	0	0	72	84	708	156	780	0.9077	2
	Neighbours are reliable during the time of crisis	0	0	3	69	84	705	156	780	0.9038	4
	Possession of skills of DRR through training and education	0	0	7	77	72	689	156	780	0.8833	21
	Provision of health services and sanitation	0	0	5	79	72	691	156	780	0.8859	18
	Accessibility of local services	0	0	3	94	59	680	156	780	0.8718	35
	Level of corruption	1	0	5	73	77	693	156	780	0.8885	13
	Communication between stakeholder groups	0	0	0	76	80	704	156	780	0.9026	6
	Empowerment of ethnic / religious minorities / female	0	0	7	83	66	683	156	780	0.8756	32
	Open minded community	0	0	5	81	70	689	156	780	0.8833	21
	Transparent land ownership regulations	0	0	0	92	64	688	156	780	0.8821	23
	Control of development trajectories by stakeholders	0	0	10	75	71	685	156	780	0.8782	28
	Governance structure at multiple geographical scale	0	0	1	80	75	698	156	780	0.8949	12
	Community support system and social institution	0	0	1	73	82	705	156	780	0.9038	4
	Safety and wellbeing	0	0	3	82	71	692	156	780	0.8872	17
	Leadership and participation	0	0	0	76	80	704	156	780	0.9026	6
Natural or Environmental	Local biodiversity status	0	0	3	88	65	686	156	780	0.8795	26
	Water availability and accessibility	0	0	0	94	62	686	156	780	0.8795	26
	Sustainable soil management	0	0	17	80	59	666	156	780	0.8538	42
	Predictable agricultural yields	0	0	3	92	61	682	156	780	0.8744	34
	Supply of energy from local source	0	0	7	92	57	674	156	780	0.8641	40
	Multifunctional environmental resources	0	0	3	83	70	691	156	780	0.8859	18
	Infrastructure redundancy-alternative road for accessibility to avoid stranded	0	0	7	78	71	688	156	780	0.8821	23
	ICT infrastructure	0	0	7	88	61	678	156	780	0.8692	38
	Local transportation system	0	0	7	87	62	679	156	780	0.8705	36
	Land-use planning and urban design	0	0	5	87	64	683	156	780	0.8756	32
	Availability of contingency, emergency, and recovery planning	0	0	0	95	61	685	156	780	0.8782	28
	Equity and diversity	0	0	0	73	83	707	156	780	0.9064	3
	Availability of research and development for DRM	3	0	1	91	61	675	156	780	0.8654	39
	Land regulation and enforcement	0	0	1	85	70	693	156	780	0.8885	13

Source: research fieldwork in 2018/2019/2020

Meanwhile, the ten (10) least important factors contributing to the disaster resilience of a community are listed in Table F-08. However, it is worth mentioning there were very small differences noted in the RII scores between these factors (i.e. with only + 0.05 difference). The difference is also considered quite marginal compared to the 10 most important factors listed in Table 4.34. Despite a small gap in RII value score, at least from the researcher's point of view, these 10 least important factors could be included in discussions of the result and in the later phase of implementation of this study.

Table F-08 Ranking of 10 least important indicators or factors contributing to disaster resilience community – all components

No.	Key Component	10 Least Important Indicators / Factors	RII	Rank
1	Economic	Connection with regional	0.8333	44
2	Economic	Inward investment	0.8449	43
3	Natural	Sustainable soil management	0.8538	42
4	Economic	Diversified income streams / sources of income	0.8641	40
5	Natural	Supply of energy from local source	0.8641	40
6	Natural	Availability of research and development for DRM	0.8654	39
7	Natural	ICT infrastructure	0.8692	38
8	Economic	Business continuity plan	0.8705	36
9	Natural	Local transportation system	0.8705	36
10	Social	Accessibility of local services	0.8718	35

Source: research fieldwork in 2018/2019/2020

The least important factors in building disaster resilience communities as identified by respondents are five (5) in natural or environmental/physical capitals, four (4) from economic capitals, and one (1) from social capitals. The ‘connection with regional economic’ and ‘inward investment’ are given less consideration due to the respondents focusing on local issues and needs. Local resources are still at an optimum level thus do not require planning for disaster resilience communities. ‘Diversification of income stream / source of income’ is hindered by the limited job opportunities particularly in non-farm activities. ‘Business continuity plan’ is also given less consideration due to minimal impact on local businesses (domestic DRR measures also applied by local businesses owners). While for natural or environmental/physical capital, the ‘sustainable soil management’, ‘supply of energy from local source’, ‘available of research and development for DRM’, ‘ICT infrastructure’, and ‘local transportation system’ given less priority due to the nature of agricultural yield in the case-study areas, which indeed, also impacted by the monsoon season. ‘Accessibility to local services’ is the only indicator in social capitals listed in the least important factors. This factor could be due to the satisfaction of the availability of multiple services in the area, thus requiring no further enhancement.

Appendix G Questionnaires of operational model components for community resilient DRR framework

UTM UNIVERSITI TEKNOLOGI MALAYSIA	FGD 01	FOCUS GROUP DISCUSSION

Community-Based Disaster Risk Management (CBDRM) Training Course under Malaysian Technical Cooperation Programme (MTCP) 2019

Date : 22 August 2019 (Thursday)
Time : 14:00H – 15:30H
Venue : Manhattan 6, Level 14,
Berjaya Time Square, Kuala Lumpur, Malaysia

The following table seeks respondent's demographic background for the purposed of the study under topic '**Integrated Disaster Risk Reduction Framework Towards Strengthening Disaster Resilient Community in Malaysia'**. The information you provide in this form will not be provided to any third parties. If you require assistance please contact **Mr Mohamad Fazli Sardi +(6)012-5596759 (h/p) or mohamadfazlisardi@graduate.utm.my.**

RESPONDENT DETAILS – FOCUS GROUP DISCUSSION

Name:	
Designation:	
Organization / Institution:	
Address:	
County:	
Contact number:	
Email:	

Multi-Geohazard and Disaster Risk – A Transdisciplinary Disaster Research
Syndicate Room 7 & 8, Level 14, Razak Tower
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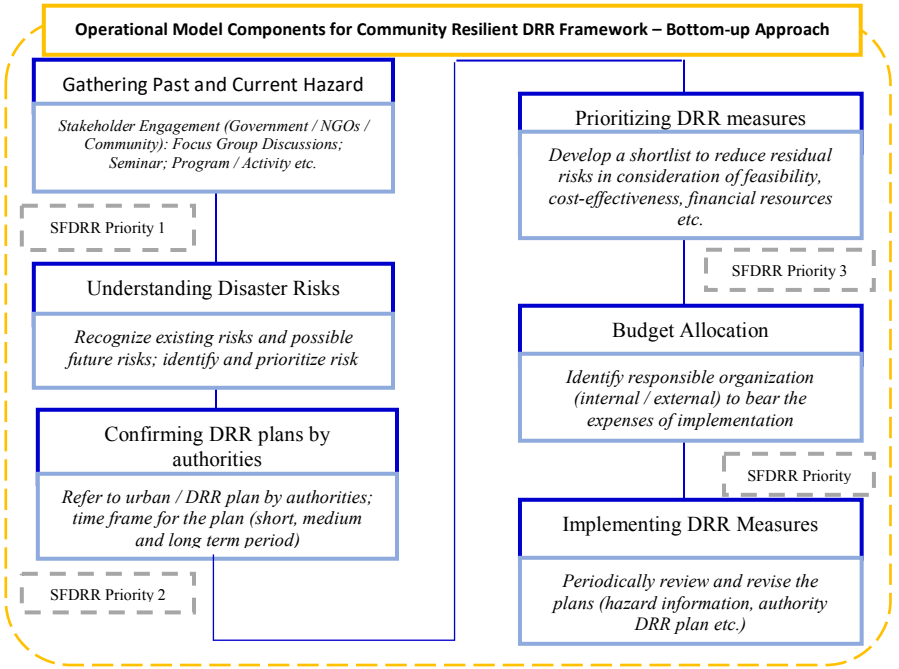
Section A: Developing a Operational Model for Community Resilient DRR Framework

{This section is to gain basic understanding about the bottom-up approach initiatives in developing operational model for Community Resilient DRR Framework based on priority for actions of Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030}



*(adopted from UNISDR (2015), Rahman (2018), UNDRR (2019))**

Priority for actions of Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030:
[Priority 1]: Understanding disaster risk; [Priority 2]: Strengthening disaster risk governance to manage disaster risk; [Priority 3]: Investing in disaster risk reduction for resilience; and [Priority 4]: Enhancing disaster preparedness for effective response, and to 'Build Back Better' in recovery, rehabilitation and reconstruction

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Section B: Community-Based Disaster Risk Reduction (CBDRR)

{This section is seeking your opinion regarding the level of achievement within each dimension in assessing inclusive CBDRR from 'very low' to 'very high'.}

INSTRUCTION: Please circle your option at the boxes provided to indicate your choice.

The scale for rating the relevancy of each item is: **1. Very Low, 2. Low, 3. Medium, 4. High, 5. Very High**

01	Participation in decision-making					
Can (and do) all people participate in decision-making?		**Scale**				
01-1	People are informed about decisions of offered opportunities to access decision-making spaces	1	2	3	4	5
01-2	People are consulted and informed about decisions taken, and mechanisms to provide feedback on them are in place	1	2	3	4	5
01-3	People are part of decision-making process within set boundaries, can influence the agenda across different levels, ensuring that their priorities are addressed	1	2	3	4	5
01-4	People are now 'in' community-based disaster risk reduction (CBDRR) circles, including through representation in decision-making bodies (such as the Village Disaster Management Committee), they can lead change and influence priorities and action at different levels	1	2	3	4	5
01-5	People are well known how to 'Build Back Better' aftermath in recovery, rehabilitation and reconstruction phase	1	2	3	4	5

02	Recognition of diversity					
Do CBDRR activities recognize diversity?		**Scale**				
02-1	Recognition that people have different characteristics is predominantly based on pre-identified categories/checklists	1	2	3	4	5
02-2	There is recognition that individual characteristics translate into diverse forms of individual/group exclusion that may not have been previously identified	1	2	3	4	5
02-3	There is recognition that diverse characteristics (e.g. characteristics, threats, capacities, vulnerabilities, approaches, barriers, knowledge, priorities, sectors, institutions) translate into different power relations which underpin exclusion dynamics	1	2	3	4	5
02-4	There is recognition of diversities (of issues, risks, excluded people) that are often hidden or taboo in society (e.g. drug addiction, mental disability, local feuds, superstition etc.), along with the traditional priorities of DRR	1	2	3	4	5
02-5	The role of 'self help' element were recognize the diversity of people in mitigating and helping the loss caused by such calamities and disaster	1	2	3	4	5

03	Tailored approach					
Are DRR activities tailored to the context?		**Scale**				
03-1	CBDRR interventions employ standardized approaches that respond to pre-determined broad categories of beneficiaries and are not adapted to the local context	1	2	3	4	5
03-2	DRR interventions are still largely standardized but are broadly adapted to the local context. Care is taken to address local sensitivities, to avoid 'doing harm'	1	2	3	4	5
03-3	Approaches are adapted to specific needs, capacities and opportunities, on a 'case by case' basis. Individual and group preferences are addressed within the particular community context	1	2	3	4	5
03-4	Approaches and outputs address the preferences and capacities of individuals. Space is created for excluded people to be in a position to contribute	1	2	3	4	5
03-5	Approaches are designed inclusively includes the traditional- and local knowledge	1	2	3	4	5

04	Removal of barriers					
Do CBDRR activities help remove barriers to inclusion?		**Scale**				
04-1	Basic barriers are addressed on a temporary basis with the use of funds and resources provided by time-bound CBDRR projects	1	2	3	4	5
04-2	Basic barriers are removed for the long term but deeply-rooted exclusion issues linked to hidden and invisible forms of power remain unidentified and unaddressed	1	2	3	4	5
04-3	Deeper barriers are identified and addressed. Excluded individuals are conscious of the barriers linked to hidden and invisible power (e.g. social norms, self- exclusion) and are in a better position to address them	1	2	3	4	5
04-4	Barriers to the inclusion of (formerly) excluded people have been removed. The community recognises that exclusion dynamics are never fully removed within a community/society, and commit to being vigilant to address continuing or new exclusion issues. Institutions are proactive both in identifying and removing barriers and in creating an enabling environment for this	1	2	3	4	5
04-5	There are platform and channel available at district level, or sub-district level, or province level, or local level, or others for the people get involved directly in CBDRR activities or projects	1	2	3	4	5

05	Overview of this conceptual model of community resilient DRR framework					
Does this conceptual model of community resilient DRR framework meet the criteria of building a disaster- resilient community?		**Scale**				
05-1	This community resilient DRR framework successfully meets the criteria outlined in the SFDRR	1	2	3	4	5
05-2	This community resilient DRR framework is easy to understand and adapt at the community level (bottom-up approach)	1	2	3	4	5

Please state your recommendation(s) or comment(s) or suggestion(s) if any:

-END OF QUESTIONS-

THANK YOU

-oooMFSooo-

Appendix H Questionnaires of expert validation for community resilient DRR framework

EXPERT VALIDATION ID No.: ☐

EXPERT VALIDATION FOR COMMUNITY DISASTER RISK REDUCTION FRAMEWORK

Dear YBhg. Dato' / Prof. / Dr. / Sir / Madam,
This questionnaires is intended to elicit the view of disaster manager/disaster practitioners/academics experts on the proposed community resilient DRR framework for the purposed of the study under topic '**Integrated Disaster Risk Reduction Framework Towards Strengthening Disaster Resilient Community in Malaysia'**. The details provided and views expressed in this questionnaires will not be provided to any third parties and will be treated strictest confidentiality. If you require assistance please contact **Mr Mohamad Fazli Sardi +(60)12-5596759 (h/p) or mohamadfazlisardi@graduate.utm.my.**

RESPONDENT BACKGROUND

Name:	
Designation:	
Organization / Institution:	
Contact number:	
Email:	

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Section A: Respondent Background

A. Group of profession

- ☐ Government Official
  - ☐ Disaster Manager
  - ☐ Community Development Manager
  - ☐ Town & Country Planner
  - ☐ Other:……
- ☐ Academics / University
  - ☐ Disaster Management
  - ☐ Emergency Response Planning
  - ☐ Other:……
- ☐ Civil Society Organizations / Non-Governmental Organizations
  - ☐ Disaster Management
  - ☐ Aid & Humanitarian
  - ☐ Community-Based DRR
  - ☐ Other:……

B. Years of experience in your area of expertise

☐	Less than 5 years
☐	5 to 10 years
☐	More than 10 years

Section B: Policy on Disaster Management and Sustainable Development

C. Are you aware of the local-, state-, national-and international policy on disaster management-related? Listed are the local, state, national and international level policies in relation to disaster management and sustainable development in Malaysia. Choose policies that you are aware of that related to disaster management. (*You may choose more than 1 answer*)

	Yes	No
1. Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030	☐	☐
2. Sustainable Development Goal (SDGs) 2030	☐	☐
3. ASEAN Agreement on Disaster Management and Emergency Response (AADMER)	☐	☐

	Yes	No
4. National Security Council Directives No. 20 - Policy and Mechanism of National Disaster Management and Relief (NSC Directive No. 20)		
5. National Physical Plan 3 (NPP-3)		
6. National Slope Master Plan (NSMP)		
7. Slopes Hazard and Risk Mapping Project (PBRC)		
8. Smart Selangor 2025		
9. Cameron Highlands District Local Plan 2030		

Section C: General Comments / Suggestions

D. Listed are the 10 most importance factors or indicators that contribute to disaster resilient community identified by local community in this study. Please indicate which of the following factors or indicators you feel relevant in order to achieve disaster resilient community? (*Circle where appropriate*)

10 Most Importance Factors or Indicators	[1] Not Important	[2] Slightly Important	[3] Minimal Important	[4] Moderate Important	[5] Very Important
Household income	1	2	3	4	5
Close interaction among people	1	2	3	4	5
Equity and diversity	1	2	3	4	5
Neighbours are reliable at time of crisis	1	2	3	4	5
Community support system and social institution	1	2	3	4	5
Communication between stakeholders group	1	2	3	4	5
Leadership and participation	1	2	3	4	5
Job opportunities	1	2	3	4	5
Aid recipient from government, academics and CSOs/NGOs	1	2	3	4	5
Individual savings	1	2	3	4	5

Please propose/add other factors or indicator for building disaster resilience community:

_____

_____

E. What do you see as the key drivers for building disaster resilient community in Malaysia? Please rank key drivers below that you agree on. (*Circle where appropriate*)

Key Drivers	[1] Not Important	[2] Slightly Important	[3] Minimal Important	[4] Moderate Important	[5] Very Important
Stakeholder collaboration and coordination	1	2	3	4	5
Diversification and integration of economic activities	1	2	3	4	5
Role of indicators and framework for monitoring	1	2	3	4	5
Adaptive capacity building and empowerment	1	2	3	4	5

Others (*please specify*):

.....

.....

F. Deliverable define as something that could be provided or achieved as a result of a process. What do you see as the key deliverables if our local community in Malaysia are resilient toward reducing multi-hazard disaster? Please choose key deliverables that you agree or disagree. (*You may choose more than 1 answer*)

Key Deliverables	Yes	No
• Ability to mitigate and minimize vulnerability		
• Ability to adapt and change		
• Ability to secure basic needs		
• Ability to move out from poverty		

Others (*please specify*):

.....

.....

.....

G. With regards to building disaster resilient community, the following questions will be based on planning process (getting started; preliminary planning; strategizing; executing; and monitoring). Please indicate which of the following practices you feel relevant in order to achieve disaster resilient community. (*Circle where appropriate*)

A. Getting Started

Practices	[1] Not Important	[2] Slightly Important	[3] Minimal Important	[4] Moderate Important	[5] Very Important
a) To determine community needs and readiness					
- resources	1	2	3	4	5
- community attitude	1	2	3	4	5
- local knowledge and skills	1	2	3	4	5
- addressing disaster risk (existing- and future risk)	1	2	3	4	5
- available capital					
b) Educating and preparing the community resilient for DRR					
- potential DRR activities to be developed	1	2	3	4	5
- linkages with other disaster-prone communities	1	2	3	4	5
- organizing workshop, FGD, seminar on the involvement of the different sectors in the community	1	2	3	4	5
- study trips and community-to-community training	1	2	3	4	5
- stakeholder engagement (government, private, academics, CSOs/NGOs)	1	2	3	4	5
- training manual formulation	1	2	3	4	5
Others (*please specify*):					

Practices	[1] Not Important	[2] Slightly Important	[3] Minimal Important	[4] Moderate Important	[5] Very Important
- Patient	1	2	3	4	5
- Dedicated	1	2	3	4	5
- Resilience	1	2	3	4	5
- Good communication	1	2	3	4	5
- Sommitted and perseverance	1	2	3	4	5
b) Establish community DRR organization					
- initial stage: drawing solely from talents within the local community	1	2	3	4	5
- mature state: maintains community structure while seeking professional assistance	1	2	3	4	5
- establishing community emergency response team	1	2	3	4	5
- identifying roles of organization (empowerment of women and youth)	1	2	3	4	5
- engaging DRR plans with authorities	1	2	3	4	5
- formulating a common vision but realistic targets	1	2	3	4	5
- community fund establishment	1	2	3	4	5
Others (*please specify*):					

B. Preliminary Planning

Practices	[1] Not Important	[2] Slightly Important	[3] Minimal Important	[4] Moderate Important	[5] Very Important
a) Identifying local leadership and 'DRR local champions' who is:					
- Visionary	1	2	3	4	5
- Disciplined	1	2	3	4	5
- Proactive	1	2	3	4	5
- Innovative	1	2	3	4	5
- Sensible	1	2	3	4	5

C. Strategizing

Practices	[1] Not Important	[2] Slightly Important	[3] Minimal Important	[4] Moderate Important	[5] Very Important
a) To establish partnerships					
- government agencies	1	2	3	4	5
- private and industry players	1	2	3	4	5
- universities	1	2	3	4	5
- aid and disaster relief - CSOs/NGOs	1	2	3	4	5
b) To adopt integration approach					

Practices	[1] Not Important	[2] Slightly Important	[3] Minimal Important	[4] Moderate Important	[5] Very Important
- economic sectors	1	2	3	4	5
- conservation and sustainable development	1	2	3	4	5
c) Plan and design DRR training					
- planning and methods	1	2	3	4	5
- participants / target groups	1	2	3	4	5
- trainers and experts	1	2	3	4	5
Others (*please specify*):					

D. Executing

Practices	[1] Not Important	[2] Slightly Important	[3] Minimal Important	[4] Moderate Important	[5] Very Important
a) Community resilient DRR plan implementation					
- construction of community DRR facilities	1	2	3	4	5
- developing community disaster action plan	1	2	3	4	5
- involve or empower community in implementation	1	2	3	4	5
- time frame for the plan (short-, medium- and long term period)	1	2	3	4	5
- develop a shortlist to reduce residual risks in consideration of feasibility, cost-effectiveness, financial resources etc.	1	2	3	4	5
- secure the funds / budgets by identifying responsible organization (internal / external)	1	2	3	4	5
- enhance existing skills and acquire new skills	1	2	3	4	5
Others (*please specify*):					

E. Monitoring

Practices	[1] Not Important	[2] Slightly Important	[3] Minimal Important	[4] Moderate Important	[5] Very Important
a) Identification of local stakeholder					
b) Training of trainers (community)					
c) Community assessment					
- community assessment using indicators to monitor community resilient DRR performance	1	2	3	4	5
- conducting monitoring on schedule by regular basis	1	2	3	4	5
- periodically review and revise the plans	1	2	3	4	5
Others (*please specify*):					

----------**THANK YOU**----------

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Appendix I Research grants involvement

1. Extra Budgetary Contribution from the Republic of Korea (EBC-K) Project: Community-Based Disaster Informatics for Building Resilient Cities at Taman Idaman, Serendah, Selangor under Asia-Pacific Telecommunity, National Information Society Agency (NIA), Republic of Korea.
   - EBC-K ICT Disaster Portal : Video - Disaster Simulation Day 2018 http://kl.utm.my/ebck-ict-disaster/cpx-idaman/
   - APM Daerah Hulu Selangor Portal : Video - Disaster Simulation Day 2018 https://fb.watch/5V-4795ka3/
   - UTM NewsHub : *Latihan Simulasi Kejadian Bencana Tanah Runtuh di Taman Idaman Serendah, Selangor*. https://news.utm.my/ms/2018/02/latihan-simulasi-kejadian-bencana-tanah-runtuh-di-taman-idaman-serendah-selangor/
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2. Federal Department of Town and Country Planning Peninsular Malaysia (JPBD): Planning Guidelines for Disaster Resilient Cities in Malaysia.
3. Taiwan AI-KBA Project.
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4. Federal Ministry of Education and Research Germany (BMBF) - Risk Cities Initiatives (RiskCities-i): A Transdisciplinary Disaster Approach for Building Urban Resilience in Malaysia.
5. JICA Partnership Project (JPP) (Period 2018-2022). Strengthening the DRR Capacity to Improve the Safety and Security of Communities by Understanding Disaster Risks (SeDAR Malaysia-Japan).
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- Facebook Disaster Preparedness And Prevention Center (DPPC) : Project Launching Workshop SeDAR Project Malaysia-Japan. https://es-la.facebook.com/DPPCMJIIT/videos/project-launching-workshop-sedar-project-malaysia-japan/194106371432712/
- Facebook Disaster Preparedness And Prevention Center (DPPC) : #Part 1 :- Commemoration Of 2011 Hulu Langat Landslide. https://Www.Facebook.Com/Dppcmjiit/Videos/151231250243312/
- Facebook Disaster Preparedness and Prevention Center (DPPC) : #Part2 :- Commemoration Of 2011 Hulu Langat Landslide. https://sw-ke.facebook.com/DPPCMJIIT/videos/4508487465832863/

6. Minerals and Geosciences Department Malaysia: High Impact Community-Based Disaster Risk Reduction (HiCBDRR) Program 2018, Kundasang Sabah.
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   - UTM NewsHub: Community-Based Disaster Risk Management (CBDRM) Program in Kundang, Selangor. https://news.utm.my/2019/05/community-based-disaster-risk-management-cbdrm-program-in-kundang-selangor/
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   - PreventionWeb : Community-Based Disaster Risk Management (CBDRM) Program in Kundang, Selangor. https://www.preventionweb.net/news/view/65461

Appendix J Award / personal achievement

1. Resource Speaker's and Panel Discussant on International Policies, Local Legislation, and Emerging Frameworks on DRRM/CCA at 2018 ASEAN Conference and Exposition on Disaster Risk Management and Climate Change Adaptation (ACEDRMCCA 2018) on July 25-27, 2018, at Batangas State University, Batangas City, Philippines;

2. Member's of Promotion of Sustainability in Postgraduate Education and Research (ProSPER.Net) – 2019 ProSPER.Net Young Researchers' School "Ecosystem-based Disaster Risk Reduction and Climate Change Adaptation" at Yogyakarta, Indonesia, March 3-12, 2019;

3. Member's of U-INSPIRE Malaysia under the auspices of the Asian Network for Climate Science and Technology (ANCST) – youth and young professional groups in DRR and climate change, support by Malaysian National Commission for UNESCO and National Disaster Management Agency (NADMA) Malaysia, April 2019;

4. 2nd Runner-up Best Presenter Award in the Seminar Kebangsaan Kor Siswa Siswi Pertahanan Awam (Kor SISPA) IPT Kali Ke-7 Tahun 2019, Universiti Perguruan Sultan Idris, Tanjung Malim, Perak;

5. Best Presenter Award in the 5th International Conference on Advanced Technology & Applied Sciences and 6th Malaysia-Japan Joint International Conference (ICaTAS-MMJIC 2020), Kuala Lumpur;

6. Certified Registered Professional Technologist (Ts.) – Manufacturing & Industrial Technology (ME), under Malaysia Board of Technologist (MBOT), October 2020;

7. Finalist for Vice Chancellor Award for Anugerah Gemilang Mahasiswa (GEMA) 2020 Universiti Teknologi Malaysia;

8. Winners of Volunteer Leaders' Award (Community Wellbeing) in conjunction with Anugerah Gemilang Mahasiswa (GEMA) 2020;

9. First Runner-up for Best Collaboration Award in conjunction with with Anugerah Gemilang Mahasiswa (GEMA) 2020.

LIST OF PUBLICATIONS

Journal with Impact Factor

1. **Mohamad Fazli Sardi** and Khamarrul Azahari Razak (2019). Assessment of Effectiveness of Emergency Response Time During Landslide Events In Malaysia. *ASM Science Journal.* Malaysia https://doi.org/10.32802/asmscj.2019.360. **(Q4 with 0.124 Impact Factor)**

Indexed Journal

1. **Mohamad Fazli Sardi,** Ahmad Fairuz Mohd Yusof, Khamarrul Azahari Razak, Rudzidatul Akmam Dziyauddin, Siti Hajar Othman, Munirah Zulkaple (2021). ICT-Based Landslide Disaster Simulation Drill: Road to Achieve 2030 Global Commitment. In: Sassa K., Mikoš M., Sassa S., Bobrowsky P.T., Takara K., Dang K. (eds) *Understanding and Reducing Landslide Disaster Risk. WLF 2020. ICL Contribution to Landslide Disaster Risk Reduction. Springer, Cham.* https://doi.org/10.1007/978-3-030-60196-6_51. **(Indexed by SCOPUS)**

2. **Mohamad Fazli Sardi,** Khamarrul Azahari Razak, Khairul Hisyam Kamarudin, Zamri Ramli, Che Siti Noor Che Mamat (2021). Accelerating Sendai Framework and Local Resilient Culture: Lesson Learnt from 2015 Sabah Earthquake. *Disaster Advances Journal*. **(Indexed by SCOPUS) Submitted**

3. **Mohamad Fazli Sardi,** Khamarrul Azahari Razak, Muhammad Izzat Haziq Mohd Nazir, Ahmad Fairuz Mohd Yusof, Khairul Hisyam Kamarudin (2021). Reframing Local Disaster Risk Reduction Resilience Strategies in the Landslide Dominated Agriculture Area. *Disaster Advances Journal*. **(Indexed by SCOPUS) Submitted**

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1. **Mohamad Fazli Sardi**, Khamarrul Azahari Razak, and Rosdiana Zaini Bakri (2019). Assessing Disaster Risk and Resilience: A Case Study in Urban Flood Vulnerable Community in Kampung Asahan, Kuala Selangor. *International Archives of the Photogrammetry, Remote Sensing & Spatial Information Sciences*. Vol. XLII-4/W16, p603-610. 8p. https://doi.org/10.5194/isprs-archives-XLII-4-W16-603-2019 **(Indexed by SCOPUS)**

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1. **Mohamad Fazli Sardi** (2018) International Policies, Local Legislation, and Emerging Frameworks on DRRM/CCA. *ASEAN Conference and Exposition on Disaster Risk Management and Climate Change Adaptation (ACEDRMCCA 2018)*, July 25-27, 2018, Batangas City, Philippines.

2. **Mohamad Fazli Sardi** and Khamarrul Azahari Razak (2018). Emergency Response Time in Malaysia: Assessment and Effectiveness in Landslide Disaster. *7th International Graduate Conference on Engineering, Science and Humanities (IGCESH) 2018,* August 13-15, 2018, Johor, Malaysia.

3. **Mohamad Fazli Sardi,** Ahmad Fairuz Mohd Yusof, Khamarrul Azahari Razak, Siti Hajar Othman and Rudzidatul Akmam Dziyauddin (2018). ICT-Based Landslide Disaster Simulation Drills: A Case Study In Serendah, Selangor. *Geomatic & Geospatial Technology International Conference (GGT) 2018*, September 3-5, 2018, Kuala Lumpur, Malaysia.

4. Rosadiana Zaini Bakri, **Mohamad Fazli Sardi**, Khamarrul Azahari Razak (2018). Understanding Urban Flood Hazard and Associated Risk: A Case Study in Vulnerable Community in Kuang, Selangor. *Geomatic & Geospatial Technology International Conference (GGT) 2018*, September 3-5, 2018, Kuala Lumpur, Malaysia.

5. Khairul Hisyam Kamarudin, Khamarrul Azahari Razak, Rozaimi Che Hasan, Wan Nurul Mardiah Wan Mohd Rani, Farahhani Kamal, Noraini Omar Chong, **Mohamad Fazli Sardi** (2018). Disaster Risk Reduction at Community Level: Action Planning Approach. *Geomatic & Geospatial Technology International Conference (GGT) 2018*, September 3-5, 2018, Kuala Lumpur, Malaysia.

6. **Mohamad Fazli Sardi**, Hafiz Amirrol, Rosdiana Zaini Bakri, Ahmad Fairuz Mohd Yusof, Khamarrul Azahari Razak (2019). Building Urban Resilient Community: A Road to Achieve 2030 Global Commitment. *Mercy Malaysia International Humanitarian Conference 2019*, August 5-6, 2019. Kuala Lumpur. Malaysia

7. **Mohamad Fazli Sardi** and Khamarrul Azahari Razak (2019). Assessing Climate-Based Disaster Resilience in a Tectonically Active Region in Malaysia: A Case Study in Kundasang, Sabah. *The International Symposium on Disaster Resilience and Sustainable Development*, Bangkok, Thailand.

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