A FRAMEWORK FOR ASSESSING THE LIVELIHOOD RESILIENCE OF POST-DISASTER RELOCATED COMMUNITIES

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A thesis submitted in fulfillment of the requirements for the degree of Doctor of Philosophy in Civil Engineering, The University of Auckland, 2018.

Abstract

Livelihood holds the key to a rapid recovery following a large-scale devastating disaster, building its resilience is of paramount importance. While much attention has been given to how to help people who are displaced from their jobs to regain employment, little research on livelihood resilience has been undertaken for those relocated communities following a disaster event. By studying five re-located villages post-2004 Indian Ocean Tsunami in Banda Aceh and Aceh Besar, Indonesia, this research has identified the indicators of livelihood resilience and the critical factors driving it for post-disaster relocated communities. A mixed approach, combining questionnaire surveys, semi-structured interviews, and field observations, was used for the collection of data. Housing entitlement, the physical and mental health of residents, access to external livelihood support and the provision of infrastructure and basic services were identified as amongst the most critical indicators that represent the level of livelihood resilience. Early recovery income support, physical and mental health, availability and timeliness of livelihood support, together with cultural sensitivity and governance structure, are amongst the most important factors. Given the nature of resettlement, access to infrastructure, location of relocated sites, the safety of the neighbourhood and the ability to transfer to other jobs/skills also play an important role in establishing sustained employment for relocated communities in Indonesia. Those indicators and factors were synthesised into a framework which was further tested in the recovery of Christchurch, and Kaikoura, New Zealand during their recovery from devastating earthquakes. It is suggested that the framework can be used by government agencies and aid organisations to assess the livelihood resilience of post-disaster relocated communities. This will help better them plan support policies and/or prioritise resilience investment strategies to ensure that the recovery needs of those relocated are best met.

Key words: Livelihood resilience, displacement, the 2004 Indian Ocean tsunami, Indonesia, relocation

Dedication

"For you created my inmost being; you knit me together in my mother's womb. I praise you because I am fearfully and wonderfully made; your works are wonderful; I know that full well"

(Psalms 139:13-14)

To my father, who has been with his Saviour. You inspire me, encourage me to make this educational pursuit a reality.

Also, to my mother and all my loving brothers and sisters, nephews, and nieces.

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I would also like to thank the New Zealand Ministry of Foreign Affairs (MFAT) through their New Zealand Asean Scholarship (NZAS) for providing financial support for me while studying in New Zealand.

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Table of Contents

List of Figures

List of Tables

Glossary

ADB	Asian Development Bank
ARC	Australian Red Cross (Australia)
BPM	Badan Pemberdayaan Masyarakat (Indonesia)
BRR	Badan Rekonstruksi dan Rehabilitasi Aceh Nias (Indonesia)
CDRRR	Centre for Disaster Resilience, Recovery and Reconstruction (New Zealand)
CRED	Centre for Research on The Epidemiology of Disaster (Belgium)
DFID	Department for International Development (UK)
DINSOS	Dinas Sosial (Indonesia)
EM-DAT	Emergency Events Database
FAO	Food And Agricultural Organisation
GIS	Geographical Information System
ILO	International Labour Organisation
IRP	International Recovery Platform
KSP	Koperasi Simpan Pinjam (Indonesia)
LPC	Lyttelton Port of Christchurch (New Zealand)
MCC	Mennonite Central Committee (US)
MFAT	Ministry of Foreign Affair and Trade (New Zealand)
NAD	Namgroe Aceh Darussalam (Indonesia)
NGO	Non-Government Organisation
NZAS	New Zealand Asean Scholarship Award
PEPG	Pemberdayaan Ekonomi Pemuda Gampong (Indonesia)
PNPM	Program Nasional Pemberdayaan Masyarakat (Indonesia)
RAND	Research and Development Corporation (US)
RASKIN	Beras Miskin (Indonesia)
SDC	Swiss Development Corporation (Switzerland)
SH	State Highway
SLF	Sustainable Livelihood Framework
SME	Small and Medium Enterprise
SYB	Start Your Business
TDH	Terre des Homes (Germany)
UEG	Unit Ekonomi Gampong (Indonesia)

UNDP	United Nation Development Program
UNISDR	United Nation International Strategy for Disaster Reduction
USAID	United State Agency for International Development (US)

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Nature of contribution by PhD candidate	The PhD candidate's contribution in this publication related to scoping the research topic, conducting the data collection, analysing and interpretating the results and writing the final paper to be submitted and doing the revision to address the comments from the reviewers.
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CO-AUTHORS

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Prof. Regan Potangaroa	Serves as the advisor in shaping the research

Certification by Co-Authors

The undersigned hereby certify that:

- the above statement correctly reflects the nature and extent of the PhD candidate's contribution to this work, and the nature of the contribution of each of the co-authors; and
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1. Introduction

1.1 Background

On Sunday, 26 December 2004, a 9.0 Richter scale earthquake occurred at 3.307°N 95.947°E and 30 km below sea level. The earthquake lasted for ten minutes and generated a tsunami that directly impacted on 11 countries, killing around 300,000 people and displacing more than one million victims (Kenny, 2010). The highest level of destruction was experienced in the Province of Aceh, the northern part of the Island of Sumatra in Indonesia, where a total of 811,409 people were displaced, 166,760 were killed, and 127,749 were unaccounted for (Athukorala & Resosudarmo, 2005). Overall, residential areas bore the main impact of the disaster, with Aceh Province being affected the most. After the tsunami, the Indonesian Government decided to establish a reconstruction scheme under the body of Badan Rekonstruksi dan Rehabilitasi (BRR) [1]Aceh - Nias. An urban reconstruction plan was established in 2005; it divided the impacted areas into multiple zones. For disaster risk mitigation purposes, the area within 2 km of the shoreline, known as the Buffer Zone[2], was restricted to house building activities (Matsumaru, Nagami, & Takeya, 2012). This policy resulted in a massive relocation of people to nonrestricted areas. In Banda Aceh City, which was affected most by the tsunami, the new relocation sites are located either on the periphery of urban areas that were unaffected by the tsunami or on the hilly areas that are some distance from the Banda Aceh city centre.

The tsunami had not only caused significant loss of life and damage to the built environment, but disruption of people's livelihoods was also worst amongst those who were relocated. Research on the effects of a disaster on livelihood revealed that agriculture and aquaculture sectors are likely to be affected most, especially in the weather-related events (Chang-Richards et al., 2013; FAO, 2015; Oo & Myint, 2010; Petterson et al., 2006). In many cases, damage caused to the crops and plantations can be so devastating that no harvest will be possible and many jobs will be lost (Polsky & Easterling, 2001; Potter et al., 2015; Sarmiento, 2007). Without timely aid, this may further lead to the lack of food supplies for the disaster victims and potential food price hiking in the disaster zone (FAO, 2015). Webber & McDonald (2004) and FAO (2015) also observed that in some developing countries, when disaster victims were displaced from their jobs while having no alternative income source, they might eventually fall into a poverty trap.

Statistics from the Emergency Events Database (EM-DAT) [3] show that the impact of natural disasters, particularly on a region's economy, has been climbing over the past several years, compounded by the effects of climate change. From 2000 to 2015, an average of 341 climate-related disasters was recorded each year, which is almost a 50 % increase from the previous 15 years' records. (Centre for Research on The Epidemiology of Disaster, 2015). Of all natural hazards, floods, droughts and the effect of storms, the agricultural sector is the sector most affected by the storm; this is considered as being the most costly effect of all natural hazards (FAO, 2015). This was evidenced in Fiji following the recent Category 5 Severe Tropical Cyclone Winston, which caused extensive damage to crops, livestock, and fisheries. In the wake of this event, reduced food production, and limited access to fresh water became a real pressure for post-disaster recovery (FAO, 2016).

For the relocated communities, in most cases, the majority of people were not only displaced from homes, but also from their jobs and needed a longer time and more complex strategies to recover (Scudder & Colson, 1982). There were also delays in securing housing tenure in the relocated site, in which case relocated households may miss out on the aid from donors and Non-government organisations (NGOs). Relocated populations may also face rejection and discrimination issues from existing communities and have persistent problems with 'fitting in' (Thorbun, 2007).

Régnier et al. (2008) suggested the quick recovery of livelihoods to allow the affected people to get back to their prior economic and social activities. Supporting this idea, Pomeroy et al. (2006) proposed seven steps for rehabilitating disaster impacted livelihoods with the fundamental principles being; 1) targeted, 2) community-participatory, 3) are based on needs assessment and 4) aimed at capacity building. They also highlighted the importance of assessing existing livelihood resilience before launching any recovery plan. Such an evaluation will enable authorities and aid agencies to have a clear picture of the survivors' livelihood status and what skills they used to have, the means of making a living they had and how the different aspects of life can be put together to help them re-gain their livelihood (Bruneau et al., 2003).

While academics and practitioners have focused their attention on exploring what makes for a successful post-disaster recovery, the needs of the impacted people and the challenges they face in relation to their livelihood following a large-scale disaster remains understudied (Nazara & Resosudarmo, 2007; Noy, 2009). Scholars such as Bolin and Bolton (1983) and Peacock, Killian, and Bates (1987) highlighted the importance of livelihood in post-

disaster recovery by exemplifying the economic opportunities it creates for the disaster-affected region. Costanza et al. (2007) and Mayunga (2007) supported the idea, arguing that a community's livelihood is one of the important disaster recovery measures which will contribute to building the resilience of communities in a sustainable manner.

Livelihood, however, is not a new thing in the development domain (UNDP, 2015). According to Chambers and Conway (Boberg & Monis-Khoo), there are two dimensions attached to the concept of livelihood; one is access to the essential food supply, and the other is the sustainability of access to the resources for making a living. The well-known proverb "*Give a man a fish, and he'll eat for a day. Teach a man to fish, and he'll eat for a lifetime*" carries the notion of sustained livelihood with an emphasis on the skills and ability for self-reliance. Livelihood self-reliance has always been considered as an essential element for poverty reduction (Ahmad Bello, 2006). In this regard, training people to become skilled or semi-skilled workers or providing mentoring and financial assistance for unemployed people to become an entrepreneur has been one of the main focuses of many aid organisations.

Literature has highlighted the key meaning of livelihood resilience, which is to empower people to be socio-economically self-sufficient or self-reliant with various means. Weldegebriel and Amphune (2017) emphasised that livelihood resilience is critical to livelihood recovery performance in a post-disaster situation. Tanner et al. (2014) and Davies et al. (2013) also pointed out that a resilient livelihood holds the key for coping with any type of shock, whether it is a financial crisis or a natural disaster. While these findings have clear implications for livelihood resilience in post-disaster reconstruction, little attention has been given to an overall systematic analysis of the underlying indicators and the affecting factors for resilience in the post-disaster relocation context. This represents an important gap in the development of a robust theory of disaster livelihood resilience.

Against this backdrop, this study attempts to address such knowledge gap by studying the livelihood resilience of post-2004 Indian Ocean tsunami relocated communities in Aceh, Indonesia. It is hoped that this research will provide insights, from the perspective of a relocated community, into the challenges they had been faced by and the mechanisms and processes that are needed to make their livelihood resilient. More particularly, this research looks more deeply at how the relocated community members had fared over a long-term recovery timeframe, given the different living environments and disruptions of livelihood they had faced. The indicators and factors identified are synthesised into a framework that could be used by government agencies and aid organisations to assess the livelihood resilience of post-disaster

relocated communities. The framework will help them to better plan livelihood support policies and/or prioritise resilience investment strategies to ensure that the recovery needs of those being relocated are best met.

1.2 Research questions and objectives

In order to fill the gap explained in the previous section, the central question of this research is, "How do we assess the livelihood resilience of disaster-induced relocated people?" In particular, this study will focus on the experiences encountered from Aceh, Indonesia, following the 2004 Indian Ocean tsunami. This central question operationalises four research questions specific to the case, as shown in Table 1.1.

The main objective of this study is to investigate the indicator livelihood resilience of disaster relocated communities, including identifying all the significant factors that influence the livelihood resilience. The detailed objectives for each specific question are shown in Table 1.1.

Table 1.1. Research questions and objectives

Research questions	Research objectives
Q1: What challenges were faced by those relocated in Aceh, Indonesia, following the 2004 Indian Ocean tsunami?	a) To identify the livelihood challenges experienced by the 2004 Indian Ocean tsunami impacted people after being relocated. b) To identify the livelihood strategies implemented for the relocated communities for dealing with the challenges faced.
Q2: What are the indicators of livelihood resilience of a post-disaster relocated community?	a) To identify the indicators of livelihood resilience in relocated community b) To develop a framework for assessing the resilience based on the indicators identified.
Q3: What are the factors that affect the affected livelihood resilience of a post-disaster relocated community?	a) To identify the critical factors that influence the livelihood resilience of a post-disaster relocated community. b) To identify the relationship between the livelihood resilience determinants.
Q4: What measures and strategies can be put in place by government agencies and aid organisations in building livelihood resilience for relocated communities?	a) To identify the implemented strategies and impacts for building livelihood resilience in the relocated communities b) To recommend the measures and strategies that may be effective for government agencies and aid organisations in building the livelihood resilience of relocated communities in future disasters.

1.3 Research methodology

Considering the alignment of the research design to the research questions and objectives, a case study was considered as the appropriate design for conducting this study with a mixed method approach. Triangulation of quantitative and qualitative methods was used to gather, analyse, and validate data. Figure 1.1 shows the overarching research design, including the main research methods used and also a literature review, questionnaire survey, in-depth interviews, and field observations; these are described in detail in Chapter 3.

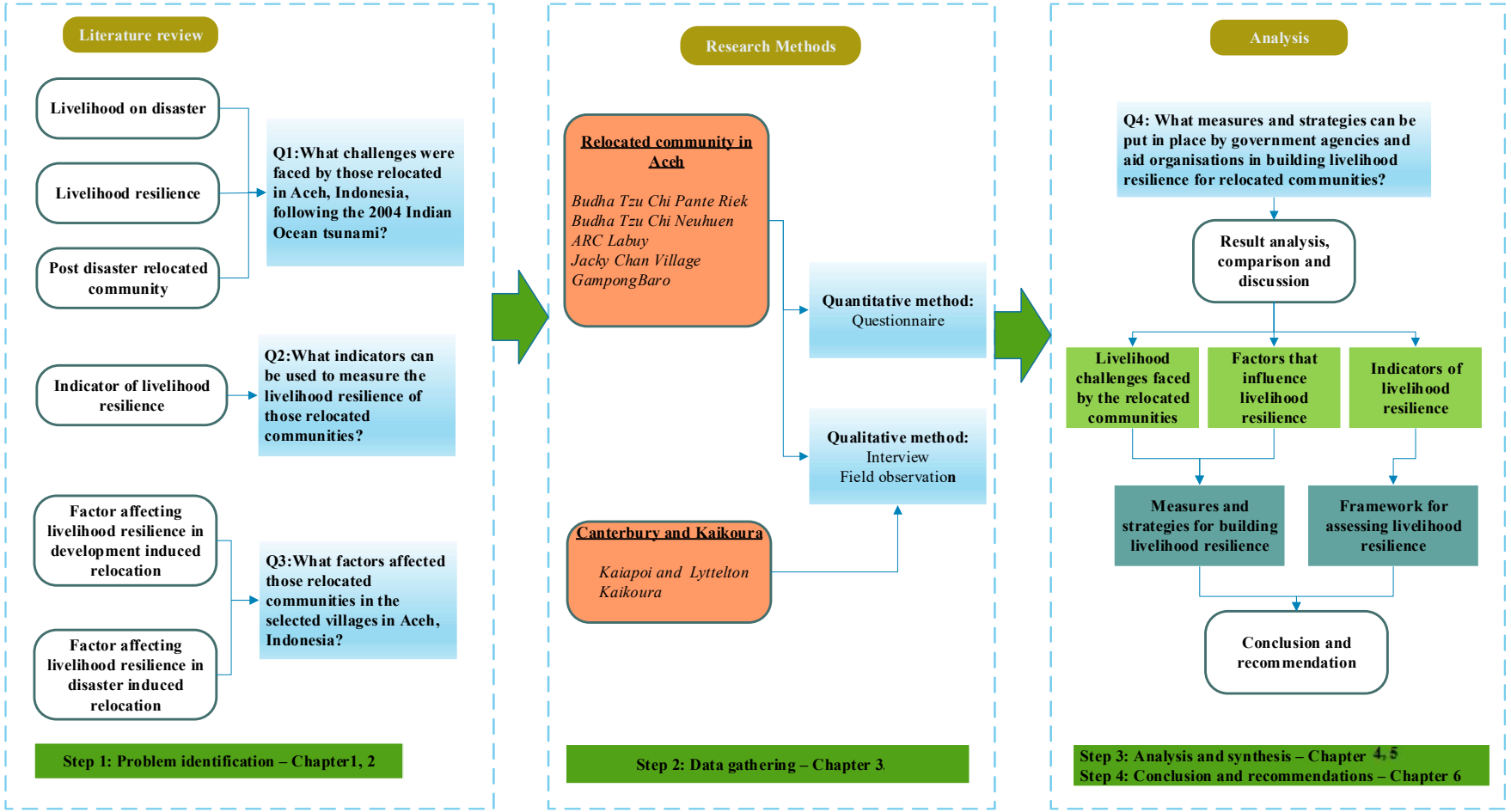

Figure 1.1. Research design

1.4 Dissertation outline

This dissertation consists of six chapters. It starts with Chapter 1, Introduction. This chapter introduces the research topic, including the background information and focus of this study. It also covers the justification of the need for undertaking this research by considering theory and practices in the field of disaster management, relocation and livelihood recovery. Furthermore, the chapter also provides brief information about the research questions and objectives, the development of the analytical framework and research methodology to address those questions.

To synthesize and articulate the understanding of the topic and to position the study within the broader body of knowledge, Chapter 2 reviews the existing livelihood and relocation literature, in addition to outlining the gaps in the existing knowledge identified to be addressed in this research.

The design and detail of the methodology of this study are described in chapter 3. This includes the process of selecting the appropriate research approach, data collection, and analysis method also ethical issues considered throughout the research stages.

Chapter 4 presents the bulk of the data that was collected during fieldwork in Aceh. Contextual data on the livelihood of the relocated communities are included here. It is followed by the application of the analysis method described in Chapter 3 to understand and determine the indicators and factors affecting the livelihood resilience of the relocated people. The Discussion section will take readers through the process of developing a framework for assessing resilience.

Chapter 5 delivers data relating to livelihood resilience from the perspective of business owners that gathered during the field trip in Christchurch and Kaikoura, New Zealand. This chapter is intended to explore the possibility of implanting the developed measurement framework in other disaster contexts. It continues with a comparison of livelihood resilience in the case of the relocated communities in Aceh as described in Chapter 4 with the context of the livelihood resilience of business owners in Christchurch and Kaikoura presented in Chapter 5. The comparison is focused on identifying the indicators that could be applied in a general disaster reconstruction context and the indicator that works specifically on disaster-induced relocation.

Finally, the thesis concludes with Chapter 6. The final chapter summarises the findings and links them with broader knowledge, followed by the recommended strategies for building livelihood resilience, also are presented in this chapter. It is hoped that the recommendations will benefit government agencies and aid organisations in developing formulating livelihood intervention policies and strategies for post-disaster relocation projects. This chapter ends by describing the lessons learned and proposes implications based on the study; it also acknowledges the limitations of the research and offers suggestions for future work.

2. Literature review

2.1 Overview

This chapter establishes a theoretical context for the dissertation. It deals with the extant post-disaster livelihood and relocation literature with a view to pinpointing the locus and scope of this research in a broader milieu. To set the scene, it begins with an understanding of a disaster impact on livelihood. It then looks at a predominant concept in disaster, resilience, particularly in the scope of livelihood. The review highlights the fact that resilience should be considered as, not just a new vision overarching the process of disaster management, but a capacity required for any involved individuals and organizations to cope with a disaster and its aftermath. It also provides some examples of past attempts that have been made to measure the livelihood resilience in various contexts. To link the understanding with a relocation context, this chapter is guided by a study of post-disaster resettlement literature, which presents the issues of livelihood in the context.

2.2 Post-disaster livelihood recovery

Livelihood is defined as the way in which someone, individually or collectively, makes their living, puts effort into fulfilling their economic necessities and also copes with uncertainties and chooses various options in responding to new opportunities (Long, 1997). In its simplest form, livelihood is the ability of a household to meet its basic needs. These needs include adequate food, health, shelter, and minimum levels of income, basic education and community participation, and security and protection. Livelihood is not solely economical but covers social content as well (Ellis, 1998).

Chambers and Conway (1992) argue that livelihood in its core, could be expressed in three main components with its linkage, as shown in Figure 2.1, namely livelihood capabilities; stores and resources; and claims and assets.

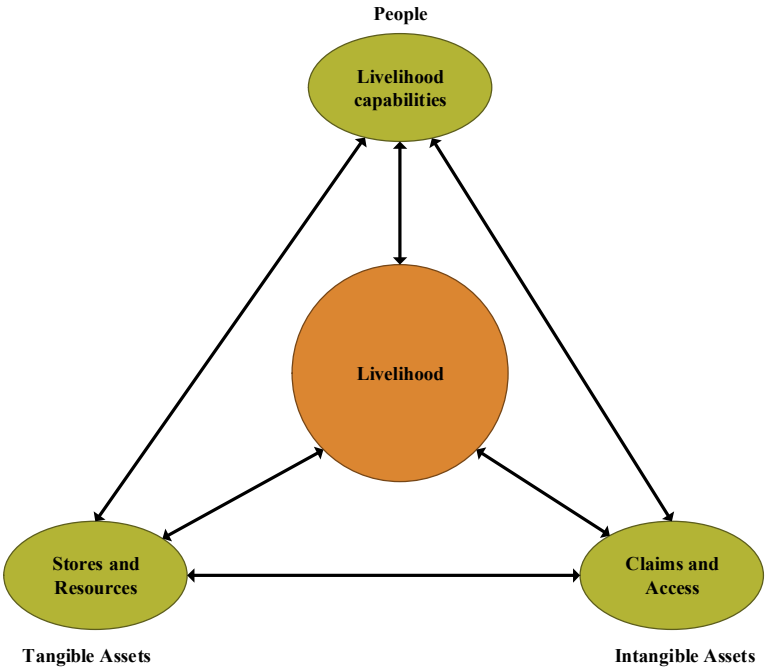

Figure 2.1. Components of livelihood (Chambers & Conway, 1992)

'Livelihood capabilities within', refers to the way people react in responding to challenges and crises such as climatic predicaments, e.g., floods and droughts, and their consequences, e.g., food insecurity (Valdés-Rodríguez & Vazquez, 2010). The term could be characterized as an individual's opportunity space to attain valuable doings and beings. (Lienert & Burger, 2015). While 'stores and resources' compromise of all tangible assets such as food stocks, stores of value such as gold, water, trees and livestock; the term 'claims' refers to demands which can be made for material, moral, or other practical support, while 'access' is the opportunity in practice to use a resource or service. Another component is the obtaining of information, material, technology, or income in making a living. A combination of these components shapes the livelihood strategies to create intrinsic, as well as instrumental, livelihood outcomes (Ashley & Carney, 1999)

While livelihood approaches centre on how people combine their assets, make choices and take action to meet their basic needs, it is also important to consider how shock or stress disturbs livelihood stability, whether livelihoods will keep declining, or thrive and return to their previous levels; or even transform into other forms after the shock (Speranza, Wiesmann, & Rist, 2014). Chambers and Conway (1992) implied that livelihood is sustainable if it can cope with and recover from stresses and shocks, maintain or enhance its capabilities, assets, and entitlements while not undermining the natural resource base. The

stress and shocks that perturb a livelihood could be a combination of natural and human-made events on a local or global scale. Turner et al. (2003) defined stress as a pressure, whether continuous or slowly increasing, in relatively normal variability. Resource decline and fluctuations in rainfall due to climate change are examples of stress. The authors describe shocks as a major series of events applying pressure beyond the normal range within which a system can operate. The main characteristic of distinguishing shock from stress is that its onset is usually intense and dramatic. Natural disasters are an example of shock.

If defined as a command of income to satisfy basic needs (Blaikie et al., 2014), livelihood could be seen as income-generating activities. Disruption of one's income source represents livelihood disturbance. Many cases exemplify the way in which disasters heavily impact people's livelihood. Statistics from EM-DAT show that the impact of natural disasters, particularly on a region's economy, has been increasing over the past few years, with compounding effects stemming from climate change. From 2000 to 2015, an average of 341 climate-related disasters was recorded each year, which shows an almost a 50 % increase in the records of the previous 15 years. (Centre for Research on The Epidemiology of Disaster, 2015).

Of all natural hazards, floods, droughts, and storms affect the agricultural sector most, with the storm being considered as the most costly effect (FAO, 2015). This was evidenced in Fiji following the recent Category 5 Severe Tropical Cyclone, Winston, which caused extensive damage to the crops, livestock, and fisheries. In the wake of this event, reduced food production, and limited access to fresh water became a real pressure for post-disaster recovery (FAO, 2016). When the 2004 Indian Ocean tsunami struck, more than 600,000 people lost their jobs, which pushed the unemployment rate to 40 percent in Aceh. Nias experienced an even worse situation where the number of unemployed people increased by 125 percent compared to the pre-event level (International Labour Organisation, 2005). Even though not as severe as in developing countries, decreases in employment have also been experienced in developed countries in the aftermath of a disastrous event. For instance, following the 4th September 2010 earthquake in Canterbury, New Zealand, there was a step decrease in the employment rate from 67 % in September 2010 to 63 % in September 2011 (Potter et al., 2015). Examples of disrupted livelihood following a large disaster are listed in Table 2. 1.

Table 2. 1. Livelihood disrupted by large disasters

Disaster	Location	Livelihood loss	References
Marmara earthquake 17 August and 12 November 1999	Turkey	140,000 people were left jobless in the affected area. The loss was approximately 45% of the pre-earthquake labour force.	Akgiray, Barbarosoglu, and Mustafa Erdik (2004)
Cyclone Nargis 2 and 3 May 2008	Myanmar	52,121 farmers could not plant rice from June to August 2008. 183 ha of paddy land lost production of 683,051 MT of paddy rice. Only 50% of paddy land could be cultivated while 26% of farmers lost their entire disaster production capacity.	Oo and Myint (2010)
Haiti earthquake 12 January 2010	Haiti	22.1% of household lost their income earner while 22.8% lost their savings.	Échevin (2011)
Hurricane Andrew 24 August 1992	USA	86,000 people lost their jobs. The number of employees in Florida decreased by 87 %.	Dash, Peacock, and Morrow (1997) Lahidji (2004)
Hurricane Katrina 29 August, 2 September 2005	USA	The unemployment rate in New Orleans increased from 5.8% to 14.8 %.	Petterson et al. (2006)
Indian Ocean tsunami 26 December 2004	Indonesia	600,000 people lost their jobs in Aceh. The unemployment rate increased by 125 % in Nias.	International Labour Organisation (2005)
Canterbury Earthquake 2011	New Zealand	The employment rate decreased by 4%, from 67% to 63 %.	Potter et al. (2015)

Even though much of the post-disaster recovery work pays attention to the importance of rebuilding livelihood as soon as possible, the major intention of recent disaster recovery projects has been focused on rebuilding physical facilities such as housing and infrastructure (Joakim & Wismer, 2015; Masud-All-Kamal, 2013). Two years after the 26 December 2004 Indian Ocean Tsunami, livelihood recovery was considered to have been met to the satisfaction of the needs of the people who had been impacted, even though the Indonesian Government also claimed success in building houses, school, roads and bridges (Nazara & Resosudarmo, 2007). A similar instance can be seen in the case of recovery from the 27 May 2006 Yogyakarta earthquake. The Java Reconstruction Fund [4]spent more than 70 percent of its resources on building houses while the allocated budget for livelihood recovery was less than 20per cent (World Bank, 2008). Due to its lower visible impact and longer achievement time, livelihood attracts less public attention, which leads to it being a lower priority than physical reconstruction (Freeman, 2004).

In addition to its relatively lower priority in reconstruction programs, is the complexity of delivering livelihood recovery programs in the aftermath of a disaster. There is insufficient understanding of how to develop strategies and how to channel aid to accelerate livelihood recovery for people affected by natural disasters(Nazara & Resosudarmo, 2007) (Nazara & Resosudarmo, 2007). Thorburn (2009) claimed that it was the most under-delivered promise and the most problematic issue in the case of recovery for Aceh following the Indian Ocean Tsunami of 2004.

According to Régnier et al. (2008), following a disaster, livelihood recovery planning could be categorised based on objectives such as relief-based intervention and livelihood protection and promotion. Relief based intervention is mainly conducted at the emergency relief stage and concentrates solely on survival. Livelihood protection involves efforts to protect household livelihood systems, including during the stage of infrastructure repair and reconstruction, while livelihood promotion, although also initiated at the stage of reconstruction, nevertheless compromises of a set of development-based measures involving improving the resilience of household livelihoods so that food, and other basic needs, can be met on a sustainable basis (Tafti & Tomlinson, 2015; UNISDR, 2009). It entails strategies for creating new income-generating activities and strengthening markets. Tafti and Tomlinson (2015) argue that post-disaster intervention initiated by NGOs or donors such as World Bank have predominantly pursued the relief-based interventions and have rarely been extended for more than a year. By exemplified the finding of Mulligan et al. (2012) in Chennai after the 2004 tsunami, they concluded that even a potentially effective livelihood intervention effort might not have a long-lasting impact, it was abandoned early. Furthermore, they also emphasised the importance of the long-term commitment of reaching beyond the relief stage and involve in development-oriented objectives.

Complementary to the categorising of the livelihood recovery intervention based on their objectives, Joakim and Wismer (2015) identified the key programs for livelihood recovery following a disaster. By studying the livelihood recovery support for the households impacted by the 2006 Jogjakarta earthquake, the researchers found that the initiatives launched by government agencies and humanitarian organisations mainly focussed on the provision of assets to support entrepreneurship and the establishment of a microfinancing institute to provide support for established business activities, livelihood sectoral empowerment, such as seed and livestock provision, and capacity building through

training for the development of new skills, particularly in relation to income generating activities.

However, each disaster has unique characteristics; environment, culture, economic, and political situation, all of which influence the nature of needs and the appropriate measures for addressing them. It is difficult to define a "one-fix bullet" recovery intervention, as each disaster presents a unique situation. Hence, a clear understanding of the capacities and needs of impacted populations can assist in the determining of appropriate strategies. (Joakim & Wismer, 2015).

2.3 Livelihood resilience

The introduction of the concept of livelihood resilience can be traced back as part of a sustainable livelihood theory proposed by Chambers and Conway (1992). They concluded that a resilient livelihood, defined as the livelihood capacity to cope and recover from an adverse event, would not cause a significant reduction in crucial functions in relation to primary productivity, natural resource base, social relationships or well-being, during, or as a consequence of, stress. Such livelihood resilience could even create an opportunity for innovation or development (Folke, 2006).

The Chambers and Conway (1992)'s sustainable concept was adopted by the British Department for International Development (DFID) in their Sustainable Livelihood Framework (SLF), as shown in Figure 2.2, having been integrated into its program for development cooperation since 1997 (Department for International Development, 2014).

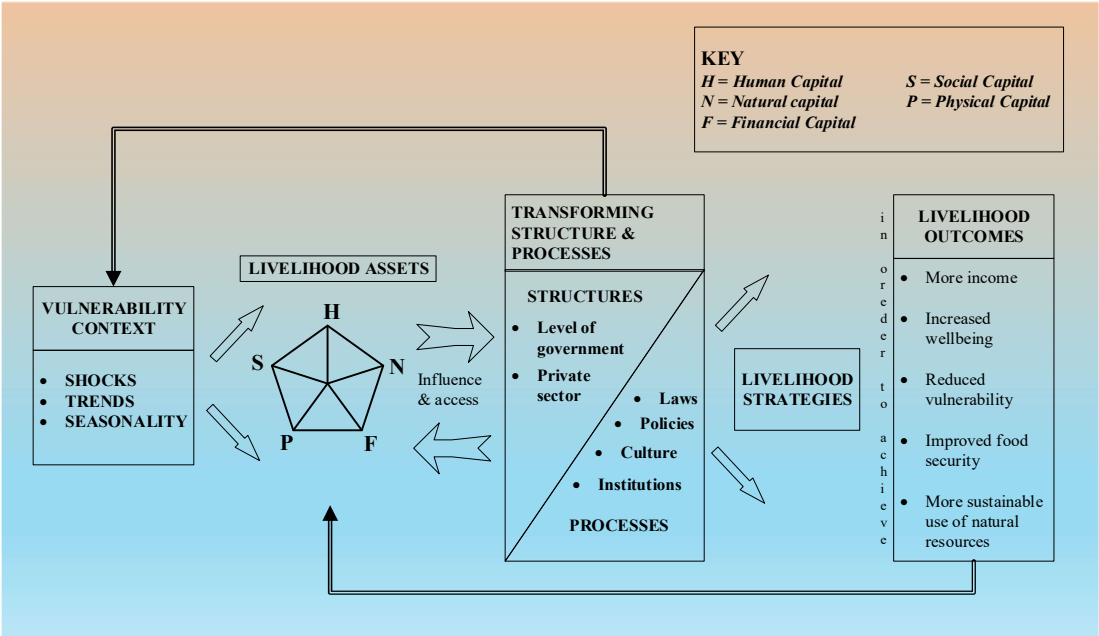

Figure 2.2. Sustainable livelihood framework

Source: Department for International Development (2014)

The sustainable livelihood framework, as suggested in Figure 2.2, has an emphasis on; livelihood context, livelihood assets and livelihood institutions and processes, and also on the interaction between those components. The framework explains how people direct their livelihood institutions, both governmental and private, as well as how their livelihood processes influence their livelihood strategies through the optimization of livelihood assets; these include, the human, social, natural, physical and financial capital for achieving desired outcomes in a particular livelihood context which are determined by certain trends of condition and seasonality (Scoones, 1998). The strategies and options for responding to livelihood vulnerability are positively correlated to the asset bundle at their disposal in terms of the amount, diversity, and the balance between assets. The strategies are delivered through the transformation of societal structures such as institutions, organisations, policies and legislation, which eventually shape livelihoods and outcomes (Speranza et al., 2014).

Despite that, the sustainable livelihood framework identifies future strategies in dealing with longer-term livelihood change, Scoones (1998) argued that the framework does not support the analysis of systematic livelihood transformation. Recognising how impacted people behave when facing livelihood disruption, including their capacity to adapt and

transform, could be beneficial in formulating appropriate strategies (Pomeroy, 2011). Linking the concept of resilience to livelihood recovery might offer a solution (Speranza et al., 2014). The resilient livelihood concept was introduced explicitly by Chambers and Conway (1992, p. 6).

> *"A livelihood comprises the capabilities, assets and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.*"

By definition, livelihood resilience is the capacity of all people across generations to sustain and improve their livelihood opportunities and well-being despite environmental, economic, social and political disturbances (Tanner et al., 2015). This definition emphasises that resilience is underpinned by human agency and empowerment, by individual and collective actions; this is a notion set within the dynamic processes of social transformation. Folke (2006) further defined that a resilient livelihood will not only have a capacity to generate primary productivity, natural resource-base, healthy social relations or well-being; it will also create the opportunity for innovation and economic development. The degree to which the livelihood is resilient, however, is determined by the level of resources individuals can have access and their capability for organising themselves to participate in income generating activities (Uy, Takeuchi, & Shaw, 2011)

Livelihood resilience is distinctly different from ecological systems resilience, in terms of the information-processing capacities of the human actors and their ability to engage in purposeful action and reflective learning (Schlüter & Pahl-Wostl, 2007). In this concept, livelihood resilience is emphasised as a process, focusing on adaptability (Handmer & Dovers, 1996; Nyamwanza, 2012; Waller, 2001), rather than as an output (Brown & Kulig, 1996; Pfefferbaum et al., 2007).

2.3.1 Indicator for measuring livelihood resilience

To be better observed and understood, livelihood resilience should be described and operationalized through indicators (Cutter, Burton, & Emrich, 2010). Even though several frameworks for measuring livelihood resilience have been proposed by scholars (See Table 2.1), few have focused on the context of disaster.

Table 2.1. Frameworks for Assessing Livelihood Resilience

Frameworks and contributors	Context	Major features	Key attributes/indicators	Theoretical/ evolved through empirical evidence
Mbae (2014)	Agriculturally based livelihood in response to climate change	Buffer capacity, self-organisational capacity, learning capacity	Access to livelihood assets, institutions, cooperation and networks, the opportunity to self-organise, reliance on own resources, knowledge of opportunities and threats, commitment to learning, knowledge identification and capability, feedback mechanism	Applied
Nyamwanza (2012)	Agriculturally based livelihood	Capacity learning to live with change and uncertainty, nurturing of learning and adaptive capacity, self-organising capacity		Theoretical
GebreMichael (2012)	Ecological and human crises such as drought, environmental degradation and human conflict	Resource base, wealth distribution, knowledge of risk, social cohesion, level of mobility, social capital	Frequency and duration of drought, optimum resource base availability, balance in the wealth and status of the people, the magnitude of IDPs and returnees, number of sheep and camels in the livestock asset, harmony and mobility with neighbouring areas, strength of the village committee, proximity to urban areas, availability of veterinary services	Empirical/applied
Sadik and Rahman (2009)	Salinity intrusion caused by climate change	Productivity, sustainability, risk	Productivity, sustainability and risk to each livelihood's assets, namely natural, physical, financial, social, and human	Theoretical
Speranza et al. (2014)	Agriculturally based livelihood in response to climate change	Buffer capacity, self-organisation capacity, learning capacity	Access to livelihood assets, institutions, cooperation and networks, the opportunity to self-organise, reliance on own resources, knowledge of opportunities and threats, commitment to learning, knowledge identification and capability, feedback mechanism	Applied

The frameworks in Table 2.1 discussed livelihood resilience in the context of slow onset perturbation caused by climate change. There has been little discussion on the assessment of livelihood resilience in the context of rapid onset shock, particularly in the case of a large-scale disaster. Drawing on the literature review, the livelihood resilience indicators can be categorised into the following four groups, as shown in Table 2.2, which follows.

Table 2.2. Livelihood resilience indicators

Category	Indicators
Individual coping Ability	Job/income Stability (Marschke & Berkes, 2006; Masud-All-Kamal, 2013; Sadik & Rahman, 2009)
	House Entitlement (Ainuddin & Routray, 2012
	Expertise and Skill (Ahmed, 2001; Khasalamwa, 2009; Mbae, 2014; Milestad & Darnhofer, 2003)
	Financial Circumstance (Ahmed, 2001; Ali et al., 2008; Joakim & Wismer, 2015; Mbae, 2014; Sadik & Rahman, 2009)
	Previous Experience of Individual (Asgary, Anjum, & Azimi, 2012; Joakim & Wismer, 2015; Polsky & Easterling, 2001; Thorburn, 2009; Uekusa & Matthewman, 2017)
	Exposure to Social and Cultural Norms (Speranza et al., 2014)
	Level of Education (Ahmed, 2001; Joakim & Wismer, 2015; Sadik & Rahman, 2009; Speranza et al., 2014)
Individual wellbeing	Quality of life (Norris et al., 2008)
	Satisfaction with Neighbourhood (Hansen & Oliver-Smith, 1982)
	Physical and Mental Health (Norris et al., 2008)
	Sense of Security (Hansen & Oliver-Smith, 1982)
Neighbourhood	Location (GebreMichael, 2012; Oliver-Smith, 1991; van den Berg, 2010)
	Infrastructure and Services (Ahmed, 2001; Ali et al., 2008; Mbae, 2014; Régnier et al., 2008; Sadik & Rahman, 2009)
	Economic Condition (GebreMichael, 2012; Masud-All-Kamal, 2013; Sawada & Shimizutani, 2008)
	Social Cohesion (De Silva & Yamao, 2007; Marschke & Berkes, 2006; Minamoto, 2010)
	Safety of the Neighborhood (Tellman et al., 2014)
Access to resources	Recovery and Policy decisions (De Silva & Yamao, 2007; GebreMichael, 2012; Masud-All-Kamal, 2013; Neef, Panyakotkaew, & Elstner, 2015; Pomeroy et al., 2006)
	Access to Livelihood Support (Joakim & Wismer, 2015; Mills et al., 2011; Sadik & Rahman, 2009
	Availability of Social Capital (Masud-All-Kamal, 2013; Minamoto, 2010; Pfefferbaum et al., 2007; Sadik & Rahman, 2009)
	Level of Participation in Income Generating Activities (Joakim & Wismer, 2015; Minamoto, 2010; Régnier et al., 2008; Tanner et al., 2015)

1) Individual coping ability

Resilience, in its simplest definition, could be associated with the ability to cope with disturbance. In this sense, the faster a livelihood recovers and progresses after a disastrous event, the more resilient it is. The ability to cope can be measured through job/income stability;

financial circumstance; housing status; previous individual experience; expertise/skill and level of education.

Job/income stability refers to secure employment, the way people make a stable living to fulfil their basic needs. Stable income does not mean they are stuck with one particular job, but it is more about securing a source of income. One example of this is the diversification of livelihood activities (Marschke & Berkes, 2006; Sadik & Rahman, 2009). Masud-All-Kamal (2013) pointed out the preference for long-term working opportunity rather than other types of relief support for sustaining livelihoods when he studied livelihood recovery for people in coastal Bangladesh post-disaster.

Financial circumstances indicate a capacity to thrive in the event of livelihood shock (Ahmed, 2001; Ali et al., 2008; Mbae, 2014; Sadik & Rahman, 2009). Better financial circumstances provide superior opportunities and the option of taking risks for improved access to such things as credit or loans for livelihood recovery. In many cases of disaster recovery, households with high economic status may benefit more from microcredit programmes, while poorer households usually benefit from the provision of capital, such as tools or assets (Joakim & Wismer, 2015).

In some countries, particularly developing ones, a house or dwelling function beyond being solely a place in which to live. It also serves as a place of work. In this case, housing status has a strong link to livelihood coping ability. Entitlement status indicates access to resources. It describes what people could do with their housing (Mbae, 2014). Ownership of a house influences the willingness to maintain and improve its quality, which eventually increases the quality of life (Ainuddin & Routray, 2012).

Previous individual experiences influence people's behaviour in facing disruption to their way of making a living. In examining the agricultural sector, Polsky and Easterling (2001) pointed out that farmers and institutions in districts with historically high climate variability had adapted, and were thus more resilient to climate variability. This is in line with Thorburn (2009) who found that the majority of successful small business operating in the aftermath of the 2004 Indian Ocean Tsunami in Aceh were owned by people who had previously had similar enterprises. Asgary et al. (2012) found that there is a significant relationship between the time needed to recover business after a disaster with prior disaster experience. Pre-disaster networking conditions also influence livelihood initiatives in the post-disaster period (Joakim & Wismer, 2015). Experience in dealing with uncertainty generates the capacity to cope and adapt to change (Uekusa & Matthewman, 2017).

Sufficient expertise and skill are also indicative of coping ability (Ahmed, 2001; Khasalamwa, 2009; Mbae, 2014; Milestad & Darnhofer, 2003). Skill refers to the ability to do something well, while expertise is more about great knowledge on a particular topic. Having skill represents the capacity to invest in alternative livelihood sources to achieve diversity.

Capacity to cope with livelihood perturbation following a disastrous event can also be predicted through an individual's level of education (Ahmed, 2001; Joakim & Wismer, 2015; Sadik & Rahman, 2009; Speranza et al., 2014). Higher education increases the possibility of gaining better employment. In their study, Crittenden, Lamug, and Nelson (2011) found that after the Mt Pinatubo volcanic eruption, education was the most important resource influencing the likelihood of finding a job.

2) Individual wellbeing

Ideas pertaining to wellbeing stand out as informative surrogates in capturing locally appropriate notions of livelihood resilience. This aspect also allows for the assessment of locally determined thresholds of livelihood resilience within a particular area (Nyamwanza, 2012). The attributes of individual wellbeing include; *quality of life, living environment of the neighbourhood, physical and mental health, and sense of security*. These sets of indicators reflect wellness and their influence on livelihood resilience.

Quality of life is one of the components that captures how people feel about their life as a whole in the domains of; work or school, family, health, leisure and neighbourhood (Norris et al., 2008), while the living environment of the neighbourhood influences willingness to blend with the neighbourhood (Hansen & Oliver-Smith, 1982). It eventually promotes permanency which motivates people to rebuild their lives. Norris et al. (2008) describe how individual wellbeing could also be assessed through physical and mental health. While physical fitness optimises the capability to optimize a livelihood opportunity, individual psychological wellness indicates the degree of successfulness of adaptation as proof of resilience.

3) Socio-physical robustness of local community

By definition, the neighbourhood is an area usually reachable on foot which includes institutions that serve the community and foster local social life (Lee, 1968). The dynamics within a community play an important role in shaping the dynamics of the livelihoods of the people living there. It influences the way people interact with others, fostering or diminishing partnerships. The indicators of the socio-physical robustness of local community which denote

livelihood resilience, include; *location, economic conditions, leadership and networking, social cohesion and safety of the neighbourhood*.

The contribution of the location to livelihood resilience is primarily associated with the proximity to amenities which boost opportunities (GebreMichael, 2012; Oliver‐Smith, 1991; van den Berg, 2010). As some types of livelihood are location-specific such as fishing, location is an important factor which influences livelihood strategies (van den Berg, 2010). The influence of neighbourhood on the resilience of livelihood could also be observed through its economic condition. Better employment opportunities are available when the economic sectors perform well. Families with collateral assets such as equity in their houses, savings and jewellery, were able to maintain their pre-disaster consumption patterns, while people with lower financial capital levels could not (GebreMichael, 2012; Sawada & Shimizutani, 2008). Informal sources of microcredit for establishing new livelihoods are more likely to be available within communities that are in a better economic condition (Masud-All-Kamal, 2013)

In addition to this, leadership and networking represent an ability to maximize the available resources to diversify livelihood strategies and contribute to livelihood recovery (Joakim & Wismer, 2015). From their research in Indonesia and India after the 2004 Indian Ocean Tsunami, Régnier et al. (2008) concluded that a local community network and high solidarity level enables post-disaster economic and social relief to be channelled rapidly and effectively. Joakim and Wismer (2015) proposed that links to external networks are the main determinant of employment stability and entrepreneurship promotion; this eventually reduces vulnerability and increases livelihood resilience.

The other attribute of local community that indicates the resilience of livelihood is social cohesion; (Marschke & Berkes, 2006) which shows the strength of the bonds with relatives and neighbours that lead to some sort of collective action (De Silva & Yamao, 2007; Minamoto, 2010); the safety of the neighbourhood (Tellman et al., 2014) and a neighbourhood's infrastructure and services (Ahmed, 2001; Ali et al., 2008; Mbae, 2014; Régnier et al., 2008; Sadik & Rahman, 2009).

4) Access to livelihood resources

Livelihood resources refer to all assets, including physical or social, that can be used to create a livelihood (Frankenberger, Drinkwater, & Maxwell, 2000; Krantz, 2001). The possession of resources, no matter the amount, diversity, or balance between assets positively influences livelihood strategies (Speranza et al., 2014). Access to resources can be measured through recovery and policy decisions, which refers to the level of contribution to decision-

making or an institution related to livelihood. Institutions can enhance or limit adaptive capacity (GebreMichael, 2012). In some cases, the availability of resources is affected bythe political intervention (De Silva & Yamao, 2007; Masud-All-Kamal, 2013; Neef et al., 2015). To elaborate, Pomeroy et al. (2006) and Masud-All-Kamal (2013) point out that the main cause of livelihood vulnerability, which implies a lack of resilience, is a lack of participation in decision-making which could be caused by the implementation of laws and regulations that affect people's access to assets.

Access to livelihood support is also an aspect that indicates the level of livelihood capacity to cope and thrive (Joakim & Wismer, 2015; Sadik & Rahman, 2009). Examples from many disaster recovery cases show that livelihood support enables people to cope with economic shocks. Support for the aquaculture-dependent households in Bireuen, Aceh, took the form of species diversification in aquaculture; technical advice and availability of credit or subsidies were considered likely to be successful as coping strategies for threats to health and economic shocks. Access to capital/credit was important for infrastructure and livelihood rebuilding as well as for purchasing inputs to re-start production (Mills et al., 2011).

Another metric for access to livelihood resources is the availability of social capital (Masud-All-Kamal, 2013; Minamoto, 2010; Pfefferbaum et al., 2007; Sadik & Rahman, 2009). Social capital can be defined as social resources, including networks, social claims, social relations affiliations, and associations from which people draw when pursuing different livelihood strategies requiring coordinated actions. Evidence from the recovery process in Kobe after the 1995 earthquake showed that social capital was the greatest determinant of recovery rates (Aldrich, 2011). When social capital is seen to be available, people tend to participate more in reconstruction programmes, which leads to faster recovery (George, 2007).

Access to livelihood resources could also be measured by the level of participation in income generating activities (Minamoto, 2010; Régnier et al., 2008). Lack of active engagement in capacity building programs constrains the effectiveness of livelihood recovery programs. Joakim and Wismer (2015) found that high unemployment rates in some villages in the Bantul regency after the Yogyakarta earthquake were caused by the low participation of men in livelihood recovery programs because of the low sensitivity to gender-sensitive approaches to recognising different sets of skills, needs, and responsibilities among men and women. They recommend the acknowledgement of the traditional division of labor in a community is important. Vice versa, high commitment to productive activities was found to improve the standard of living. An example from Newtok, a Yup'ik Inuit community highly dependent on subsistence hunting and fishing for food and a minor cash economy attests to this

statement. The community has decided to relocate as the only means of protecting itself from climate-induced environmental change. To improve the standard of living of community residents and increase the community's cash economy, the council has designated funding to train community members in construction skills so that they can build infrastructure at their relocation site and generate income (Tanner et al., 2015).

The dimensions for the assessment are summarized in Figure 2.3, while the detailed indicators are listed Table 2.2

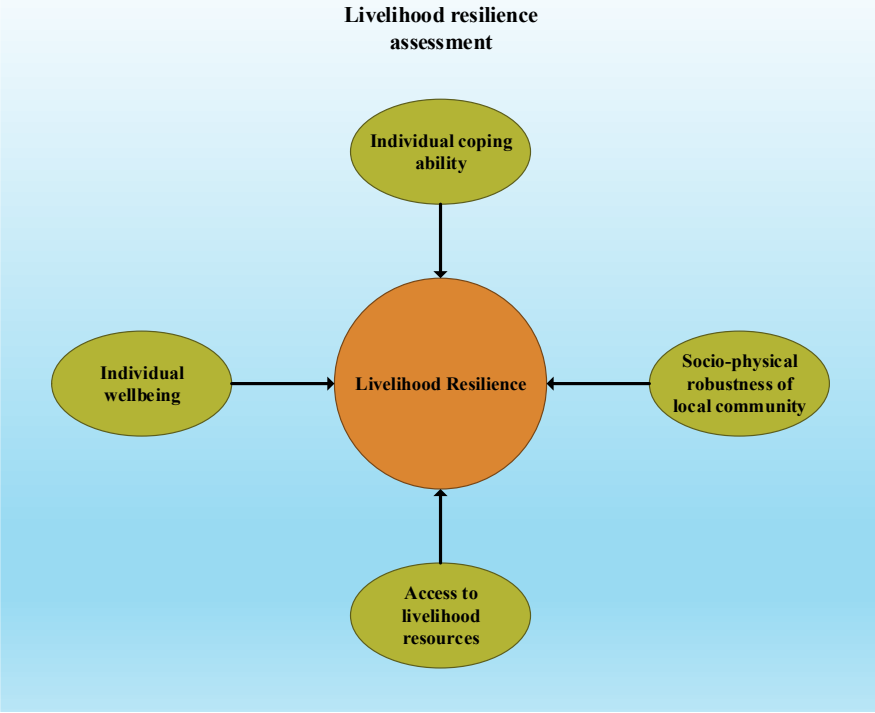

Figure 2.3. Livelihood resilience assessment framework

2.3.2 Factors affecting livelihood resilience

Recovering the livelihood of impacted people has been recognised as a critical issue in the disaster practitioner community. From an economic lens, Costanza et al. (2007) and Mayunga (2007) argued that a community's livelihood is an important disaster recovery measure which will contribute to building the resilience of communities in a sustainable manner. However, delivering the livelihood recovery programmes in the aftermath of a disaster is a complex task. It was cited as the most undelivered promise and the most problematic issue in the case of recovery from the Aceh post-Indian Ocean tsunami 2004 (Thorburn, 2009). Nazara and Resosudarmo (2007) suggested that there is an inadequate understanding as to how

to develop strategies and how to channel aid to accelerate the recovery of livelihood. In practice, livelihood support interventions often rely on the provision of food and the replacement of assets while significant challenges remain, such as lack of assessment and evaluation tools and lack of coordination among agencies which leads to the overlapping of interventions or sometimes to a conflict of interest in supporting the affected people (IRP, 2010)

Due to the strong link between resilience and the recovery of livelihood, the factors that affect livelihood resilience need to be explored, particularly in the context of a natural disaster. Those factors could be related to coping strategies formulated after the event, for example, the diversification of livelihood to a more robust one (Shiferaw et al., 2014) or the improvement of pre-disaster conditions (Lizarralde, Johnson, & Davidson, 2010). A review of previous literature leads to a body of evidence on key factors affecting livelihood resilience in various contexts, as shown in Table 2.3. These factors can be divided into three categories: factors related to individuals/households; factors related to local communities; and factors related to livelihood recovery agencies.

Table 2.3. Factors influencing livelihood resilience

	Factors influencing livelihood resilience following a large disaster	References	Context
Factors related to individuals/households			
1.	Gender of the household head	Eriksen, Brown, and Kelly (2005)	Development
2.	Age of the household head	Eriksen et al. (2005) Adams, Cekan, and Sauerborn (1998)	Development Development
3.	Household size	Eriksen et al. (2005) Adams et al. (1998) Niehof (2004)	Development, Natural hazard Development
4.	Physical and mental health	Pilot study	Natural hazard
5.	Early recovery income support	Eriksen et al. (2005) Adams et al. (1998)	Development Natural hazard
6.	Financial circumstances	Adams et al. (1998) Mayunga (2007) Weldegebriel & Amphune, 2017) Mills et al. (2011)	Natural hazard Natural hazard Natural hazard
7.	Access to credit	Samuels (2010)	Natural hazard
8.	Ability to shift to other livelihoods (skill and expertise)	Adger et al. (2004) Marschke and Berkes (2006)	Natural hazard Development
9.	Participation in social activities	Pilot study	Development
10.	Level of education	Adams et al. (1998)	Development
11	Availability of insurance	Linnerooth-Bayer, Mechler, and Hochrainer-Stigler (2011) Warner and Spiegel (2009)	Natural hazard Natural hazard
12.	Relative/extended family support	Pilot study	
13.	Previous work experience	Adger et al. (2005) Jang and Wang (2009) Polsky and Easterling (2001) Joakim and Wismer (2015) Uekusa and Matthewman (2017) Thorburn (2009)	Natural hazard Natural hazard Natural hazard Natural hazard Natural hazard Natural hazard
Factors related to local communities			
1.	Location/distance to working place	Oliver-Smith (1991) Weldegebriel and Amphune (2017)	Natural hazard Natural hazard
2.	Infrastructure and basic services	Oliver-Smith (1991)	Natural hazard
3.	Environmental resources nearby	Adams et al. (1998)	Development
4.	Social capital	Eriksen et al. (2005) Adams et al. (1998)	Natural hazard Development
5.	Social cohesion among the community	Oparinde and Hodge (2011)	Development
6.	Information accessing capacity	Speranza et al. (2014)	Development
7.	Network with other people from outside communities	Joakim and Wismer (2015) Régnier et al. (2008)	Natural hazard
8.	Neighbourhood safety	Shaw et al. (2006)	Natural hazard
9.	Neighbourhood economic condition	Sawada and Shimizutani (2008) Masud-All-Kamal (2013)	Natural hazard Natural hazard
10	Resources distribution equity	Tellman et al. (2014) Cutter et al. (2008)	Natural hazard Natural hazard
Factors related to livelihood recovery agencies			
1.	Governance of livelihood support	Gaillard et al. (2008) Thorburn (2009)	Natural hazard Natural hazard
2.	Availability of long-term livelihood support	Neef et al. (2015) Daly et al. (2017)	Natural hazard Natural hazard
3.	Culturally appropriateness of livelihood support	Thorburn (2009) Joakim and Wismer (2015)	Natural hazard Natural hazard
4.	Timeliness of livelihood support initiatives	Chang-Richards et al. (2013) Joakim and Wismer (2015)	Natural hazard Natural hazard

1) Factors related to individuals/households

According to Adams et al. (1998), personal or households characteristics such as age, the gender of the household head, income level and size of the household often play a role in affecting the livelihood status of the household. In some countries in Africa, the patriarchal hierarchies of gender and generations largely determine resources access and control (Adams et al., 1998). Domestic responsibilities such as looking after children and providing meals often restrict most women from many activities which gain income such as in the running of a shop, or even from undertaking paid work which requires mobility (Eriksen et al., 2005). In certain places, traditionally social inequities associated with gender constrain the opportunities of female household heads to secure the income (Joakim & Wismer, 2015; Shaw et al., 2006; Worku et al., 2014).

In addition to the intrinsic characteristics, previous individual experience in dealing with change and uncertainty also influences their capacity to respond to the livelihood perturbation in severe events (Jang & Wang, 2009; Polsky & Easterling, 2001; Uekusa & Matthewman, 2017). Polsky and Easterling (2001) suggested that farmers and institutions in areas with high historical climate variability tend to be more resilient to impacts from climate change, in comparison with those farming in temperate climate conditions. Thorburn (2009) also found that the majority of successful small business who still operated in the aftermath of the 2004 Indian Ocean tsunami in Aceh were owned by experienced business people.

Ex-ante financial circumstances also affected the livelihood capacity to cope, adapt, and transform (Mills et al., 2011). The financial assets could vary depending on the type of livelihood. Financial assets could be manifested in saving or livestock holdings (Mayunga, 2007; Weldegebriel & Amphune, 2017) or insurance (Régnier et al., 2008). For instance, a longitudinal study in Christchurch, New Zealand, following its 2010/11 earthquakes, revealed that businesses with business interruption insurance tended to fare better than those without insurance. The business interruption insurance, covering the loss of revenue as a result of the earthquakes, temporary relocation fee and even the cost of repairing the businesses premises, had positively impacted the firm's survival and the probability of increasing performance and productivity following the catastrophe (Poontirakul et al., 2017).

Similarly, in New Orleans after the Hurricane Katrina, those self-employed people who were financially well-off were faster at getting back on their feet compared to those who were struggling with cash flow pre-event (RAND Corporation Gulf States Policy Institute, 2010). A complement to the pre-disaster financial circumstances, ex-post financial capacity, access to credit could boost up the livelihood diversification opportunity (Adler & Ziglio, 1996; Mayunga, 2007). The 2004 Indian ocean tsunami victims in Banda Aceh, particularly those

low-income ones, had repeatedly mentioned the need for access to credit in order to re-start or restore their businesses (Samuels, 2010).

Given the level of livelihood perturbation after a disaster, the capacity to recover and adapt is influenced by the ability to diversify or shift to other livelihoods (Marschke & Berkes, 2006; Sadik & Rahman, 2009). Having a skill represents the capacity to invest in alternative livelihood sources to achieve diversity. The ability to maximise all the livelihood opportunities is also affected by the level of education (Weldegebriel & Amphune, 2017). Higher education increases the possibility of gaining better employment (Joakim & Wismer, 2015). By taking the case of recovery following the Mt Pinatubo in Philippine, Crittenden et al. (2011) pointed out that education was one of the most important resources determining the likelihood of getting a job.

2) Factors related to local communities

Livelihood resilience is also affected by the entities of the neighbourhood. The location of a household determines proximity to amenities (Oliver‐Smith, 1991; Weldegebriel & Amphune, 2017). That proximity is important for utilising social and economic networks for bartering purposes or accessing loans, credit, and information (Adams et al., 1998). van den Berg (2010) exemplified that in rural Nicaragua where he emphasised that location is an important factor which influences livelihood strategies for non-farming activities. Previous events show that a long distance of travel from home to work-place after disaster-induced displacement was one of the top issues reported by the relocated workers (Oliver‐Smith, 1991). To overcome this disadvantage, the availability of adequate and reliable infrastructure plays an instrumental role in connecting isolated communities to better livelihood options (Adams et al. (1998).

Availability of natural resources, such as forest and farmland, affects the livelihoods of those living in regions where they rely on such resources for making a living. However, an eco-balance is somehow needed to make sure the uses of environmental resources are well monitored and managed to avoid excessive exploitation. In his research on Sahel, West Africa, Adams et al. (1998) found that the carrying capacity of the land may also limit the aspirations of those pastoral households to diversify the breeds of their herds. In another research undertaken by Cutter et al. (2010) and Tellman et al. (2014), the equity of resource distribution was proved to have a significant effect on the livelihood resilience among communities.

Social capital, including the type of the community (religious, ethnic and kinship), norms and values or existence of institutions such as credit groups or work associations also influences the livelihood resilience (Adams et al., 1998; Eriksen et al., 2005). According to

Joakim and Wismer (2015), community dynamics influence how the community manages the available livelihood resources in response to shock. Swift (1993) exemplified the role that community-level institutions, such as cereal banks, communal fields, and kinship and network affiliations, play in spreading risk and coping with the food crisis following the 1970s drought in Mali. Marschke and Berkes (2006) also found that livelihood recovery can proceed more effectively when there is strong social cohesion within the studied communities. This is in part because bonds with relatives and neighbours will be likely to encourage some type of collective action in responding to the livelihood perturbation (De Silva & Yamao, 2007; Minamoto, 2010).

Régnier et al. (2008) argued that a local community network and high solidarity level could enable resilience building in many aspects of a household in that community. In contrast, Joakim and Wismer (2015) suggested that the linkages of a household to external networks outside of their community can also serve employment stability and entrepreneurship promotion, which eventually reduce their socio-economic vulnerabilities. These internal and external social and/or economic networks would benefit the community in reaching out for livelihood assets while supporting information sharing and accessing leading to more livelihood options (Speranza et al., 2014). Another important factor that is considered in the literature as being associated with livelihood resilience is neighbourhood safety (Mills et al., 2011; Shaw et al., 2006). Tellman et al. (2014) revealed that high crime and violence rates disrupt social cohesion which further weakens the capability and functionality of certain social organisations which is a key element of building livelihood resilience in the region. They exemplified that in South America, where increases in crime such as extortion by gangs in a community had prevented the profit gain of many small businesses that were mostly family/household types of business.

3) Factors related to livelihood recovery agencies

In addition to those intrinsic factors mentioned previously, livelihood resilience of individuals/households is also influenced by other external factors. In examining the role of post-disaster recovery agencies, Daly et al. (2017), Gaillard et al. (2008), Neef et al. (2015) and Thorburn (2009) found that the effectiveness of livelihood support is determined by its governance, availability of long term support, cultural appropriateness of livelihood support and timelines of livelihood intervention.

Governance of livelihood support includes the decision-making process, how the support is delivered and managed on the ground. It is often the case that post-disaster livelihood interventions are largely limited to providing food and replacing physical assets (Pomeroy et

al., 2006). Funding for continued livelihood support is often channelled through multiple sectors or agencies creating overlaps or conflicts between agencies (UNISDR, 2010). Daly et al. (2017) highlighted the need to have a governance protocol in place to make sure any livelihood support measures distributed to household livelihood needs are met.

In addition to the governance, the continuity of livelihood support is also essential for livelihood resilience (Neef et al., 2015). Long-term assistance can increase the buffer capacity of the affected populations against initial setbacks. Daly (2017) found that disaster-affected businesses often faced the short-term challenges of lack of cash flow to operate, but that their needs would change over time. Joakim and Wismer (2015) exemplified that livelihood intervention in the Katengan village after the 2006 Jogjakarta earthquake where training for processing coconut was considered as a waste of time due to a lack of follow-up assistance in helping trainees to build their market.

Cultural appropriateness of livelihood programs and timeliness of livelihood interventions were suggested by Thorburn (2009) and Joakim and Wismer (2015) as critical factors influencing the success of livelihood-related interventions. For example, acknowledging the gender-sensitive approach in livelihood recovery support by recognising that men and women may have different skill sets, needs, and responsibilities might encourage their participation in different programs (Inter-Agency Standing Committee, 2006). Timeliness of livelihood support, however, reflects the alignment of interventions with the livelihood needs at different times (Chang-Richards et al., 2013; Joakim & Wismer, 2015).

2.4 Post-disaster relocation

2.4.1 Effects of disasters on relocated populations

Relocation is the act of moving and rebuilding community's housing, assets, and public infrastructure to another location (Jha & Duyne, 2010b) whether forced or voluntary (Tercan, 2001). The movement necessitating involuntary resettlement of populations can be caused by a variety of triggers, ranging from development projects, political events, such as war or internal conflict, to natural disasters, such as earthquakes, hurricanes, and floods. Since 2008, an average of 26.4 million people have been displaced from their homes each year by disasters brought on by natural hazards - equivalent to one person displaced every second (Yonetani et al., 2015). A summary of the number of newly displaced people between 2008 and 2017 is displayed in Figure 2. 1. It shows that disaster-forced displacement far outnumbered those that were conflict-generated. Although many disasters result in temporary displacement, certain

events in both developed and developing countries lead to the permanent relocation of affected populations (Badri et al., 2006; Tamakloe, 1994). In 2005, Hurricane Katrina forced over half of the population of New Orleans to permanently relocate to other places (Uscher-Pines, 2009). This phenomenon of post-disaster relocation is likely to remain and even intensify due to trends in development, population growth, and climate change, which increase the prevalence and severity of disasters.

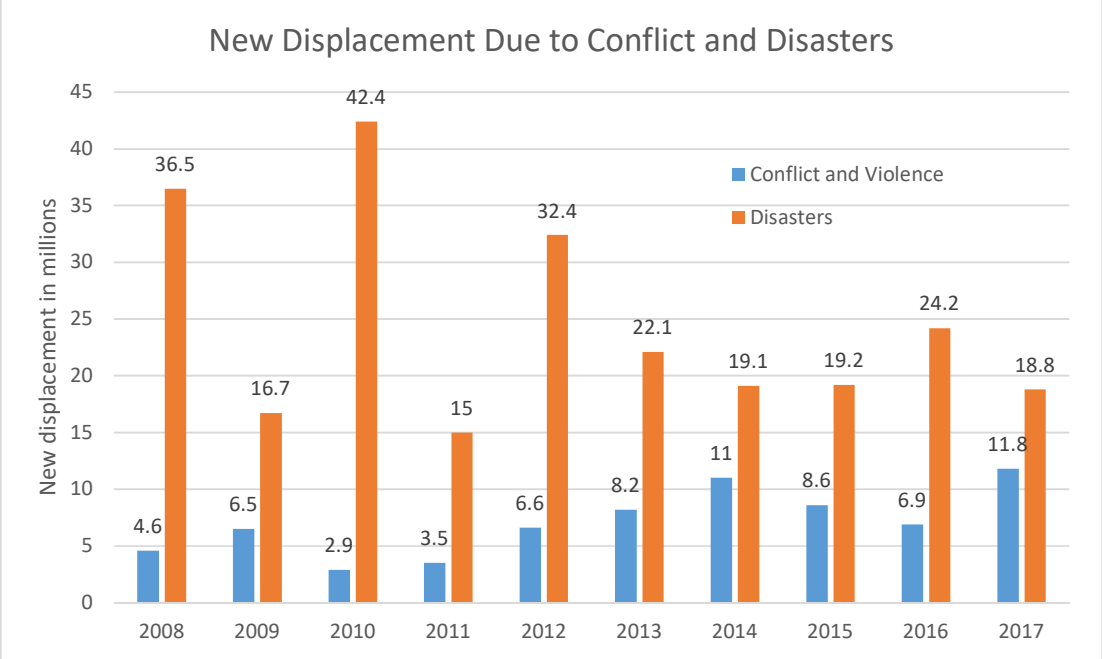

Figure 2. 1. New Displacements Due to Conflicts and Disasters (2008 – 2017)

Source: Internal Displacement Monitoring Centre (2018)

Post-disaster relocation is often opted for reasons which include hazard and vulnerability (Arnall et al., 2013; Dikmen, 2010; Jha & Duyne, 2010b; Perry & Lindell, 1997; Yonetani et al., 2015), economic displacement (Asian Disaster Preparedness Centre, 2005; Dikmen, 2010; Perry & Lindell, 1997) and environmental displacement (Abe & Shaw, 2015). It is recognised that relocation is still a commonly chosen approach in post-disaster reconstruction (Badri et al., 2006).

Regarding a time frame, the relocation process could be divided several stages. Scudder (2011) proposed a model focussed on the experiences of the people being relocated. This framework involves four stages: Stage 1, planning for the relocation prior to physical removal when people are stressed due to preparations for relocation and uncertainty about the future.

This is followed by Stage 2, coping with the initial drop in living standards that tends to follow relocation. During this phase, individuals attempt to learn to adjust and cope with their new circumstances. Continuing to Stage 3, Initiation of economic development and community formation activities that are necessary to improve the living standards of the first generation. The final stage, handing over a sustainable resettlement process to the second generation and non-project authority institutions, individuals and communities seek to take full control of their lives and the new community becomes fully established and integrated (incorporated) into the regional economy.

The model implies that following a relocation, livelihood turbulence is expected to face the relocated people. Being relocated from their resources, the previously disaster-impacted people face greater pressure in recovering their livelihood. Vanclay (2017) argued that it is likely that relocated people would not succeed in overcoming this turbulence, but remain dependent and struggle to cope, rather than step up to the next stage to initiate economic development if relocation planning is not done well. To ensure the accomplishment of the relocation objectives for establishing an independent, resilient, and self-reliant relocated community, the implementation of appropriate relocation strategies is crucial; this has been documented in various policies in post-disaster recovery. Maly and Ishikawa (2014) summarised some of the policies implemented in previous post-disaster relocation projects, as shown in Table 2.4.

Table 2.4. Relocation approaches and policies

Disaster, Year	Area, Country	Project type	Resident participation in decisions	Location related to livelihood	Compensation system for former land
Indian Ocean Tsunami, 2004	Hambantota, Sri Lanka	Relocation, houses built by NGOs.	No	Far from former seaside homes.	No, can keep former land
Indian Ocean Tsunami, 2004	Nagapattinam, India	Collective relocation, housing built by NGOs, government support for housing reconstruction in relocation areas.	Yes	Location subject to residential approval.	Varies. Most reconstruction became an on-site reconstruction. Some people forced to give up land, sometimes compensated.
Indian Ocean Tsunami, 2004	Aceh, Indonesia	Relocation supported by government (land) NGOs (housing construction).	Little	Varies. In some cases it is good: many locations are far from former activity.	No, can keep former land
Indian Ocean Tsunami, 2004	South Thailand	Main housing recovery: on site; also NGOs-driven housing reconstruction.	Varies	Varies	No, can keep former land
Turkey Earthquake,1999	Marmara, Turkey	Government sponsored relocation.	Not enough	Many are rejected by residents because of the location.	No, can keep former land. Some chose to sell to developers.
Taiwan Marokat Typhoon, 1999	South Taiwan	Government (land) + NGOs (housing) sponsored relocation.	Some projects very much, others nothing	Some projects, yes, most cannot continue former activities.	No, can keep former land but for most residents, former land is hard to access.
Wenchuan Earthquake, 2008	Beichuan and Sichuan, China	Massive scale relocation of entire cities.	No	Far from the former site, cannot continue former activities.	No, former land belongs to the national government.

Source: Maly and Ishikawa (2014)

Relocating people is not purely about rehousing people, but also about reviving livelihoods and rebuilding the community, the environment, and social capital (Jha & Duyne, 2010a). Hence, relocation poses complex challenges regarding technical, social, economic, and cultural issues. Karunasena and Rameezdeen (2010) listed some of them including; ownership of property in the previous living place, land availability for building the settlement, provision of necessary infrastructure and, livelihood, community bridging, and project funding. Due to its complexity and cost, this approach is often considered as the last option in post-disaster management (Ahmed, 2011; Jha & Duyne, 2010b). Relocation even gives a bad impression as there is nothing further that can be done so people must be moved (Blaikie et al., 2014).

Many scholars have argued that relocation has a social and economic impact on displaced communities due to the differences in societal composition, cultural characteristics and economic conditions (Molin Valdés, Patel, & Hastak, 2013). The relocated people also have to face a greater challenge due to the separation from their livelihoods (Thorburn & Rochelle, 2015). Relocation also brings more pressure to the host community. Roseberry (2008) exemplified that relocated the Acehnese Indian Ocean tsunami victims away from the coast to the forest, creating a platform for illegal logging without any reasonable alternative. The rate of crime in the nearby host village rose after the relocation of tsunami victims in the city of Galle, Sri Lanka. Much of the rise in crime was caused by those who had been relocated (Fernando, Warner, & Birkmann, 2010). Decades of experience with development-induced resettlement indicates that related projects are rarely successful and often lead to loss of livelihoods, impoverishment, and social disarticulation (Fu, Lin, & Shieh, 2013).

Dikmen (2010) listed some reasons why many relocation projects had failed to meet their objectives. In many cases, a top-down approach in site selection, without including the beneficiaries in decision-making, leads to the choosing of location which is unsuitable with the beneficiaries need. For instance, communities which practice site dependant livelihoods, such as a fishery, will be reluctant when being relocated into mainland areas far from the sea. In addition to that, the inappropriateness of the provided houses regarding their targeted beneficiaries needs in terms of size, availability of public spaces and the quality of the house itself, are often quoted as the reasons for a relocation area being abandoned. Boen and Jigyasu (2005) concluded that to minimise the potency

of the failure, the relocation project's decision-makers should consider the aspect of targeting a community's culture.

A significant body of literature found the cause of livelihood disruption in case of relocation. Both development and disaster-induced relocation share similarity where livelihood vulnerability is increased (Muggah, 2011). Usamah and Haynes (2012) pointed out the challenges in adapting the livelihood to the relocation environment. In many cases, alternative livelihood options were not adequately considered for communities who had been forced to move and resettle in another place (Shaw & Ahmed, 2010). Post-disaster responses usually focus on physical reconstruction with less attention being paid to rebuilding livelihoods that are sustainable in the long term (Pomeroy et al. 2006).

The relocation sites limit the livelihood options due to the remoteness of the site, high transport cost, or lack of homestead land (Karanth, 2005). These conditions affect those who have relocated due to the reduced income-generating opportunities, increased expenditure, and the loss of social networks and other resources to facilitate the securing of income (Zottarelli, 2008). Lack of infrastructures such as transportation facilities, electricity, or access to town or place of work often intensifies the sense of being remote to the relocation. In addition to economic difficulties, relocates are often faced with socio-cultural challenges. Separation from the previous environment disrupts their connection with families and relatives and cultural assets (Badri et al., 2006; Cernea, 1997; Dikmen, 2010). This situation impacts their networks and increases their livelihood vulnerability. Manatunge and Abeysinghe (2017) argue that moving could also generate a sense of homelessness and marginalization. In relation to the host community, researchers pointed out many examples that indicate that the bonding of relocates with neighbouring communities is also a complex problem (Fernando et al., 2010; Panjwani, 2013).

In many cases, neither the donors who constructed the settlements nor the local government officials have considered options for improving the livelihood recovery for those relocated (Pomeroy et al., 2006). A new house or housing subsidies might be the only aid from these agencies (Fernando et al., 2010; Hettige, 2007). Strong political commitment to focusing on livelihood aspect in post-disaster relocation influences the success of helping relocates who are dealing with the challenges faced at a new settlement (Barenstein, 2012)

Even though findings have exposed the fact that relocation projects commonly fail, which has led to the impoverishment of the resettled communities (Webber & McDonald, 2004), relocation also poses opportunities to improve previous conditions if managed and organized properly (Bilau, Witt, & Lill, 2015; Manatunge & Abeysinghe, 2017). Over the past several decades, a number of successful resettlement practices have emerged in the context of specific projects from countries around the globe, including Bangladesh, China, Nepal and Vietnam (Zaman, 1996). A successful collective relocation means the new community can depend on its own resources and have the capacity for self-reliance indicated by the willingness to take the new place as their permanent home and to start investing resources in the new place (Coburn, LESLIE, & Tabban, 1984). Relocated people can live in a new settlement area without disaster risk; in addition, people can access new facilities and educational opportunities such as those of environment and disaster management, livelihood support, and so on. It may be said that relocation has some positive effects such as loss of vulnerability hazards and the opportunity for getting a new life and education (Abe & Shaw, 2015)

A relocation project's success is influenced by factors such as the physical environment of the new site, attachment to the previous location and capabilities of the relocated community (Karanth, 2005; Mahapatra, Tewari, & Baboo, 2015; Maruyama, 2003; Murao & Isoyama, 2012; Oliver-Smith, 1991). Usamah and Haynes (2012) also elaborated that a successful relocation is indicated by the appropriate livelihood provisions being met, and people being fully involved and in control of the decision-making process surrounding their resettlement. Despite the difficulties in responding to and counteracting the social impacts, it is nonetheless important to compensate the affected communities for their material losses, especially livelihood options, because such initiatives, if well-planned, can successfully contribute to the long process of disaster recovery (Manatunge & Abeysinghe, 2017).

2.4.2 **Common strategies used by relocated populations for their livelihood recovery**

Being relocated from their resources, the previously disaster impacted people to face greater pressures in recovering their livelihood. Some of the strategies implemented by relocated people to deal with the pressures are described as follows:

- **Livelihood switching**

Karanth (2005) argued that one of many factors influenced the successfulness of relocating the community living in Bhadra sanctuary, India, is the fact that the relocated people did not have to change their livelihood. After being relocated, village households remained agrarian, had access to better facilities and opportunities to improve crop productivity and diversify production. However, this privilege does not happen in every relocation project. Scholars pointed out that in most cases, the relocates have to shift to other livelihoods due to constraints to continuing their previous employment. Owing to lack of land for rice cultivation in the relocation site of the Guchchagram project in Gupalganj, Bangladesh, only 8% of the relocates remained to produce rice while some of them switched to home gardening as the line provided sufficient for home gardening (Mallick & Sultana, 2017). Maly and Ishikawa (2014) elaborated with this example post the 1999 Marokat Typhoon relocation where the people of Rinai Village in Taiwan who could optimise their cultural and historical resources linked their resource preservation to a variety of economic promotions in the tourism sector including crafts, cultural demonstrations, and homestay facilities.

- **Strengthening community cohesiveness**

Scholars have emphasized that strong community cohesiveness highly influences the recovery process, including livelihood recovery. Oliver-Smith (1991) exemplified the case of Caroling community in Guatemala, where the strong, cohesive community brought out strong political empowerment to put pressure on the authorities when dealing with the needs of their settlement. In many cases, particularly in developing countries, political connection strongly influences resource allocation in post-disaster recovery. (Barenstein, 2012; Mallick & Sultana, 2017)

- **Abandoning the relocation site and returning to live near the place of work**

When the option of shifting jobs seems to be unreliable for sustaining a livelihood, going back to the previous place of living might be a chosen strategy. In their research of relocated communities in Flores, Indonesia after the1992 tsunami, the natives of Babi Island that had been relocated to the main island, returned to their old village in order to practice their previous livelihood of planting corn and casava.

3. Research Methodology

3.1 Overview

This chapter explains the overarching framework and elements implemented in this study. It starts with a process of reviewing literature in livelihood and relocation contexts to synthesise the understanding of livelihood resilience in post-disaster relocation. The second section of the chapter describes the methodology implemented in the study to answer the research questions and reaching the goals, as stated in the research objectives.

This study adopts a mixed method approach, combining quantitative and qualitative strategies. The selection of research methods throughout the research process is detailed in the research approach design, including the logical links between the questions and the selected methods.

3.2 Organising guidelines for understanding the research concepts and questions

This research is intended to develop a framework for assessing the resilience of livelihood in post-disaster relocation situations. The following description explains the development of the organising guidelines of the study. The process began by synthesizing the main concepts of post-disaster relocation, and livelihood, as reviewed in the previous chapter. It is linked to the concept of resilience to build a theoretical model integrating all the main concepts. The stage was finalized by the formulation of research questions and hypotheses.

3.2.1 Post-disaster relocation

Relocation is an action of moving and rebuilding a community's, housing, assets, and public infrastructure to another relocation, whether forced or voluntary. The movement necessitating involuntary resettlement of populations can be caused by a variety of triggers, from a development project, political events, such as a war or internal conflict, to natural disasters, such as earthquakes, hurricanes, and floods.

The literature review in Chapter 2 indicates that Post-disaster relocation is often opted for due to reasons including hazard and vulnerability, economic and environmental events. However, due to complexity and cost, this approach is often considered as the last option in post-disaster management. Relocation brings both social and economic impacts on displaced communities due to the difference in societal composition, cultural characteristics, and economic conditions. Relocated people also have to face a greater challenge due to the separation from their livelihoods. Relocation also puts further pressure on the host community. Decades of experience with development-induced resettlement indicates that related projects are rarely successful and often lead to loss of livelihood, impoverishment, and social disarticulation. Therefore, strategies implemented in relocating disaster-displaced people should not only provide houses but must also be seen as an opportunity to deliver a liveable environment.

Even though relocation projects commonly fail, which leads to the impoverishment of the resettled communities, relocation also poses opportunities to improve previous conditions if managed and organized properly. A successful collective relocation means the new community can rely on its own resources and has the capacity for self-reliance indicated by the willingness to take the new place as their permanent home and to start investing resources in the new place. It may be said that relocation has some positive effects such as loss of vulnerability hazards or the opportunity of getting a new life and education.

A relocation project's success is influenced by factors such as the physical environment of the new site, attachment to the previous location and capabilities of the relocated community, appropriate livelihood provisions being met, and people being fully involved and in control of the decision-making processes surrounding their resettlement. Despite the difficulties in responding to, and counteracting the social impacts, it is nonetheless important to compensate the affected communities for their material losses, especially livelihood options, because such initiatives, if well-planned, can successfully contribute to the long process of disaster recovery.

3.2.2 The concepts of livelihood resilience in post-disaster relocation

The Literature Review on disaster reconstruction and recovery indicates that it is required to include livelihood resilience into post-disaster reconstruction theory and

practice following a large-scale disaster. Both development and disaster-induced relocation share a similarity in that livelihood vulnerability is increased; the Review highlights the challenges in adapting the livelihood to the relocation environment. How the relocated people respond to livelihood challenges and to what extent they can recover is likely to depend on their resilience.

The Literature Review also emphasizes the need to re-define livelihood resilience in a post-disaster relocation context. The notion of livelihood resilience as the capacity to cope and strive following relocation should be operationalized for the more practical implementation of post-disaster reconstruction. The new definition specified in this dissertation seeks to bring to the forefront the socio-economic dimension of livelihood resilience in post-disaster relocation.

1. **Individual coping ability**: This is the first dimension of livelihood resilience. It refers to the ability to cope with disturbance. In this sense, the faster a livelihood recovers and progresses after a disastrous event, the more resilient it is.
2. **Individual wellbeing:** The ideas of wellbeing stand out as informative surrogates in capturing locally appropriate notions of livelihood resilience. This aspect also allows for assessment of locally determined thresholds of livelihood resilience within a particular area.
3. **Socio-physical robustness of local community** refers to the way in which the dynamics within a community play an important role in shaping the dynamics of the livelihoods of the people living there. It influences the way people interact with others, fostering or diminishing partnerships
4. **Access to livelihood resources** refers to the extent to which a person can access all available assets, including those that physical or social, which could be used to create a livelihood. The possession of livelihood resources, no matter the amount, is important; diversity or balance between assets positively influences livelihood strategies.

Experience of past relocations also indicated the necessity of looking at a certain number of aspects that are likely to influence the livelihood resilience in the post-disaster relocation context. Resilience can be seen as a function of various possible configurations of physical, economic, social, and cultural factors embedded in the neighbourhood.

3.2.3 Organisation of concepts for understanding livelihood resilience in post-disaster relocation situations

In this section, the concept of livelihood is applied and integrated to develop a model for understanding the particular resilience in a post-disaster relocation context. Based on the review of the literature on livelihood, disaster resilience, and relocation, the model proposed in this thesis is based on the following aspects:

(1) Separated from their previous environment, resources, and connections, the relocated community experiences further pressure in recovery. This challenges various physical, social, economic, and cultural aspects that are linked to the neighbourhood.
(2) Livelihood recovery is shaped by a variety of approaches to relocate the impacted people. The disaster relocation approach is a reflection of various combinations of individual, local, and external, institutional resources, capacities, and arrangements. As the relocation stakeholders are institutionally defined, these stakeholders operate their leverage on the decision making of the livelihood recovery program's implementation funding mechanism.
(3) The indicators of livelihood resilience that are likely to be of particular interest and importance for the livelihood recovery, as well as the critical factors affecting resilience, can provide insight into the execution of post-disaster relocation projects in any future events.

The organisation for integrating the concept of post-disaster relocation, resilience, and livelihood are shown in Figure 3.1.

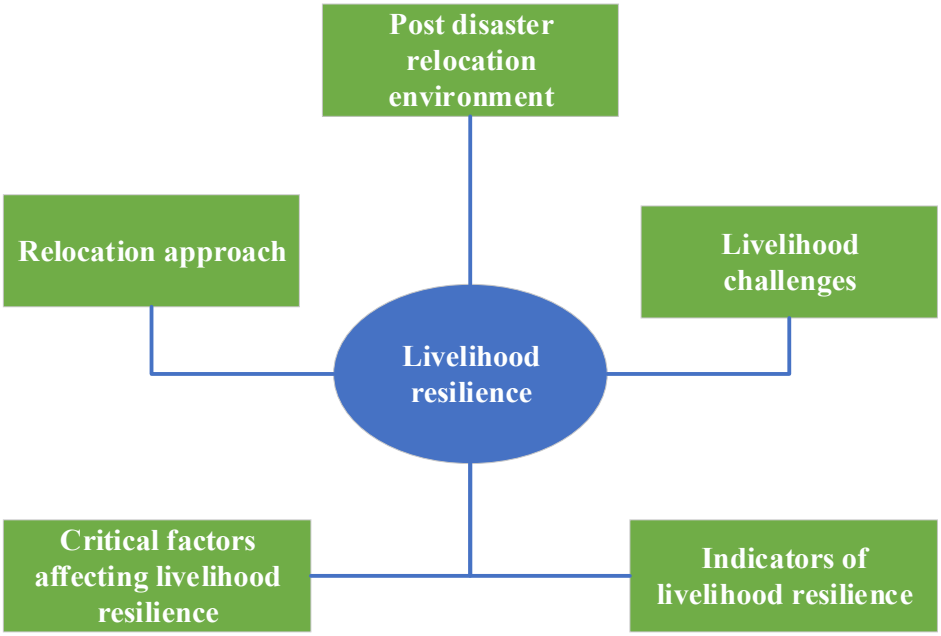

Figure 3.1. Organisation of concepts for understanding livelihood resilience in post-disaster relocation

The key elements of this model are: 1) Post-disaster relocation environment, 2) post-disaster relocation approach, 3) livelihood challenge in relocation neighbourhood 4) indicators of livelihood resilience and 5) critical factors that affect livelihood resilience. In this current research, livelihood resilience is understood as a key element of dealing with livelihood challenges and the livelihood recovery process in disaster-induced relocation projects. The overhaul approach to livelihood recovery within the disaster reconstruction context provides a strong analytical framework to increase the understanding of livelihood resilience in post-disaster relocation projects.

The strength of using these guidelines in this research lies in two main aspects. Firstly, it allows for an approach that looks at post-disaster relocation in a broader disaster recovery context. While the livelihood challenges faced by the relocated community varies in different neighbourhoods, the tools offer a means of understanding the livelihood situation in the corresponding implementation approaches for relocating disaster impacted people.

Secondly, this guiding tool offers a means of understanding factors that may affect the livelihood resilience of relocated people. It is also beneficial to analyse which aspects

should be focused on to enhance and improve the livelihood resilience of the affected people. This understanding of influencing aspects and indicating characteristics could serve as a base for formulating a livelihood intervention to mitigate the impact of relocation. From this perspective, improvement schemes can be suggested by identifying those attributes that might best be mustered to build resiliency in a post-disaster relocation.

3.2.4 Research questions

The literature review in Chapter 2, along with the synthesis in the preceding sections, provides a discussion of what might be expected in livelihood intervention future policies and research challenges in the context of post-disaster relocation. It also implies the need for empirical research, which builds on the current body of work, to examine how to assess livelihood resilience in post-disaster relocation situations, as well as what the critical factors are that hinder or enable resilience.

The analytical model previously discussed for the understanding of the concept of livelihood resilience can be operationalized through a number of research questions which pose the main paths of this thesis. The research questions this study aims to address are listed in section 1.2 Research questions and objectives (page 4).

The purpose of this research is to understand the livelihood resilience in post-disaster relocation. According to the model described above, differences in resource availability are a function of the five elements. In order to test this model, the research design and methodology applied will be specified in the following sections.

3.3 Research process

The objective of this research is to develop a framework for assessing livelihood resilience of a post-disaster relocated community for the purpose of helping the recovery stakeholders set a benchmark for starting a livelihood intervention in disaster recovery, particularly in a relocation context. To accomplish the objective, the research process is divided into several stages.

1. **Problem identification:** The knowledge gap as the base of the research question was identified through an intensive review of the disaster reconstruction literature.

Livelihood and relocation were combined in discussion with disaster management practitioners during seminars. The information from this process also served in formulating the analytical framework for understanding livelihood resilience in the context of relocation. Furthermore, research questions and objectives were developed together with the planning methods used in addressing the question and its objectives as part of the research design.

2. **Data collection:** this stage involved multiple techniques in its research design, arriving at an accurate perception of reality, knowledge, and truth (McMurray, Pace, & Scott, 2004). The implemented research method was selected in consideration of the research objectives and the questions to be addressed (Amaratunga et al., 2002; Creswell, 2014). In this research, a mixed method design was selected to identify the indicators and factors affecting livelihood resilience. Qualitative and quantitative techniques were used for data gathering and analysis in the hope that each technique would produce complementary data. Two field trips were conducted to collect data. The data collection also included the process of validating the information gathered.
3. **Analysis and synthesis:** in this phase, based on the analytical framework, the characteristics that indicated the livelihood resilience of the surveyed relocated communities were identified. Together with this, the critical factors that affect resilience were also analysed. The indicators were further integrated into a proposed assessment framework for identifying the resilience of a post-disaster relocated community's livelihood. A synthesis of all the information yielded from the study was undertaken to arrive at pertinent suggestions for improving the livelihood intervention practices in post-disaster relocation situations.
4. **Conclusion:** This was the final stage in wrapping up the whole process of the research by summarizing the research findings as well as suggesting recommendations for livelihood intervention in post-disaster relocation. The research's contributions to the current knowledge base were discussed, and research limitations and constraints were summarized. In line with the unfilled research gaps and areas that had not already been dealt with by the research, in its final stages, the thesis has summarized the directions needed for future research and practical effort.

The detailed research process is depicted in Figure 3.2.

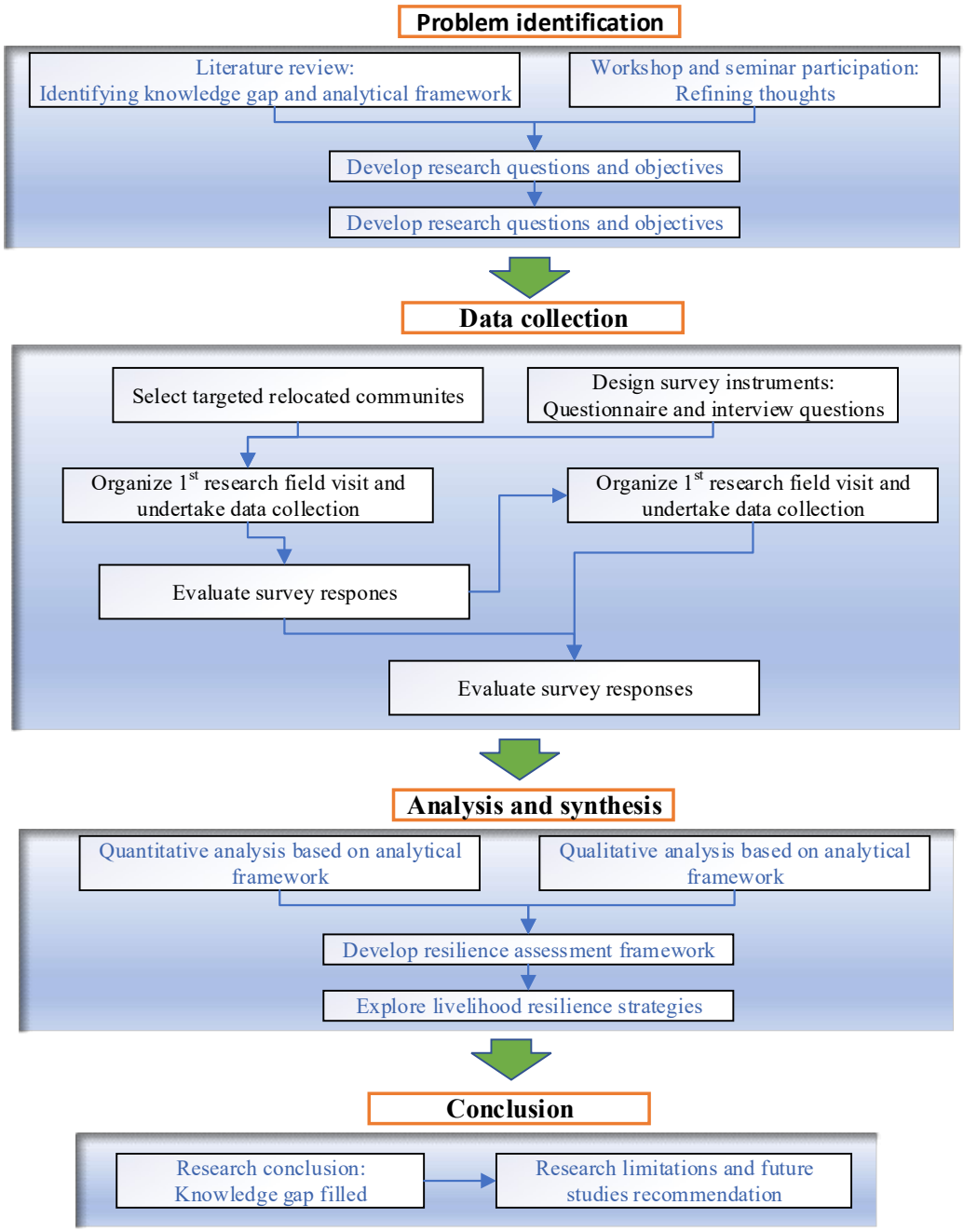

Figure 3.2. Research process

3.4 Research design

Research design refers to the overall strategy chosen to integrate the different components of the study in a coherent and logical way, thereby ensuring that the researcher will effectively address the research problem as validly (Yin, 2014), objectively, accurately and economically as possible (De Vaus & de Vaus, 2001; Kumar, 2014).

A good research design path includes all the research stages, including the data collection measurement analysis and the process of conclusion building. There are many types of research design that are implemented in social studies, such as; action research design, case study research design, casual design, cohort design, cross-sectional design, descriptive design, experimental design, exploratory design, historical design, longitudinal design, meta-analysis design, mixed method design and observational design (University of Southern California Libraries, 2018) with particular strengths and weaknesses.

According to Yin (2014), there are three main aspects to be considered in designing research include a) the type of research question posed, b) the extent of a researcher has over the actual behaviour events and the degree of focus on contemporary events. The relationship of five major research design to those three aspects is shown in Table 3.1. Yin (2014) also elaborates that the case study is an empirical inquiry which investigates a contemporary phenomenon (case) deeply and within its real-world content. The case inquiry relies on multiple sources of evidence, with data needing to converge in a triangulation fashion and as another result and must employ prior development of theoretical prepositions to guide data collection and analysis.

Table 3.1. Relevant Situation for Different Research Design
(Yin, 2014)

Research Design	Form of Research Question	Requires Control of Behavioural Events	Focuses on Contemporary Events
Experiment	how, why?	yes	yes
Survey	who, what, where, how many, how much?	no	yes
Archival Analysis	who, what, where, how many, how much?	no	yes/no
History	how, why	no	no
Case study	how, why?	no	yes

Since this study is aimed to investigate the livelihood experience of relocated communities in Aceh post-2004 Indian Ocean tsunami, the situation is relevant to the case study method as suggested in Table 3.1. Table 3.2 displays the suitability of this study to the case study method. This research focusses on livelihood resilience in post-disaster relocated cases which have not been broadly investigated, as explained in Chapter 2. This condition goes in line with Chang (2012), who implies that a case study is especially suitable for learning more about a little known or poorly understood the situation. The central research question focuses mainly on "how" question which can be addressed through a case study. Even though Q1 to Q4 were formulated as "what" questions, all of them are the justifiable rationale for conducting an exploratory study about the livelihood resilience of relocated communities in Aceh. Hence, a case study method could be implemented for answering these questions (Yin, 2014).

To address the pose research questions, a researcher must conduct a series of investigation, including experiments, surveys observations, or interviews. In this case, the information needed, such as listed in Table 3.4, is directly collected from the post-disaster relocation stakeholders, where the researcher could not control the behavior of the event. For this reason, a case study design was implemented in this research.

Table 3.2. Matrix of Research Case Situation

Research situation		Suitability to case study approach
Research question	**Question type**	
Central question: *How do we assess the livelihood resilience of disaster-induced relocated people?"*	How	yes
Q1: *What challenges were faced by those relocated in Aceh, Indonesia, following the 2004 Indian Ocean tsunami?*	what	yes
Q2: *What are the indicators of livelihood resilience of a post-disaster relocated community?*	what	yes
Q3: *What are the factors that affect the affected livelihood resilience of a post-disaster relocated community?*	what	yes
Q4: *What measures and strategies can be put in place by government agencies and aid organisations in building livelihood resilience for relocated communities?*	what	yes
Researcher's role in the study	**Require control over behaviour events?**	
• *Interview research participants* • *Direct observation on studied events* • *Dealing with all variety of research data including documents, photos, interview and observation results*	No	yes
Focus Event	**Contemporary events?**	
• *2004 Indian Ocean Tsunami in Aceh, Indonesia* • *2010/2011 Canterbury Earthquake* • *2016 Kaikoura Earthquake*	Large scale disaster	yes

Chang (2012) suggests that a comparison study is beneficial for drawing an accurate conclusion. A comparative study across disasters is essential for developing a knowledge base on how the studied communities recover from disasters (Chang et al., 2010; Wu & Lindell, 2004). In this study, the quantitative and qualitative information derived from post-2004 Indian Ocean tsunami in Aceh implemented in building the assessing framework while a comparison with qualitative information from New Zealand post-earthquake experience serves in generalizing the framework implementation across different post-disaster reconstruction context.

3.5 Research methods

According to Creswell (2009), the selection of research method is affected by factors including, philosophical worldview, strategy, and method implemented, research questions, the personal experience of the researcher and the audience for whom the report will be written. Creswell proposed a framework for research method which interconnects worldviews, strategies of inquiry, and research method, as shown in Figure 3.3.

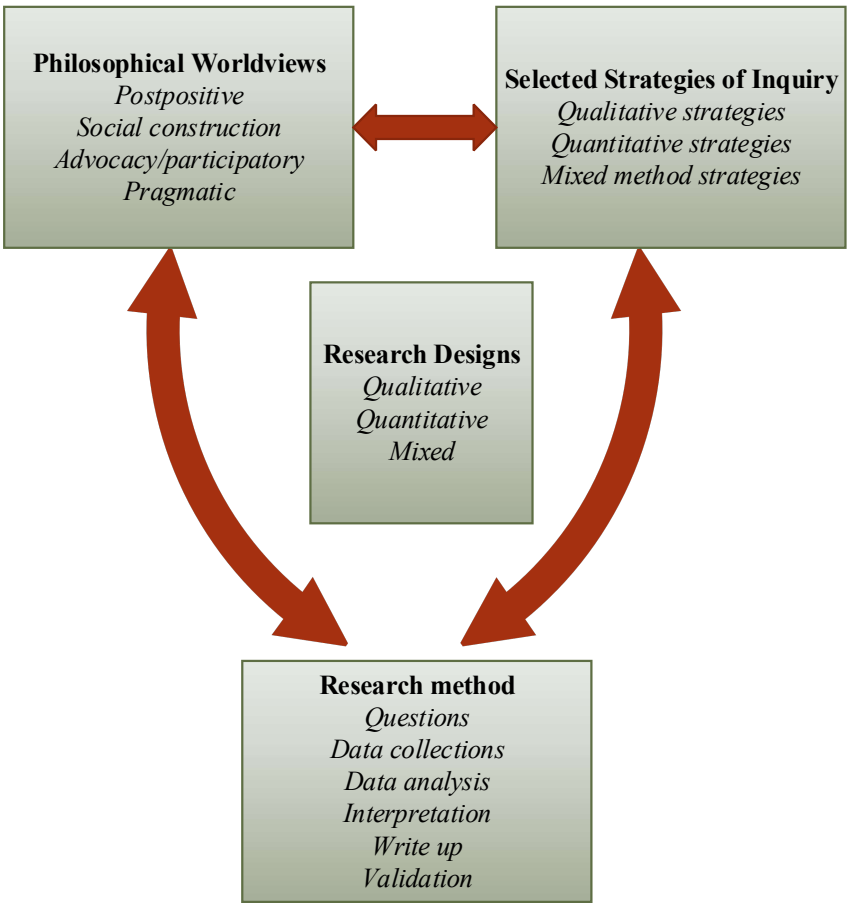

Figure 3.3. Framework for formulating research method

Source: Creswell (2009)

Amaratunga et al. (2002) explained that logical positivism supporters use quantitative and experimental methods for testing the hypothetical-deductive generalisation in searching for casual explanations and fundamental laws. The implication is the need for hypotheses formulation researchers to pull themselves out from

the subject being studied. Conversely, the phenomenological proponents employ a qualitative and naturalistic approach to understand the holistically human experience in context-specific settings. Each approach has its own strengths and weaknesses. Easterby-Smith, Thorpe, and Lowe (1991) summarised both approaches, as shown in Table 3.3.

Table 3.3. Strengths and weaknesses of positivism and phenomenological research approaches

Paradigms	Strengths	Weaknesses
Positivism (quantitative)	Can cover a wide range of situations.	The method used tends to be rather inflexible and artificial, the
	Can be fast and economical.	The method is not very effective for the understanding of the process or the significance that people attach to actions.
	Maybe considerably relevant to policy decisions as long as the statistical conclusion is aggregated from a large sample.	Not very helpful in generating theories.
		Focus is on what it is, or what has been recent. This means that it is hard for the policymaker to infer what changes should be made and what should be done in the future.
Phenomenological (qualitative)	Data-gathering methods seem more natural rather than artificial.	Data collection can be tedious and requires more resources
	Able to look at change processes over time.	Difficult to analyze and interpret the gathered data.
	Able to understand people's meanings	Difficult to control the pace, progress, and end-points of the research process.
	Flexible in its adjustment to new issues and ideas as they emerge.	Policy makers may perceive that the qualitative results are less credible.
	Contributes to theory generation.	

When designing research, the main consideration should focus on the suitability of the chosen method for that particular research inquiry, its objectives, and the resources available, rather than sticking to one particular positivism or phenomenological approach (Amaratunga et al., 2002). Sloss, G. Philliber, and R. Schwab (1980) elaborated on four aspects namely; what questions to study, what data are relevant, what data to collect and how the researcher should analyse the data.

Table 3.4 displays the question types used in this research, the relevant data needed, and the process of collecting and analysing data for answering the research questions.

Table 3.4. Question type, relevant data and analysing method

Research Questions	Relevant data needed	Data collection and analysis for addressing the question
Q1: What challenges were faced by those relocated in Aceh, Indonesia following the 2004 Indian Ocean tsunami?	Livelihood difficulties and challenges faced by the relocated communities after being relocated.	Identify the livelihood problems experience by the relocated communities, the causes of livelihood problems, and how the communities responded to the challenges.
Q2: What are the livelihood resilience indicators of disaster-induced relocated communities?	Indicators of livelihood resilience for post-2004 Indian Ocean tsunami relocated community in Aceh.	Identify the characteristics that indicate the livelihood resilience of the community post the 2004 Indian Ocean tsunami in Aceh, also identify how the indicators surrogate the resilience. This is critical for providing the framework to assess resilience.
Q3: What factors affect the livelihood resilience of post-disaster relocated community?	Factors that affected the livelihood resilience of the post-2004 Indian Ocean tsunami relocated community of Aceh.	Identify the determinant of the livelihood resilience of the post-2004 Indian Ocean tsunami in Aceh. This process involves the study of all the strategies that might affect resilience.
Q4: What measures and strategies can be put in place by government agencies and aid organisations in building livelihood resilience for relocated communities?	Livelihood interventions implanted by NGOs and government agencies in the post-disaster relocated communities, the strategies, and measures conducted by the relocated communities to recover their livelihood after being relocated.	Identify the reliable strategies that might be working on strengthening the livelihood resilience of a post-disaster relocated community.

The approaches to address the research questions are shown in Table 3.5. The table implies that it would be best to employ a complementary approach which includes both qualitative and quantitative methods. Yin (2013) suggested a triangulation, which is the mix or combination of different methodologies in the study of the same phenomenon. Mixed methods research is an approach to inquiry that generally combines or associates both qualitative and quantitative forms (Hesse-Biber, 2010). It involves philosophical assumptions, the use of qualitative and quantitative approaches, and the mixing of both

approaches in a study. Thus, it is more than simply collecting and analysing both kinds of data; it also involves the use of both approaches in tandem so that the overall strength of a study is greater than either qualitative or quantitative research (Creswell, 2014; Hesse-Biber, 2010).

Table 3.5. Research questions and approaches to addressing the questions

Research questions	Type of question	Approach to address the question
Q1: What challenges were faced by those relocated in Aceh, Indonesia, following the 2004 Indian Ocean tsunami?	What	**Quantitative** Questionnaire survey **Qualitative** In-depth interview Field observation
Q2: What are the livelihood resilience indicators of post-2004 Indian Ocean tsunami relocated communities in Aceh?	What	**Quantitative** Questionnaire survey **Qualitative** In-depth interview Field observation
Q3: What factors affect the livelihood resilience post-2004 Indian Ocean tsunami relocated communities in Aceh?	What	**Quantitative** Questionnaire survey **Qualitative** In-depth interview Field observation
Q4: What measures and strategies can be put in place by government agencies and aid organisations in building livelihood resilience for relocated communities?	What	**Qualitative** In-depth interview Field observation

Based on those considerations, this research adopted the exploratory sequential mixed method research design proposed by Hesse-Biber (2010), as shown in Figure 3.4.

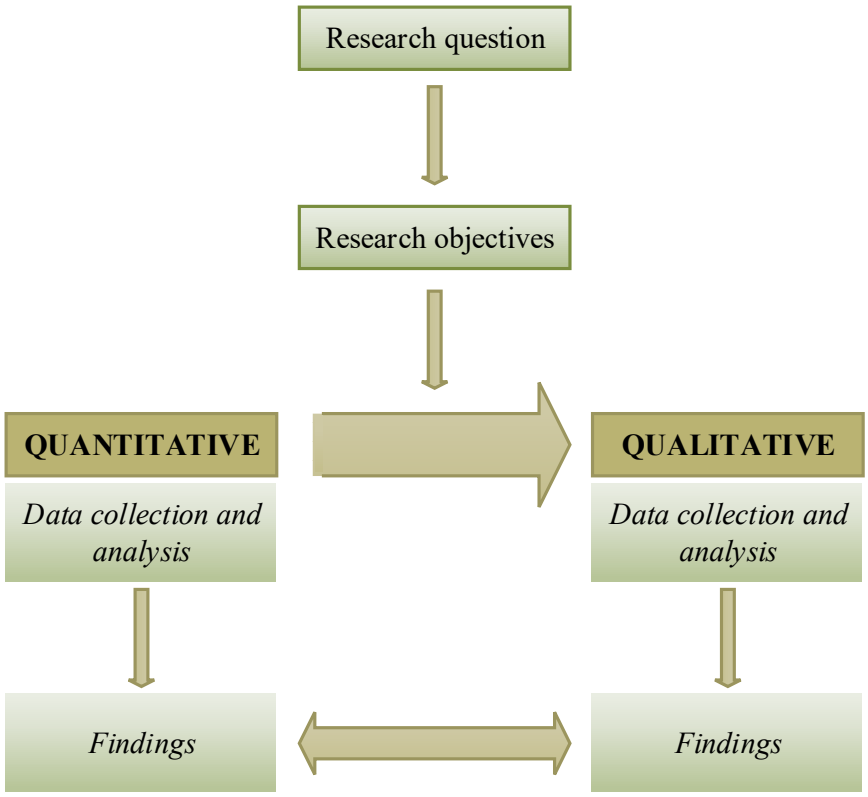

Figure 3.4. Quantitative → Qualitative Sequential Exploratory design

Adopted from: Hesse-Biber (2010)

The qualitative approach is used to conduct a further in-depth investigation of the research problem. Findings from each study will be compared and contrasted for validating and generalising. The overall research design is illustrated in Figure 1.1Figure 1.1. Research design; these are the various methods, described in the following section, that has been applied in each stage of the process.

3.5.1 Literature review

The literature review, as a part of a research process, contributes to the properness of the research. Kumar (2014) argued that the literature review plays an important role by providing a theoretical background to the study, helping to establish the link between what is going to be examined and what has been studied. It also helps to integrate the research findings with the existing body of knowledge. The literature review not only covers the context being studied but also reviews the methodological literature which puts the researcher in a better position to select a methodology that is capable of providing

valid answers to the research questions (University of Southern California Libraries, 2018). The role of the literature review in this research process is illustrated in Figure 3.5.

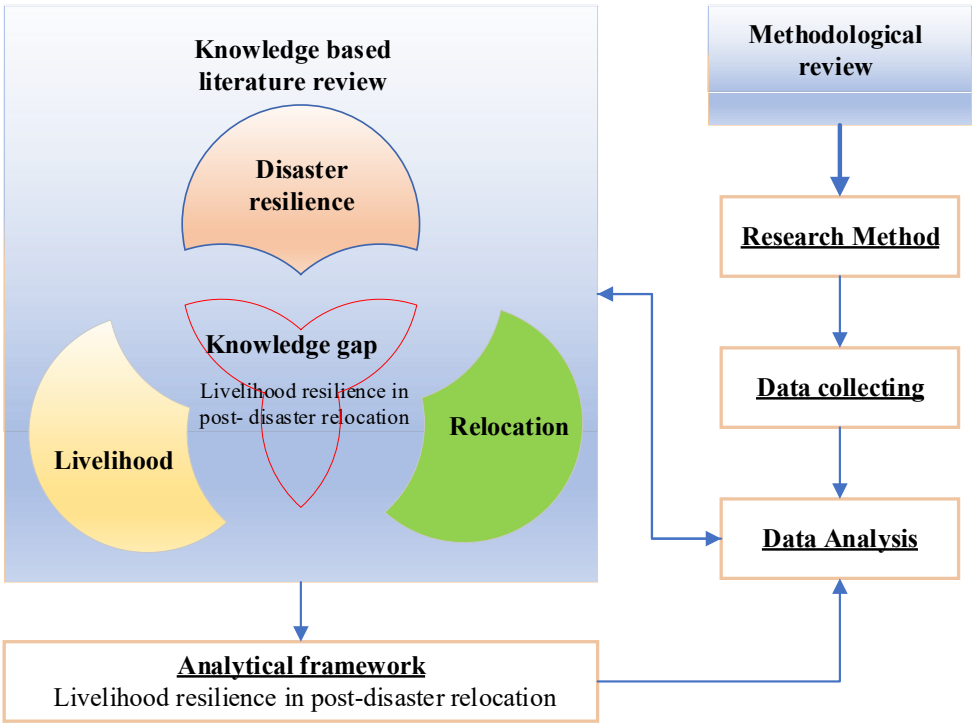

Figure 3.5. Role of the literature review in the research

In this study, the literature review identified the knowledge gap in the previous livelihood studies, particularly in the context of disaster-induced relocation projects. Reviewing past research concepts is also beneficial in the process of developing the analytical framework for understanding the resilience of relocated peoples' livelihoods and the research methodology implemented in livelihood studies.

3.5.2 Questionnaire survey

Survey research studying a sample population contains a quantitative or numeric description of the trends, attitudes, or opinions, of that population. It includes cross-sectional and longitudinal studies using questionnaires or structured interviews for data collection, with the intent of generalizing from a sample to a population (Babbie, 1990).

The questionnaire survey in this research study was used for the purpose of identifying indicators, and critical factors that affected livelihood resilience following the 2004 Indian Ocean tsunami after the communities in Banda Aceh and Aceh Besar had been relocated. The questionnaire in this study has been designed as an opinion survey with the majority of the questions in an ordinal format. There are also open-ended questions which allow participants to add their opinions on the livelihood challenges and the recovery process. The questionnaire design and survey sampling are described as follows.

According to Kumar (2014), there are three options for selecting the sample in a research survey; these are; random, non-probability, and mixed sampling. Creswell (2014) argued that the ability to generalize findings on a sample of a population is represented by the degree of randomization of the sample itself; hence, non-probability sampling poses the least power in generalizing the conclusion as the design does not follow the theory of probability that ensure that each element in the studied population has an equal and independent chance of being included in the study. However, in this research, the sample selection is in accordance with the informants' livelihood experiences after being relocated. Therefore, the sample selection employed systematic sampling design utilizing both the random and non-probability techniques.

The random technique was adopted to select the targeted sample from each relocated community. Following that, non-probability quota sampling was employed to reach a minimum of 20% responding to the questionnaire from each targeted sample population group. The main consideration is researcher access to the sample population (Kumar, 2014). As the targeted respondents are adults who are responsible for their household's livelihood, the researcher went to the field and asked for people to meet the criteria and showed a willingness to participate in the research. The process continued until the required quota was reached. Detailed information pertaining to the respondents is shown in Table 3.6.

Table 3.6. Questionnaire survey respondents

Relocation Site	Distance from the city centre (kilometers)	Relocated community	Number of households	Number of people sampled for questionnaire	Number responding to questionnaire
Budha Tzu Chi Pante Riek	0	Mixed	325*	175	37
Budha Tzu Chi Neuhuen	15	Mixed	350*	200	52
Jacky Chan Village[5]	15	Mixed	300*	150	32
Gampong Baro Village	17	The whole community has been relocated	57	30	15
ARC Labuy	15	Mixed	85	50	14

The questionnaire used in this study was designed in line with McMurray et al. (2004) who argued that a comparable understanding of respondents in regard to the questions is essential to ensure that the responses reflect accurate respective views of the issues being observed. From the literature review, a list of 27 factors that are likely to post-disaster livelihood's resilience. Twenty characteristics that might indicate the respective resilience have been catalogued, as shown in Table 2.3 and Table 2.3 presented in the form of a questionnaire, as shown in the Appendix.

The survey instrument in the present research contains three main components: background questions, open questions, and closed questions. The questionnaire was designed as a generic instrument so that the same questionnaire was administered to all irrespective of the differing characteristics of the participants. It was, therefore, necessary to collect demographic data and other useful information to assist in categorizing the responses. The questionnaire begins with background questions to gather demographic data on the participants. Open format questions are those that ask for unprompted opinions (Leedy & Ormrod, 2005). In other words, there are no predetermined sets of responses, and the participant is free to answer; however, he/she chooses. Open format questions are used in research questionnaires for soliciting subjective livelihood resilience indicators, and factors affect it because the range of responses is not tightly defined. This increases the likelihood of receiving unexpected and insightful perceptions and

perspectives to increase the full range of opinion. The questionnaire also ends with open format questions asking the respondent for opinions about the hierarchy of the indicators and factors. This type of question allows the researcher to filter out useless or extreme answers that might occur in an open format question (Sekaran & Bougie, 2016). The questionnaire contains closed format questions in the form of a ranking scale that was used to assess the livelihood resilience indicator. In the questionnaire, respondents were asked to rank the indicators under each themed group base of the content analysis of the potential characteristics extracted from the literature review. For the questions about the factors affecting livelihood resilience, respondents were asked to rank the importance of each factor on a five-point Likert scale from 1 to 5, where one symbolizes 'not important at all' and 5 represents 'very important'. The reliability of the preliminary questionnaire was achieved by conducting a pilot test of the questionnaire.

3.5.3 Interviews

Interviewing is a very common method for gathering qualitative data. According to Kumar (2014), unstructured interviews in qualitative research can be categorised in four types, namely, in-depth interview, focus group interview, narratives, and oral histories. This research accommodates in depth face to face interviews between the researcher and the participants in order to understand the relocated people perspectives on livelihood resilience and recovery.

According to Maxwell (2012), in addition to providing additional information complementary to observation, interviews also serve in checking the accuracy of the observations and validity of questionnaire responses. In this case, the interview was used for three purposes: 1) to increase the understanding of the elements in the livelihood resilience analytical framework through gaining perspectives from the relocated people; 2) to identify the relationships between recognized critical factors that affected the livelihood resilience of the relocated community and to validate questionnaire findings; and 3) to derive insight into possible strategies for improvement in the livelihood intervention practice in post-disaster relocation.

In general, the interview questions were developed based on the research questions and objectives. Therefore, the question list in this research comprises three themes, as presented in the livelihood resilience analytical framework: livelihood

challenges in a post-disaster relocation context; livelihood resilience indicators, and critical factors that affected livelihood resilience in post-disaster relocation. The interview tools included both unstructured and semi-structured questions and were intended to elicit views and opinions from the participants. The interview instruments are included in the Appendix.

The sampling of interviews employed the same approaches as the process in the questionnaire survey. Non-probability quota sampling was used until reaching the saturation point. In this case, whether the collected information was considered similar or not varied. In the case of the 2004 Indian Ocean tsunami relocation in Aceh, the household heads or the housewives were asked to share their perspectives about livelihood after being relocated. In this research, the selection of interviewees was also determined by the willingness and availability of the potential interviewees; this was indicated when they participated in the questionnaire survey. The majority of questionnaire respondents, therefore, constituted the sample of the ensuing interviews. For the comparison with the New Zealand context, several business operators in Christchurch and Kaikoura were interviewed about their livelihood recovery and resilience following the earthquakes. During all of the interviews, the researcher mainly recorded information using handwritten notes. The number of interviews is shown in Table 3.7. For the purpose of convenience of reporting, each interviewee was allocated a single code, as listed.

Table 3.7. Interview respondents

Location		**Number of selected interviews and coding**
Relocation sites in Aceh	Budha Tzu Chi Pante Riek	6 (CP1 – CP6)
	Budha Tzu Chi Neuhuen	8 (CN1 – CN 8)
	Jacky Chan Village	6 (JC1 – JC6)
	Gampong Baro Village	4 (GB1 – GB4)
	ARC Labuy	3 (LB1 – LB3)
New Zealand Earthquake impacted areas	Christchurch	10 (CH1 – CH10)
	Kaikoura	13 (K1 – K13)

3.5.4 **Field observations**

Observation is one way of collecting qualitative primary data. In this study, the researcher implied the non-participant observation protocol, as suggested by Kumar (2014) to look into the livelihood phenomenon of the relocated communities. The field observations captured the interaction amongst people, also between the people and their environments through photographs, video recordings, or notes. The collected observation throughout the two field trips complements the questionnaire and interview data to understand the livelihood resilience of the relocated community.

The links between field observation and other data collection methods such as questionnaire surveys and interviews to address the research questions and objectives are shown in Figure 3.6.

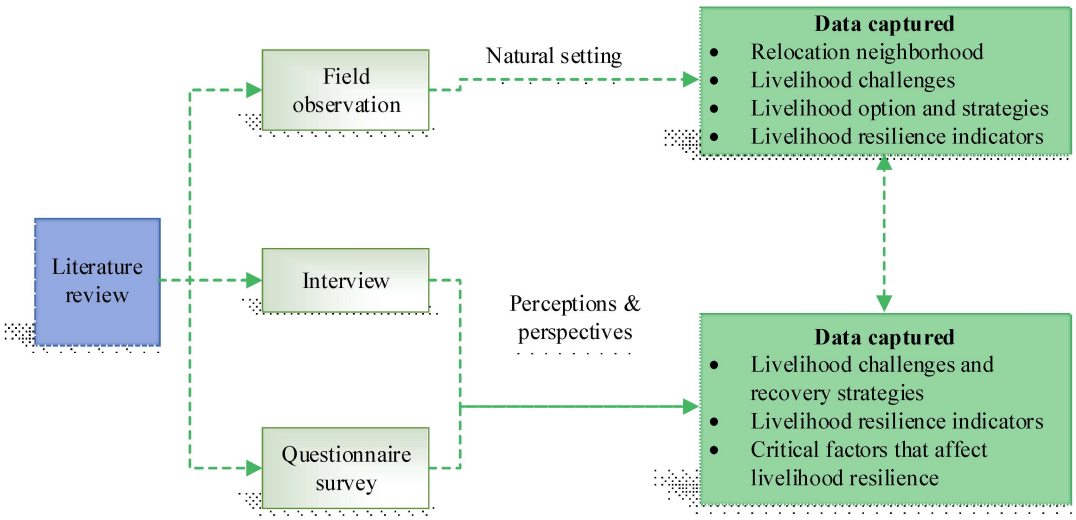

Figure 3.6. Linkages between data gathering methods in the research

3.5.5 **Triangulation**

Amaratunga et al. (2002) implied that a combination qualitative and quantitative approach in a triangulation effectively compensates for the weaknesses of each particular approach by counterbalancing the strength of the other. Rossman and Wilson (1994) also elaborated that in linking the qualitative and quantitative approaches, the research provides opportunities to develop an analysis of the richer details and initiate new studies for clarifying any contradictions and surprises that arise from a study.

Implementation of all the research methods to address particular research questions and objectives are summarised in Table 3.8.

Table 3.8. Methods implemented to address research questions and objectives

Research questions	Research objectives	Research methods
Q1: What challenges were faced by those relocated in Aceh, Indonesia, following the 2004 Indian Ocean tsunami?	a) To identify the livelihood challenges experienced by the 2004 Indian Ocean tsunami impacted people after being relocated. b) To identify the livelihood strategies implemented to the relocated communities for dealing with the challenges.	• Literature review • Questionnaire surveys, In-depth interview, and field observations conducted in two field trips in Aceh, Indonesia.
Q2: What are the indicators of livelihood resilience of a post-disaster relocated community?	a) To identify the indicators of livelihood resilience in the relocated community. b) To develop a framework for assessing the resilience based on the identified indicators.	• Literature review • Questionnaire surveys, In-depth interview, and field observations conducted on two field trips in Aceh, Indonesia.
Q3: What are the factors that affect the livelihood resilience of a post-disaster relocated community?	a) To identify the critical factors that influence the livelihood resilience of a post-disaster relocated community. b) To identify the relationship between the livelihood resilience determinants.	• Literature review • Questionnaire surveys, In-depth interview, and field observations conducted on two field trips in Aceh, Indonesia.
Q4: What measures and strategies can be put in place by government agencies and aid organisations in building livelihood resilience for relocated communities?	a) To identify the implemented strategies and their impacts on building livelihood resilience in the relocated communities. b) Recommend the measures and strategies that might be effective for government agencies and aid organisations in building the livelihood resilience for relocated communities in future disasters.	• Literature review • In-depth interview and field observations conducted on two field trips in Aceh, Indonesia. • In-depth interview and field observations conducted in Christchurch and Kaikoura, New Zealand to validate the findings from Aceh.

3.6 Studied areas

This study focused on the 2004 Indian Ocean tsunami impacted people that had been relocated in the reconstruction process. By looking at the relocated people's experience, this research aims to develop a measurement framework for assessing the livelihood resilience of a post-disaster relocated community. An additional study was also conducted to look into the livelihood resilience and recovery following the 2010/1011 Canterbury Earthquake and the 2016 Kaikoura Earthquake. Both cases in the New Zealand disaster context previously described might not imply an emphasis on a post-disaster relocation situation, yet the surveyed areas in these cases also share some

commonality with the relocation situation in Aceh in terms of livelihood delay and vulnerability due to separation or isolation from livelihood resources. This similarity, therefore, offered an opportunity for the researcher to look into the possibility of implementing the framework developed based on the findings in Aceh into different disaster situation. Details of the studied areas are described in the following section.

3.6.1 Post-Indian Ocean Tsunami communities in Aceh

On 26 December 2004, an Mw 9.3 earthquake hit Aceh in northern Sumatra, Indonesia this was followed by a catastrophic tsunami in the Indian Ocean. The tsunami caused devastating damage to the coastal areas of countries in the Indian Ocean, including Indonesia, Thailand, Sri Lanka, India, and some East African countries. The details of the impacted countries in Africa, South Asia, and South East Asia are displayed in Figure 3.7, while Table 3.9 lists the devastation.

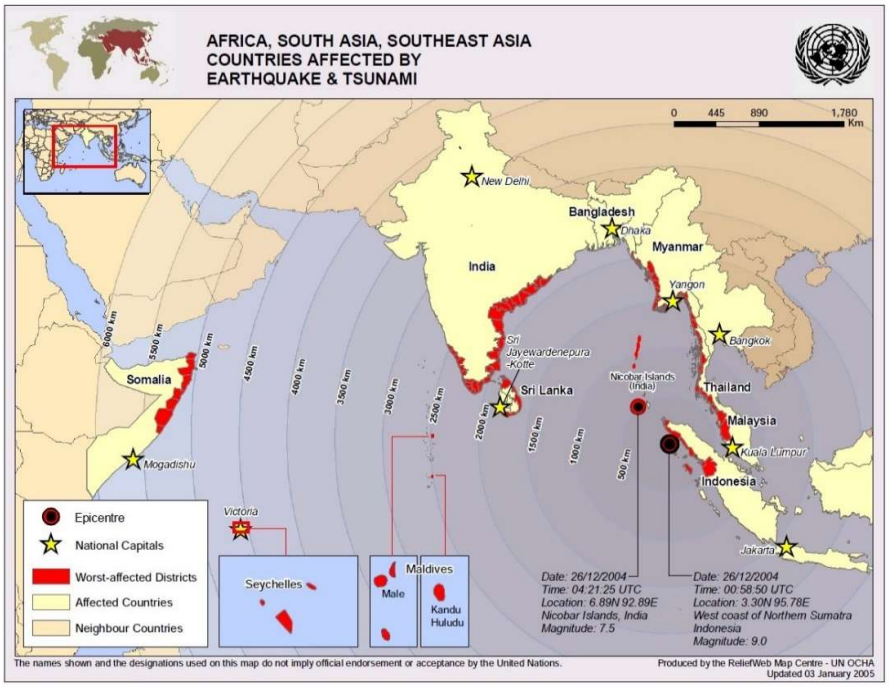

Figure 3.7. Countries affected by the 2004 Indian Ocean tsunami

Source: UN Office for The Coordination of Humanitarian Affairs (2005)

Table 3.9. The tsunami devastation: Summary data circa end of February 2005 (Athukorala & Resosudarmo, 2005)

	Areas affected	**Damage**	**Displaced**	**Deaths**	**Missing people**
India	2,200 km of coastal land; 300 m to 3 km inland; 3 million people	897 villages; 157,393 dwelling units; 11,827 ha of cropland; $US1.56 billion in assets	647,556	10,872	5,551
Indonesia	Aceh, 14 out 21 districts; 1 million people	172 sub districts; 1,550 villages; 21,659 houses	811,409	166,760	127,749
Malaysia	Northwestern states of Penang and Kedah		8,000	68	6
Maldives	20 atolls	100,000 people	10,578	82	26
Myanmar	23 villages	592 houses in 17 villages	2,591	At least 2,500[a]	n.a.
Somalia	Punland region worst hit; 650 km coastline	600 families lost their properties	4,000	At least 150	n.a .
Sri lanka	1,720 km of coastal land; 300 m to 3 km inland; 103 families	78,529 fully damaged houses	502,668	30,959	5,644
Thailand	Six provinces on the west coast	6.85 m baht provided to assist victims	n.a.	5,392	3,100

Note: n.a. : data are not available

a: Estimated deaths in Phang Nga province, which took the biggest hit in Myanmar on 26 December 2004.

The most devastating effects were experienced in Aceh, in the most north province of Indonesia, as shown in Table 3.9, where more than 100 thousand people were killed, and 127,000 houses were damaged or destroyed making more than 700,000 people homeless (Pribadi et al., 2014). A subsequent earthquake on 28 March 2005 intensified the impact and led to the displacement of more than 500,000 people (Fitzpatrick, 2007).

Figure 3.8. Aceh Province (adapted from daemeter.org (2015) and GIS Center Aceh Besar (2007)

After the tsunami, the government of Indonesia decided to establish a reconstruction scheme under the body of Badan Rehabilitasi dan Rekonstruksi (BRR) NAD-Nias. An urban reconstruction plan established in 2005 divided the impacted areas into multiple zones. For the considerations of risk and hazard, the area within 2 km of the shoreline, the Buffer Zone, was restricted for housing (Matsumaru et al., 2012). This policy banned the impacted people from rebuilding their houses in their previous areas and having to be relocated to non-restricted areas. In Banda Aceh, these housing relocation sites were located, either on the periphery of urban areas that were unaffected by the tsunami or on hilly areas some distance from the Banda Aceh city centre.

As the housing support was distributed based on land entitlement, only landowners benefitted from the intervention. This policy put the renters and squatters among the poorest and most vulnerable victims of the tsunami disaster. Without land of their own, they were among the last in line for housing assistance. To address this issue, in June 2006, the BRR issued the BRR regulation 21/2006 that provided cash to renters and squatters instead of direct land or housing assistance (Adger et al., 2005). After domestic protests and international representations, this regulation was amended in February 2007 to allow direct land and housing assistance to renters and squatters (Fitzpatrick, 2007). Nevertheless, the provision of dwellings for those renters and squatters in Banda Aceh faced obstacles. In addition to the land ownership problem, the massive imbalance between housing demand and supply, in addition to a shortage of

suitable land on which to build housing for the landless, intensified the pressure on the BRR (Fitzpatrick, 2007).

To deal with the pressure, the BRR implemented some relocation schemes. The government, through the BRR, provided the land, and other humanitarian agencies built the houses for relocating the landowners who had lost their land as well as the renters and squatters. Two sites are marked for renters and squatters. These sites are located at Neuheun and Labuy, which are both in Aceh Besar (approximately 17 km from Banda Aceh). Several NGOs and donors – including the Chinese Charity Foundation, the Buddha Tzu Chi Foundation, the Asian Development Bank (ADB), Islamic Relief and the International Organisation for Migration – are providing houses for renters and squatters at these locations. NGOs that provide housing for renters and squatters either at Labuy or at other sites, include; GenAssist, Zero to One Foundation, the United States Agency for International Development (USAID), the Australian Red Cross and the Mennonite Central Committee[6] (MCC)(Arie et al., 2009; Fitzpatrick, 2007).

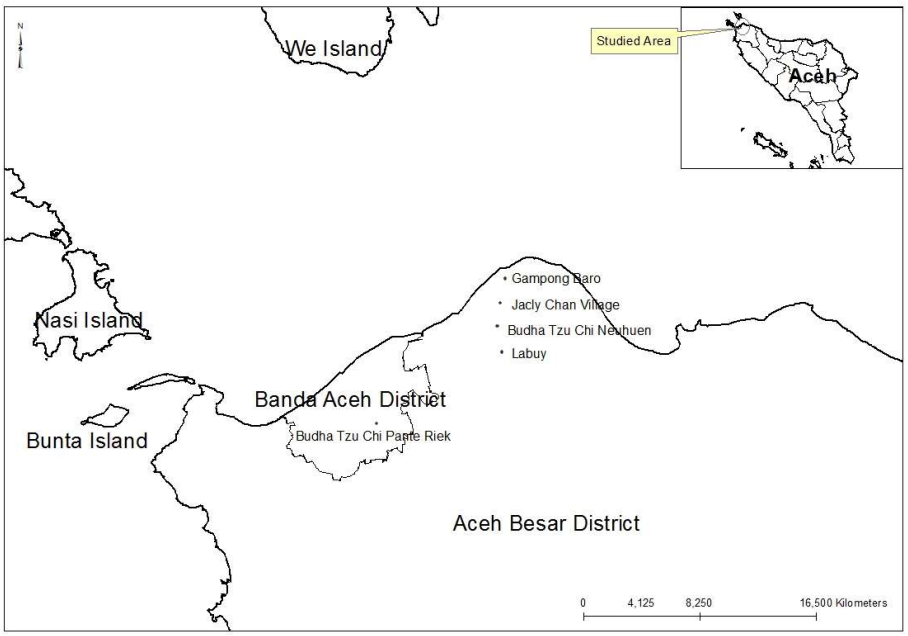

Figure 3.9. Location of the relocated communities studied

Gampong Baro village was located at the coastline about 12 km at the North West of Banda Aceh before the tsunami hit. It was severely inundated by the tsunami and was later considered by the Indonesian Government as a wetland, unsuitable for a rebuild.

Using the livelihood funding provided by an NGO, the entire village managed to buy land from villagers at the uphill five km away from their previous site. Later, another NGO, Terre des Homes (TDH) Germany provided housing assistance to the relocated people. The whole community then moved to the new site. The four other relocation sites, Budha Tzu Chi Pante Riek, Budha Tzu Chi Neuhuen, Jackie Chan Village and ARC Labuy were part of the Badan Rekonstruksi dan Rehabilitasi Aceh - Nias (BRR) policy to provide houses for 1) renters and squatters who did not have land for rebuilding their houses or 2) landowners at the tsunami buffer zone, considered as a high-risk area for future disasters. The sites were built by several NGOs on land provided by the Aceh Government. Predictably, these four sites are of a mixed nature where the communities consist of people who originally lived there and those from other parts of the region. The key characteristics of the relocated communities are listed in Table 3.10.

Table 3.10. Profiles of studied relocated communities

Community	Key characteristics	Reasons for relocation	Relocation approach
Budha Tzu Chi, Pante Riek	A mixed community, embedded in the administration of Pante Riek Village. Located in the centre of Banda Aceh City. The sites consist of 716 houses and are named after the NGO that built the relocation.	Providing housing for renters and squatters and landowners in the areas that could not be rebuilt.	Fully contractor built. The relocated community is embedded within the Pante Riek Village.
Budha Tzu Chi, Neuhuen	A mixed community, embedded in the administration of Neuhuen Village. Located on the uphill slopes, about 15 km to the Northwest of Banda Aceh City. The site consists of 850 houses. Named after the NGO that built the relocation.	Providing housing for renters and squatters and landowners in the areas that could not be rebuilt.	Fully contractor built. Contractor built. The relocated community is embedded in the Neuhuen Village.
Jacky Chan Village, Neuhuen	A mixed community, embedded in the administration of Neuhuen Village. Located on the uphill slopes, about 15 km to the Northwest of Banda Aceh City. Built by an NGO from China.	Providing housing for renters and squatters and landowners in the areas that could not be rebuilt.	The full contractor built. Contractor built. The relocated community is embedded in the Neuhuen Village.
ARC community, Labuy	A mixed community, embedded in the administration of Labuy Village. Located in the uphill slopes, about 15 km to the Northwest of Banda Aceh City. Built by the Australian Red Cross.	Providing housing for renters and squatters and landowners in the areas that could not be rebuilt.	Fully contractor built. The relocated community is embedded in the Labuy Village.
Gampong Baro Village	An entirely relocated community who managed to approach donors for land procurement funding and TdH for housing provision. This autonomous village consists mainly of houses with one administration office for the village chief but has no other public facilities.	The original site was inundated by the tsunami and faced the risk of future tsunamis.	Community participatory, contractor built. The relocated community is an autonomous administrative village.

3.6.2 Earthquake impacted people in Christchurch and Kaikoura, New Zealand

The 2010/11 Canterbury Earthquakes

On 4 September 2010, at 4.35 am, a magnitude 7.1 earthquake occurred on a previously unknown fault 35 kilometers from Christchurch, New Zealand. Being relatively distant from the main population, in combination with the good seismic building code and the fortuitous timing of the occurrence, this event resulted in no deaths and only a few serious injuries. Nevertheless, on 22 February 2011 at 12.51 pm, another 6.3 magnitude earthquake struck, this time centered directly under the city of Christchurch resulted in extremely violent ground shaking in the centre and eastern areas of the city. The unprecedented intensity of ground shaking was well in excess of engineering design criteria and resulted in extensive damage to buildings within the central city business district (Mamula-Seadon, Selway, & Paton, 2012).

In addition to the central city, the eastern suburbs of Christchurch including Lyttleton, Bexley, Aranui, Southshore, Redcliffs and Sumner suffered extensive damage in both the February 2011 and September 2010 earthquakes. Lyttleton is a small port town of approximately 3,000 people located about 12 kilometers from Christchurch central. As shown in Figure 3.10. This town has always been a remote township since European settlement began in 1850 (Everingham, 2012). It consists of a population from a mixture of socio-economic backgrounds: professionals, tradespeople, retirees, and artisans (Stevenson et al., 2011). It is linked to the city of Christchurch by both rail and road tunnels, which are about 2km long (Stevenson et al., 2014).

Figure 3.10. Map of Canterbury's eastern suburbs

Source: Ministry for Culture and Heritage (2005)

In the event of the earthquake, Lyttleton suffered significant damage to residential housing and infrastructure. The impact was made worse by its physical isolation from the city of Christchurch due to landslides and concerns over the safety of the main access route through a road tunnel (Greenhill, 2011). The Lyttelton Port of Christchurch (LPC), one of the major economic drivers of its economy and the main port for the Canterbury region, had already sustained approximately NZ$50 million of damage and business interruption from the September earthquake. This figure is expected to increase significantly due to temporary forced closure and the pending of a full assessment of the port's infrastructure, Stevenson et al. (2011). The town suffered power, telecommunication, and water supply failures. The road infrastructure has badly damaged some roads rendered impassable. It was difficult for households to know what was happening and to decide whether or not to stay or evacuate, even if they could (Cretney, 2016; Idle, 2012)

The 2016 Kaikoura Earthquake

At 12.02 a.m. on the 14th of November 2016, a large earthquake tore through 150 kilometers of land from the Waiau Plains in North Canterbury to Marlborough in the upper South Island of New Zealand. This M7.8 earthquake later named the Kaikōura Earthquake due to Kaikōura being the location of the peak intensity of the tremors. It caused 21 faults to rupture and generated a 7-meter tsunami in localised areas (Woods et

al., 2017). The earthquake was felt strongly from Christchurch to Wellington. The strength, location, and size of this earthquake impacted thousands of people and disrupted lifeline utilities. (Bradley, Razafindrakoto, & Nazer, 2017; Market Economics Limited, 2017).

State Highway 1 (SH1) between Seddon and Cheviot via Kaikoura and the Inland Kaikoura Road, as shown in Figure 3.11, were closed immediately following the earthquake. In addition, the Main Northern Line railway was also closed, effectively cutting off all land routes into Kaikoura and putting the community in isolation.

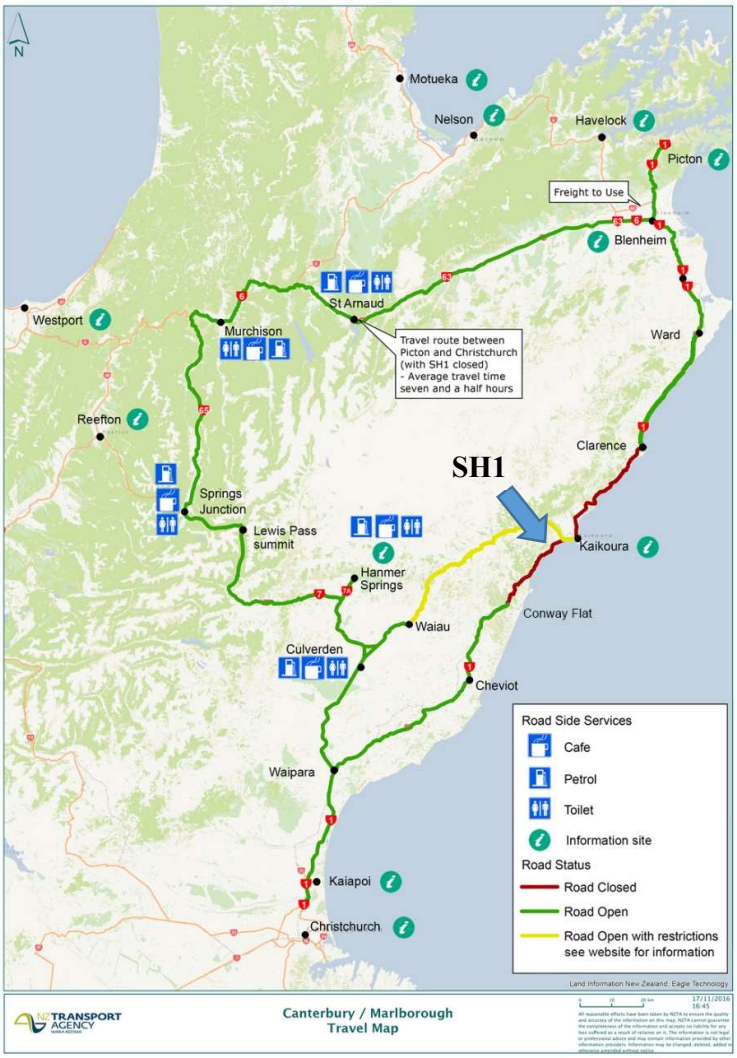

Figure 3.11. Canterbury – Marlborough Travel Map

Source: New Zealand Transport Agency (2016)

The road and rail outages impacted the transportation of goods and commodities from and into the area. However, the most severely impacted sector was tourism (Market Economics Limited, 2017) which was the main income source for more than a quarter of the 3,730 population which contributed up to 12% of Kaikoura's economy (Edmunds, 2016). In the five weeks after the quake, international tourism spend dropped to zero; meanwhile, domestic tourism dropped approximately 85% (Market Economics Limited, 2017). Even though Road SH1 was re-opened on 15 Dec 2017, it may still have to close when there is heavy rainfall due to the potential for further landslides.

In both cases of the New Zealand disaster context described above might not imply the emphasising of post-disaster situations, yet the surveyed area in these cases also shares some commonality with the relocation situation in Aceh, in terms of livelihood delay and vulnerability due to separation or isolation from livelihood resources. This similarity, therefore, has offered an opportunity for the researcher to look into the possibility of implementing the framework that was developed based on the findings in Aceh in relation to a different disaster situation. In July 2018, the researcher joined a group of the University of Auckland scholars undertaking a field trip to Christchurch and Kaikoura. A series of interviews and field observations were conducted to gather some qualitative information on livelihood recovery and the resilience of the impacted people and businesses.

3.7 Data analysis

Data analysis is the process of applying systematic and logical techniques to inquire into the sense and meaning of the gathered data for answering the research problem. As this research implies a mixed method approach to collect both quantitative and qualitative sets of data, the analysis of the collected data was undertaken using the method that follows:

3.7.1 Quantitative Questionnaire Survey data analysis

The statistical analysis of quantitative survey data in this research was done using the SPSS 24 software. The non-parametric Mann Whitney U test and descriptive statistics technics were implemented to analyse the indicators of livelihood resilience while a t-test was performed to analyse the factors influence the livelihood resilience.

3.7.2 Qualitative Interview and Field observation data analysis

Kumar (2014) argues that the analysis of qualitative research data depends upon how the researcher plans to communicate the findings which could be categorized in three different ways, narrative, content analysis, and frequency analysis. The thematic analysis method (Braun & Clarke, 2006; Guest, MacQueen, & Namey, 2011) identifies the main themes that emerge from the response given by the respondents or from the observation notes. This process involves several steps:

1. Identify the main themes
2. Assign codes to the main themes
3. Classify responses under the main themes
4. Integrate themes and responses into the report

In this study, all the qualitative data, including the interview data transcribed, observation notes and pictures, were coded and analysed using the NVivo 11 Pro software. This version of qualitative data analysis produced by the QSR International integrates with reference management tools and supports multi-media sources; it allows users to work with advanced queries and powerful visualization tools in discovering themes, justify the findings and report on the work (QSR International). Similar comments and quotes from interviewees under the same question were analysed and synthesized on a computer. An NVivo qualitative database for this research was established

3.8 Data validation

3.8.1 Validation of quantitative method data

In quantitative research, the reliability of an instrument is measured by its consistency (Kumar, 2014); this means that, under constant conditions, the responses will be relatively similar (Moser & Kalton, 2017). There are two methods used in this research to test the reliability of data generated from questionnaires, namely, 1) by replying on the inter-validity of the statistical tool, and 2) by gaining consistent feedback from the questionnaire respondents. Statistical non-parametric tests and one sample test were conducted using SPSS 23 software. All of these statistical data analysis tools contain

inter-validity regarding the correlation between the sample and the population from which the sample was drawn.

On completing the questionnaire, the respondents were asked whether they would be willing to participate in a follow-up interview. This process enables participation to provide further judgments, comments, and explanations of answers in the questionnaire. In this research, the process helped to eliminate possible extraneous threats caused by the purposive selection of the relatively small samples in the research.

3.8.2 **Validation of the qualitative method and data**

Zohrabi (2013) stated that, in qualitative research, "the reality is holistic, multidimensional, and ever-changing. Thus, there is a need to attempt to build a valid approach to the various research stages from collecting data to analysing and interpretation of the findings relayed to researcher and participants. For instance, in this research, there are concerns about translation and representation. Addressing the concerns of the research's validity, multiple lines of inquiry and methods were implied.

Validation of qualitative data in this research is in line with the Merriam (1998) though methods as follows:

1) Long-term observation

   Understandably, repeated observations over an extended time period enhance the validity of research data and findings, thus enabling the researcher to obtain complementary information. The observation continues until a saturation point is achieved. In this study, the researcher spent four months in Aceh; this provided an opportunity to be better able to develop an in-depth understanding of the phenomenon under study.

2) Respondent's checks

   Respondent's checking is an array of techniques that purport to validate findings by demonstrating the correspondence between the researcher's analysis and collectively members' descriptions of their social world (Bloor, 1997). Through this process, the interviewees could confirm the content of what they had stated during the interview encounter, thus enabling recognition and support of the information's plausibility and truthfulness. During the discourse of this research, the qualitative data from each field visit was presented in the form of a field trip report that was submitted to the those

among the interviewed participants who had indicated willingness to conduct member checking for data validation. Member checking was undertaken in the forms of follow-up telephone calls and mail correspondence with several interviewees.

3) Peer examination

In the peer examination process, the research data and findings are reviewed and commented on by several non-participants in the field. However, these peers need to be familiar with the subject under study and to possess sufficient background information on it. Therefore, the researcher asked colleagues who were doing the same Ph.D. course to review and comment on the interview data and its findings. It is certain that the plausibility of data analysis and interpretations of these peers can augment the validity of the research to a huge extent.

4) Triangulation

Zohrabi (2013) argued that collecting data using a single technique could be questionable, biased, and weak. Gathering information from a variety of sources with a variety of techniques can confirm the findings. Triangulation is the combination of methodologies in the study of the same phenomenon (Amaratunga et al., 2002) in the premise that this combination of methods compensates for the individual limitations of the research while exploiting the respective benefits (Shenton, 2004). For instance, in the current research, the observations, literature review, documentation, questionnaires, and interviews were used for creating a solid database in accordance with the livelihood resilience of the relocated community.

3.9 Research method limitations

This study implemented a combination of multiple approaches to gather and process data, including the questionnaire survey, in-depth face to face interviews and field observations. The preceding section of this chapter has outlined the advantages of using a mixed method approach and is also the reason for choosing this particular method for addressing this research's problems. This section provides some reflection on the limitation of using such method in this research.

The first limitation lies in the sampling method implemented. Non-probability quota sampling for selecting respondents in a questionnaire survey might constrain the generalisation of the findings to the total population of the relocated communities. As the members of the targeted communities do not have equal opportunities to be selected, there

is a possibility that the participating respondents have unique characteristics, hence might not truly represent the total sampled population. Snowball sampling for in-depth interviewing also limits the chance of acquiring reliable informants. The choice of the entire sampling rests upon the choice of individuals at the first stage. If the first informant belongs to a particular faction or has a strong bias, the study may be biased.

The researcher's observations in gathering qualitative data pose the second limitation of this study. Despite that the mechanism produced valuable information for complementing the other two data collection techniques, it also involves problems such as lack of ability to perceive reality from the viewpoint of the researcher being 'inside' this topic rather than being external to it. Therefore, self-perspective is unlikely to produce an 'accurate' portrayal of the phenomena being studied. Moreover, due to the high degree of interaction between the researcher and the interviewed subjects during face to face interviews, the researcher may have may also have had the ability to manipulate minor events such as influencing the interviewees during a meeting by narrowing down the questions investigated or producing potential biases. Both the researcher and interview participants are likely to follow a commonly known phenomenon and become supporters of the group or organization being studied.

Bearing these possibilities in mind, there is a range of solutions which are summarized in this chapter that allows for the triangulation of data sources to enhance validity and reliability. The intrinsic limitations of this research, as summarized in this section, are closely related to factors such as the investigator, the data source, and their interactions. Therefore, through the careful design of case studies, triangulation of data, and evidence-based justification, the limitations of the research method can be minimized effectively.

3.10 Ethical considerations

Researches that involve interaction with participants such as in questionnaires and interview surveys have the potential to generate ethical issues that can arise throughout the entire research process. To minimize the possibility of any ethical conflict being generated throughout any study, The University of Auckland has implemented a policy to ensure that all research proposals must pass an ethical assessment by the Human Participant Ethics Committee. This research was granted permission by the Participant

Ethics Committee, Reference Number 014782, approved on 11 June 2015 for a period of 3 years. To accommodate the need for another field trip to Christchurch and Kaikoura, the ethics approval was then amended on 12 June 2018. The Participant Information Sheet and Consent Form, which are the supporting documents of the ethics approval are attached in the Appendix.

The ethics approval outlines constrain that the research must be done in procedures that ensure:

1) Provision of information stating that participation in the research is voluntary.
   Before conducting a survey, each potential participant must be provided with the Participant Information Sheet and advised to complete the Consent Form as confirmation of the decision to participate.
2) Compliance of personal privacy and confidentiality.
   All the questionnaire and interviews conducted in this research are anonymous to ensure confidentiality.

3) Ethical compliance in data analysis and interpretation.

   All the questionnaires and interviews conducted in this research are anonymous to ensure confidentiality. For the provision of an accurate interpretation in analysing the data, member-checking validation with a number of key informants is implemented to minimize bias stemming from missing words or language interpretation. All the information produced in this study is protected from misuse for other purposes according to Auckland University's ethics guidelines and principles which state that all the data produced in this study will only be kept by the researcher for a six-year period.

4. A framework of livelihood resilience for relocated communities in Aceh

4.1 Overview

This chapter provides research findings. The focus of this study is to understand the livelihood nature of the relocated communities in Banda Aceh and Aceh Besar. The information is described in a quantitative and qualitative format, based on the synthesis of data acquired from the questionnaire survey, interviews, field observations, and documentation. The discussion in this chapter is presented with respect to the livelihood recovery strategies, livelihood resilience indicators, and the factors that affect them.

4.2 Post-Disaster Relocation in Banda Aceh and Aceh Besar

After the tsunami, the government of Indonesia decided to establish a reconstruction scheme under the body of BRR. An urban reconstruction plan established in 2005 divided the impacted areas into multiple zones. For the reason of risk and hazard considerations, the area within 2 km of the shoreline, called the Buffer Zone, was restricted for housing (Matsumaru et al., 2012). This policy banned the impacted people from rebuilding their homes in the previous area, and the people affected were required to be relocated to non-restricted areas. In Banda Aceh, these housing relocation sites are located on the periphery of urban areas that were unaffected by the tsunami or in hilly areas some distance from the Banda Aceh city centre.

In conducting the relocation project, the BRR implemented certain schemes. The government, through BRR, provided the land, and other humanitarian agencies built the houses for the relocation of the removed landowners, in addition to the renters and squatters. Two sites were reserved for renters and squatters. These sites are located at Neuheun and Labuy, which are both in Aceh Besar (approximately 17 km from Banda Aceh). Several NGOs and donors, including the Chinese Charity Foundation, Buddha Tzu Chi, the Asian Development Bank, Islamic Relief and the International Organisation for Migration provided housing for renters and squatters in these locations. NGOs that might provide housing for renters and squatters either at Labuy or other sites that include GenAssist, Zero to One Foundation, USAID, the Australian Red Cross and the Mennonite Central Committee (MCC)(Arie et al., 2009; Fitzpatrick, 2007).

The process of resettling the tsunami impacted people in the five communities studied along with stakeholders involved, and their roles are summarised in Figure 4.1.

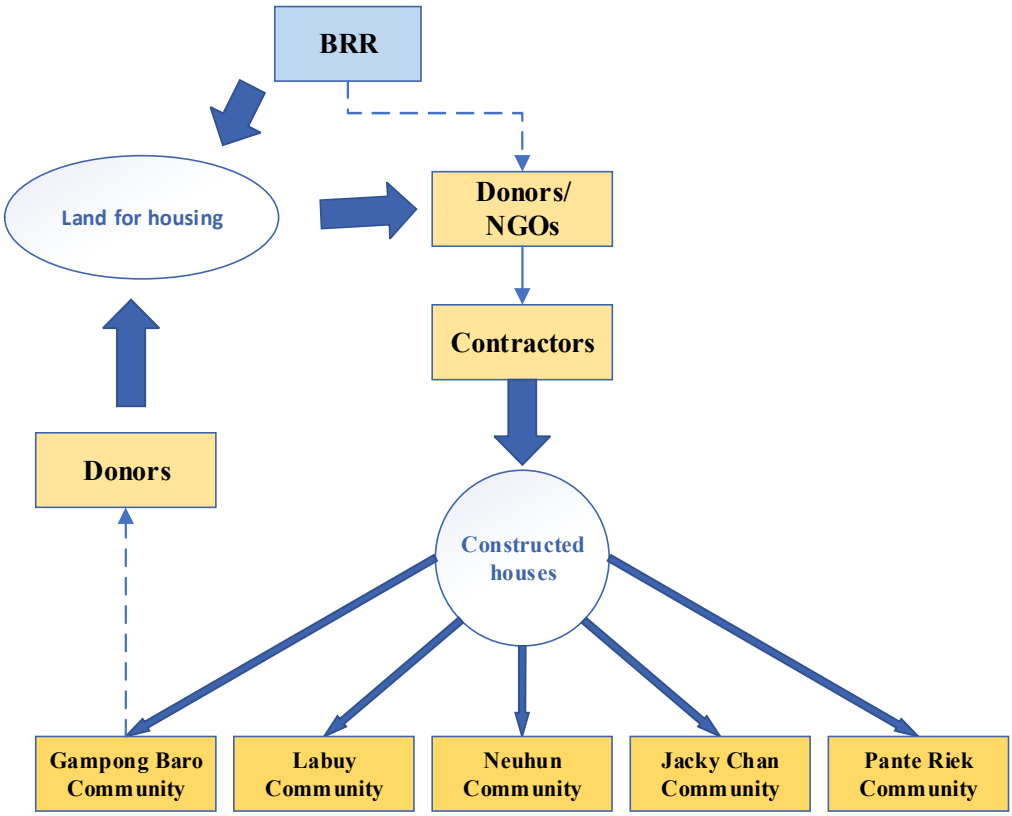

Figure 4.1. Relocation stakeholders and their roles in the relocation process

Gampong Baro Village was located on the coast about 12 km to the North West of Banda Aceh before the tsunami hit. It was severely inundated by the tsunami and was later decreed by the Indonesian Government to be a wet land that was unsuitable for a rebuild. Using the livelihood funding provided by an NGO (anonymous in this research), the entire village managed to buy land on the uphill slopes, five kilometers away from the previous site. Later another NGO, Terre des Homes (TDH), from Germany, provided housing assistance to the relocated people. The whole community then moved to the new site. The other four relocation sites are, Budha Pante Riek, Budha Tzu Chi, Jack Chan Village and Labuy where part of the Badan Rekonstruksi dan Rehabilitasi Aceh - Nias (BRR) policy was to provide houses for 1)

renters and squatters who did not have land for rebuilding their houses on or 2) landowners from the tsunami buffer zone which was considered to be a high-risk area for future disasters. Those sites were built on by several NGOs on land provided by the Aceh Government. As can be expected, the four sites are of a mixed nature consisting of people who originally lived there and those from other parts of the region. Aerial views of the relocation sites and the houses provided are shown in Figure 4.2, Figure 4.3, and Figure 4.4.

Figure 4.2. Aerial views of Budha Tzu Chi Neuhuend and Jack Chan Village

Figure 4.3. House provided by Australian Red Cross in Labuy

Figure 4.4. House provided in Gampong Baro

As intended, to accommodate the landowners in the buffer zone areas as well as the impacted renters and squatters, the beneficiaries of the relocation projects are quite varied in terms of the ownership of their previous living places, as displayed in Figure 4.5. This is with

the exception of the beneficiaries of Gampong Baro who had been moved together as a community because their previous village was inundated by water, most of the relocated people had rented houses before the disaster happened. During the reconstruction period, as they did not have any land on which to build a house, they were re-housed on the relocation sites. From the perspective of house provision, the renters' situation improved as they finally got their own homes; this meant that the money that had been used for renting could now be used for other living expenses.

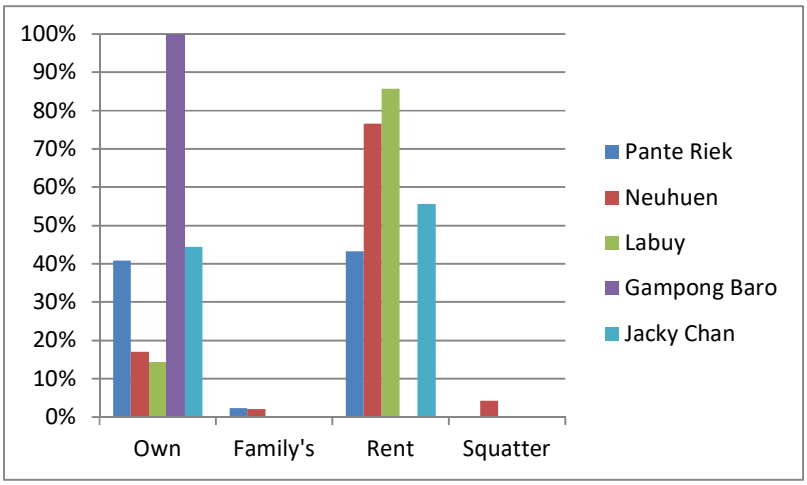

Figure 4.5. Respondent's previous housing entitlement

These communities also consisted of people with varying levels of education. Figure 4.6 shows that more than half of the respondents had completed high school. On average, less than 30 % of them, with the exception of the 39 % of respondents from Gampong Baro, had finished their education on leaving primary school.

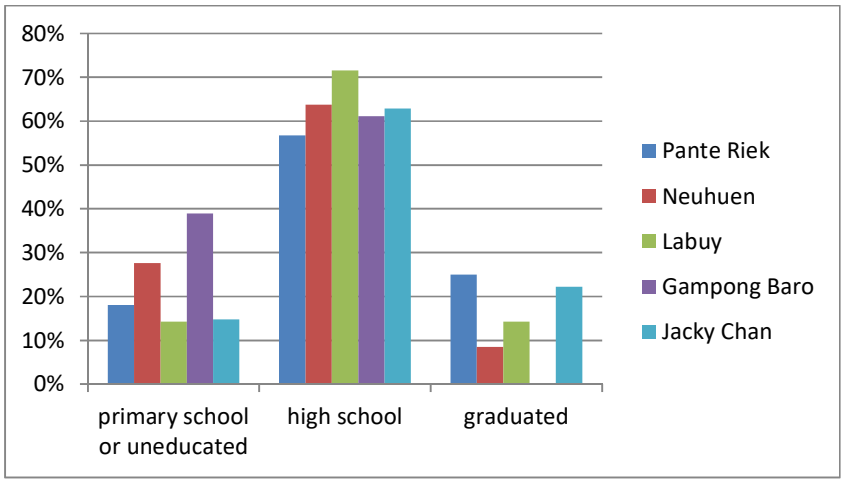

Figure 4.6. Respondents' level of education

4.2.1 **Livelihood challenges facing the relocated community**

It is widely recognized that relocation, whether induced by development intention or disaster, causes severe socio-economic stress that puts pressure on the relocates' livelihood (Cernea, 1996; Manatunge et al., 2009). This means that a relocation policy should not only focus on the physical aspect of providing houses but also be concerned about how the beneficiaries can adapt and cope with livelihood perturbation.

As the relocates had been living in the relocation areas studied for more than ten years, it could be concluded that they were at the stage of the adaptation process; this is the third stage of Scudder and Colson (1982)'s four stages of relocates' responses to resettlement. Many lessons can be learned from the livelihood adaptation during the process. Interviews with the relocated people gave rise to some issues, including access to transportation, joblessness, the layout of the settlement which causes flooding in some houses, lack of financial support, friction with host communities and lack of established institutions to assist with the operation of the facilities provided. Identified challenges faced by the respondents are shown in Figure 4.7

Having suffered from the tsunami, the livelihoods of the relocated people are highly impacted. They have to face further pressure from being disconnected from their source of income, relatives and networking, and other beneficial resources for recovering disrupted livelihoods. When moving to relocation sites in 2006, they were faced with a scarcity of

employment; unemployment in Aceh had increased up to 30% (International Labour Organisation, 2006). According to BPDE data, most of the renters and squatters that were being relocated recorded monthly incomes of less than 500,000 rupiahs in January 2005. As stated by Speranza et al. (2014), in response to livelihood vulnerability, people will implement strategies to combine all their assets, reshaping the structures and institutions through livelihood strategies for achieving the desired livelihood outcome. Figure 4.8 and Figure 4.9 record how some of the respondents choose to change their employment in order to adapt to the lack of job opportunities in the locality.

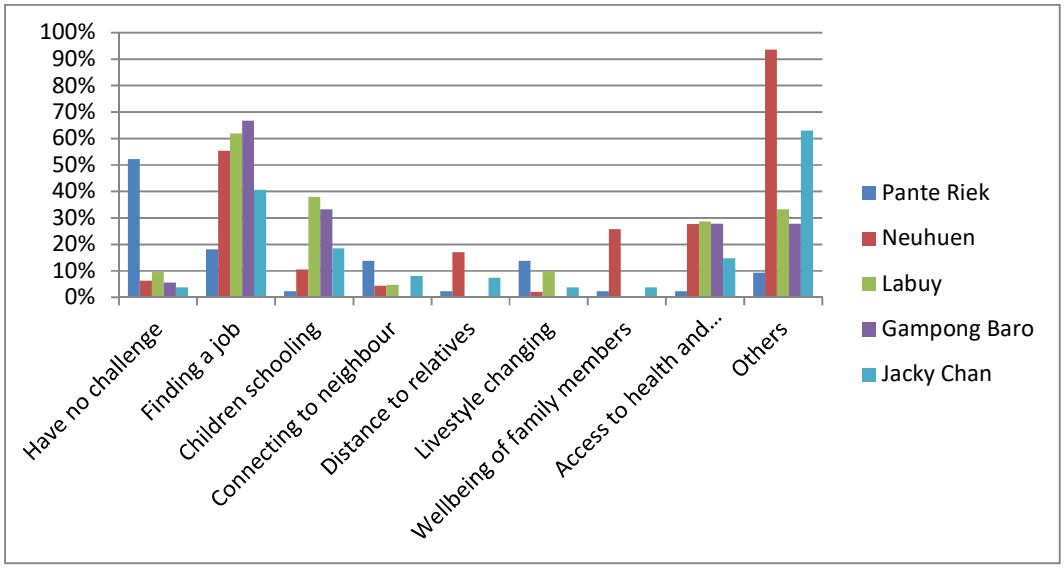

Figure 4.7. Livelihood challenges faced by relocated respondents

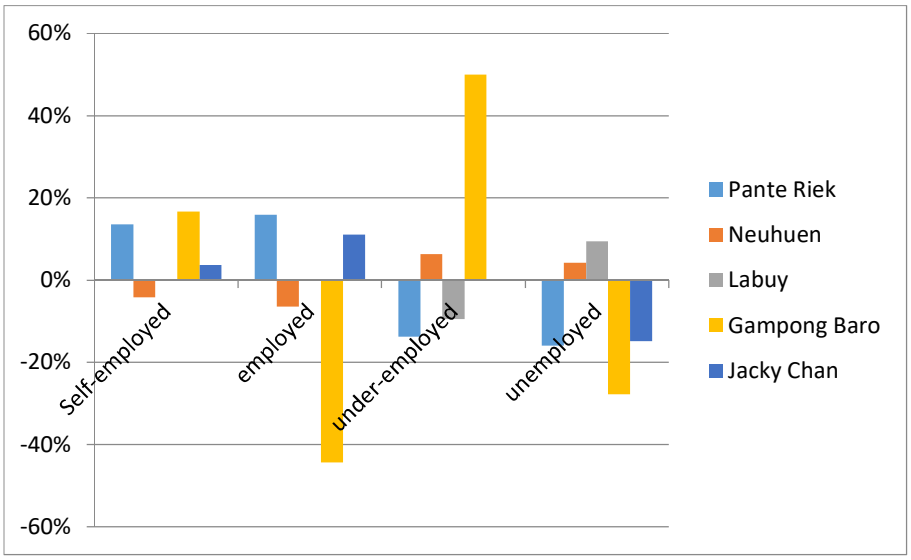

Figure 4.8. Job changing after being relocated

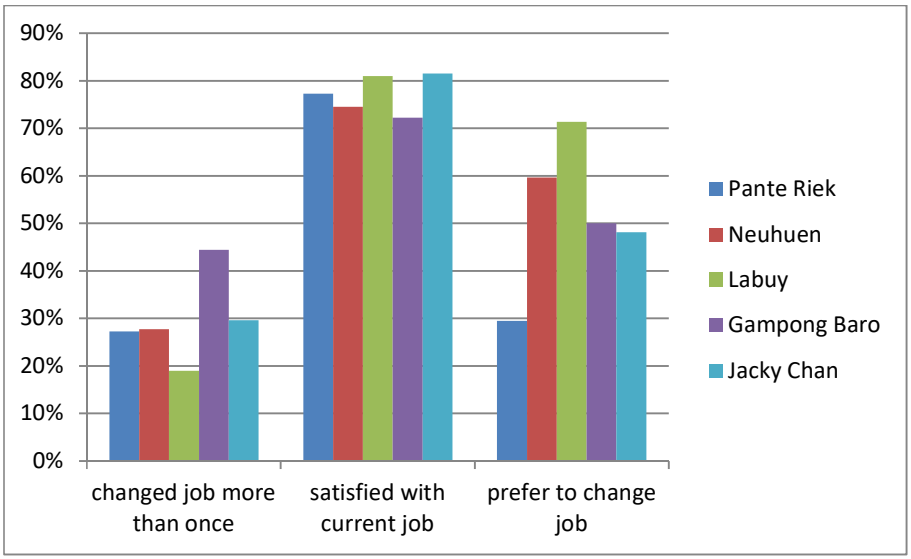

Figure 4.9. Respondents' job satisfaction

As shown in Figure 4.8, after being relocated, the employment status of relocated people changed. Generally, self-employment increased except in Neuheun where it decreased slightly. With the exception of Pante Riek, the employment rate of the people living in the relocation sites decreased while the number of under-employed people increased. Many people of Pante Riek had worked as Government officials when the disaster occurred. Thus their

employment was not affected. Others could use the opportunity to work in various sectors in Banda Aceh as their settlement was located there.

In contrast, the people in Labuy, Neuhuen, and Jacky Chan were separated from their previous income sources in Banda Aceh. The worst case was experienced by the Gampong Baro people who had depended on the sea for their income source. Up until the time of the survey, the only access to the previous ponds and ganders was via a one-lane suspension bridge for pedestrians and motorbikes, as shown in Figure 4.10. Inaccessibility to the previous livelihood options was quoted as the main reason for the change in location.

> *"Our allocated land is not enough for gardening. Women here also need some vocational training so we could help our husbands generate some income to support the families. I wish we could be relocated back to our previous village (GB4).*
>
> *"I wish the government build a bridge to our previous village. It is better if we could be relocated back" (GB1).*
>
> *"Before 2010, I could earn enough money by driving Pedicab, after 2013 it is hard to get that. However, I will not change my job because I am too old for another job. 60 % of the people here are poor. Economic activities are stagnant here because all of us working in the city. There is no job opportunity here". (JC5).*

Figure 4.10. Pedestrian suspension bridge to the old Gampong Baru

To deal with that, BRR coordinated some livelihood rebuilding programs implemented through NGOs. This action was implemented through many programs such as the restoration of the damaged agriculture and fisheries sectors (Nazara & Resosudarmo, 2007), financial assistance to the affected SMEs, and employment programs such as Cash for Work (Doocy et al., 2006), and many training programs (Arie et al., 2009). The livelihood support programs for the tsunami-impacted people are listed in Table 4.1, while the type of support received by the respondents in relocation is displayed in Figure 4.11. The livelihood recovery support received by the relocated people came mainly in the form of food and cash. Aid for supporting long term income generation activities such as; work tools, vocational, or other skill training; credit for business development was relatively rare. However, the majority of the relocated people did not have access to livelihood recovery programs, either those implemented by the government or by other parties, as shown in Figure 4.12. The most commonly cited as having received aid is RASKIN[7], a government program to donate rice for poor people. Some of the relocated people also said that they had heard about other programs such as PNPM[8] however. First, they have to have access to it, in order to benefit from it.

Table 4.1. Livelihood support programs received by the relocated communities

Stage	Agency	Program
Pre-relocated	• The Mercy Corps (7 January – 31 July 2005), Save the Children, Oxfam. • Swiss Development Corporation (SDC), Department of Social Welfare (DINSOS ACEH[9]).	• Cash for work and other short-term assistance, including regular distribution of basic substance cash transfer. • In-kind support such as rice, oil, and canned fish.
Post relocation	• DINSOS ACEH, Baitulmal Aceh[10] • ILO, BPM Aceh, PNPM Bina Insan Mandiri[11] Baitulmal Aceh.	• Cash grant for poor people orphaned children and elderlies from Ministry of Social Affairs. • Cash grants and loans for starting up small-scale entrepreneurship such as Start Your Business (SYB) conducted by the International Labor Organisation (ILO), Bina Insan Mandiri, Program National Pemberdayaan Masyarakat (PNPM), Pemberdayaan Ekonomi Pemuda Gampong (PEPG), Unit Usaha Gampong (UEG/KSP)[12], conducted by Badan Pemberdayaan Masyarakat Aceh (BPM)[13], Baitulmal. • Provision of work tools such as boats, fishnets, sewing machines, etc. • Training for encouraging working skills and expertise such as carpentry, cake, and snack production, sewing, etc. • Training for encouraging entrepreneurship such as SYB, undertaken by ILO. • Microcredit financial assistance for business improvement, whether through formal financial institutions such as banks or informal institutions such as Koperasi, or personal suppliers • Provision of livestock and seeds to initiate the agriculture sector livelihoods • Empowerment of village institutions such as Lembaga Ekonomi Gampong for setting up small profit-making enterprises by optimising exploitation of village assets such as post-harvest processing, tourism, or small water filtering facilities.

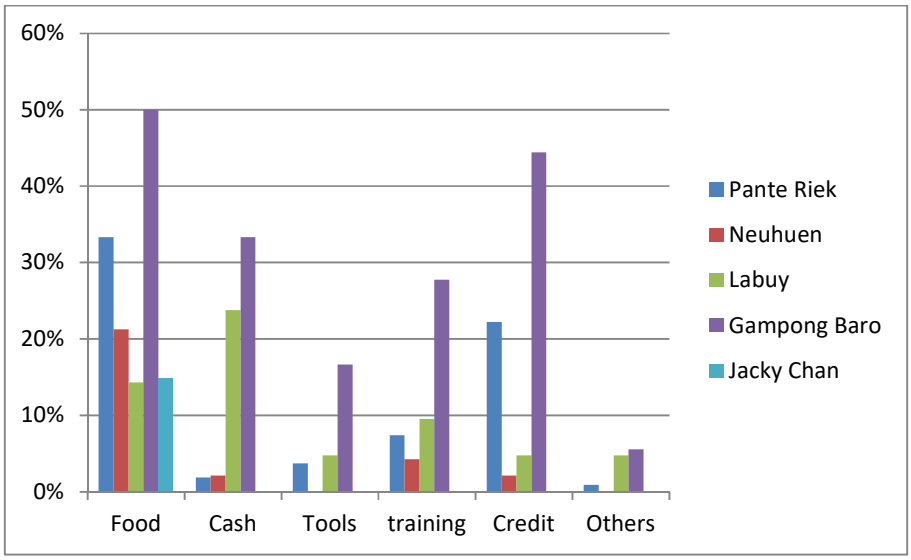

Figure 4.11. Type of Livelihood support received by respondents

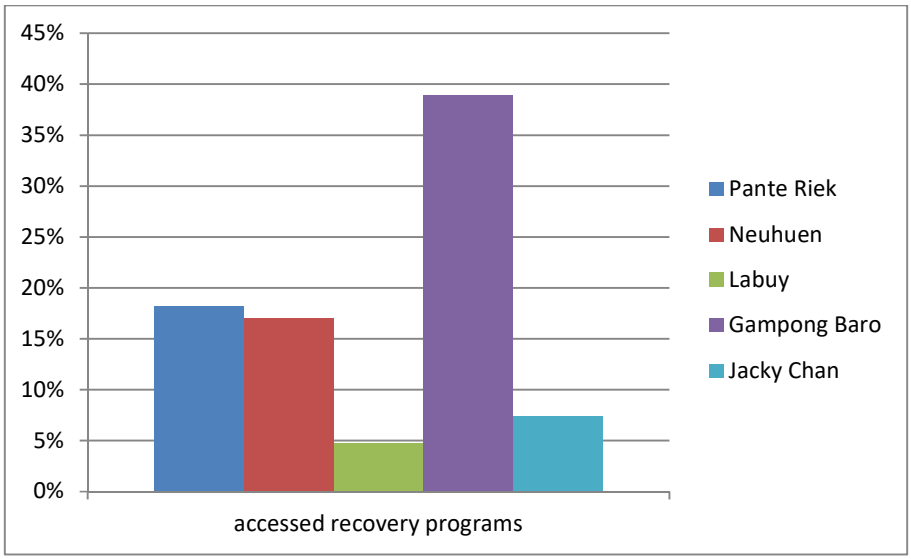

Figure 4.12. Respondents' access to livelihood support programs

For dealing with the limited job opportunity in the locality and to sustain their income, many beneficiaries express their willingness to establish micro-entrepreneurship. However, starting and maintaining a small business is challenging due to lack of financial support (CP1, CN7, GB1, and LB3). The most cited reason for not receiving financial credit for starting or enhancing business is lack of access due to the unavailability of any

assets to use as a loan guarantee. Some participants tried to apply for a loan from money lenders with higher interest rates. Many of them got trapped in debt and sometimes had to sell their belonging to pay (LB2, JC2).

> *"I borrow some money from a money lender to start my business of selling fish. For five hundred thousand rupiahs loan, I only got four hundred and fifty thousand rupiahs. I have to pay back thirty thousand rupiahs each day for thirty days. I do not work for a day, I could not pay the debt, and my family does not have anything for our dinner. I have to do it because I cannot access bank credit." (LB2).*

Another reason is the efficiency of the support provided. Some of our respondents expressed their reluctance for taking a loan because the amount offered was too small for setting up or improving a business (LB3, GB1). This finding is in line with Joakim and Wismer (2015), who argued that, in a post-disaster recovery situation, financial assistance and microcredit facilities are likely to be more supportive to middle-income groups rather than poorer families. The intervention to initiate entrepreneurship as a strategy for livelihood recovery should be targeted to appropriate acceptors.

Some initiatives for empowering the community economics through revolving funds launched by the Indonesian government through the PNPM (National Program for Community Empowerment) or from other programmes in conjunction with village administrative bodies such as PEPG, UEG/KSP which is supported by government policy faces a lot of challenges due to a lack of community self-organisation capacity.

> *"Most of the people now have a perception that all the available funding whether from the government or NGOs are granted, they keep thinking like ten years ago when everything was given for free. It is the reason why most of the empowerment loans programs could not sustain us (CP1)"*

In addition to financial support, the interviews emphasized the importance of providing skills or training for income-generating activities rather than a consumptive item which create a sense of aid dependency. However, most of the participants said that they had no access to such programs. One of the respondents from Budha Tzu Chi Pante Riek (CP6) said that he was so lucky because he was able to access a sewing and carpentry course while staying at a temporary camp in the nearby town of Jantho, about one hour's drive from Banda Aceh. At the time of the interview, he had established a home industry producing bed covers, bed sheets, and pillows.

Located on the hillside outside the city of Banda Aceh, relocates in Neuhuen, Jacky Chan Village and Labuy claimed that the inadequacy of public transport, their location in Banda Aceh has highly affected their capacity to recover their livelihoods. Except for the people from Gampong Baro who had previously made their living as fishermen or farmers, the relocates in Budha Tzu Chi Neuhuen, Jacky Chan Village, and Labuy mainly practiced an urban livelihood. They made their living from a variety of income generated strategies such as government officers, laborers, small traders, or rickshaw drivers. The demand for these types of labor generally exists in the city, so relocated people need to commute from their relocation site to a workplace, which is considered to be very expensive. Some of the respondents spend nearly 30% of their daily income on transportation. This the consequence they have to face living in the relocation area because there are not many opportunities to find a job nearby (JC3, JC4, CN5). Female respondents (JC5, CN4) were dissatisfied about the consequences of living in such an isolated area, limiting their opportunities to make a living from selling homemade snacks, working for neighbours as maids, or running small shops in front of their houses as they used to do in the urban area of Banda Aceh. While commuting to work is more common for men in Aceh, women living in the isolated relocation area do not have many options for earning income.

Due to the inadequacy of public transport to and from their re-location site to Banda Aceh, the people's livelihood recovery capacity became very constrained. This inclined with Kirsch et al. (2012), who stated that displacement and relocation following disaster reduced stable work opportunities leading to economic hardship in many households. To overcome the problems, the local government improved the road conditions. Ten years after the relocation process, access to the sites has been improved through the upgrading of roads. Nevertheless, the lack of reliable public transportation for the relocation compound is still an issue. Respondents (JC2, CN8) claimed that they have to have to walk a long distance or take transport services to the main road. Such transport is offered by individual service providers, such as RBT (single-seat motorbikes provide services for dropping people from the compound to the main road or vise versa). Introducing a reliable public transport service to the relocation sites was a challenge. In addition to the lack of private providers, the idea of introducing Labi-labi (small pick-up truck modified for people transportation) was constrained by the reluctance of the RBT drivers who gain benefit from the insufficiency of transportation (CN4, JC5). However,

respondents from Pante Riek (CP2, CP4, CP5) claimed that their problems with transportation are not as crucial as what was experienced by their fellows in Neuhuen and Labuy, their access to amenities proving to be far superior.

> *"...there are no public transportation facilities here. Using RBT costs us five thousand rupiahs to the gate of this relocation site....many beneficiaries have to let their house go because it is too far from their workplace"(JC2).*

> *"...we have to spend Rp. 30.000 per day for transportation only. It is too expensive and unaffordable for us" (CN7)*

The quotes from respondents JC2 and JC7 imply that reliable transportation highly influences the livelihood options of a disaster-induced relocated community. Substantial investment in public transportation, which can broaden access to employment sources, is lacking. Lack of public transportation limits accesses to employment and non-local markets for people operating micro-enterprises.

Another challenge faced by the people in the compound of Budha Tzu Chi Neuhuen was caused by the unsuitable layout of the relocation. The relocation areas were mainly constructed following the existing contours of the available land, without proper land shaping. This has put many of houses at Budha Tzu Chi site in Neuhuen at the edge of a rainwater stream; it exposes them to the vulnerability of being inundated by overflows. These houses are regularly inundated by water in the rainy season up to the level of an adult's knees, as seen in Figure 4.14. The frequency of flooding even increases after the operation of some stone mining in the nearby hills. The lack of reliable drainage and sanitary system, also the provision of adequate water supply had been overlooked and were of great concern. The drilling wells shown in Figure 4.13 could not provide enough water for the whole community, particularly in the dry season. The pressure on livelihood for living those living in the relocation area is heavier because the relocates have to find extra money for fresh water.

Figure 4.13. Drilled well for drinking water supply

Figure 4.14. Level of inundating water in a flooded house

Figure 4.15. Poor drainage in Budha Tzu Chi Neuhuen

Apart from the economic burden, social interaction is also a commonly admitted problem. The cooperation between households is limited, for most of the community, cooperation is channeled through the mosque as the centre of the community. Community leaders claimed that, except for religious activities that have been an intense part of the culture of the Acehnese, mobilizing people to work together in the community, the organization of communal activities is quite challenging. People more focus on making money as the income is sufficient only for daily expenses makes it hard to establish a strong network amongst them.

> *"Awareness of people to pay their dues is low. If the collected fund is not enough to pay the power bill, PLN[14] cut the power to the pump. I wish the water supply service is handled by PAM[15] so each house should be responsible only for their own expenses, not be shared among the community" (JC3).*

In relation to the host villagers, respondents from Labuy, Jacky Chan Village, and Budha Tzu Chi Neuhuen admitted the presence of friction. Being integrated as part of existing village administration, the relocated people feel that they have been treated separately and unequally in many aspects, including access to community empowerment and livelihood support.

> *"Because of the head of the village comes from the local people, most of the aid and government programs are mainly focused on local people. There is a lack of equity between local people and located people. We also face a conflict with local people on the issue of land use. This area was the place local people grazed their cows" (CN1, LB1).*

The respondents hope that their communities could be accredited as autonomous villages (LB1). Conversely, the people in Gampong Baro village experienced a different situation.

Being relocated as an entire community, they managed to keep their previous administration and social structure in their resettlement area. Working together, the community were starting to rebuild their previous village.

Despite the availability of some public facilities provided by the agencies that built the relocations, the optimising of all the services and facilities provided. Including the buildings and infrastructure built in the relocation, require the participation of both community and governmental agencies. Lack of initiatives to maximise the facilities has led to the wastage of potential opportunities. Schools in public market buildings and Jacky Chan Village have never been used since being built. Two schools were built in Budha Tzu Chi Neuhuen, but only the primary school has been used; the one intended as a secondary school has become dilapidated due to the absence of an established education institution. Facilities include a kindergarten building, a village clinic, and a large covered concrete slab to accommodate an open market in Jacky Chan Village, unfortunately, the centre has never functioned properly.

Figure 4.16. Dilapidated and abandoned school and public market place

The experiences stemming from the post-disaster relocation in Aceh, illustrate the importance of livelihood intervention in a post-disaster relocation, which has to be appropriate and relevant to local needs. Several crucial issues should be considered to pave the way for livelihood recovery support and assistance.

1) Relocation planning requires an adequate intention to livelihood

Relocating disaster impacted people does not mean only providing housing. More important than housing is the sustainability of people's livelihoods. Livelihood

intervention for relocated communities should be concerned with continuity beyond emergency relief and be linked to development objectives and focus on ongoing community development to build more secure livelihoods. International aid agencies have largely adopted the aim of getting people back on their feet by replacing housing assets and the equipment needed to generate household' livelihoods; however, these strategies do not address livelihood vulnerability. Only community development strategies, combined with effective long term social and economic planning, can support the aim of 'build back better' (Mulligan et al., 2012)

2) Access to the neighbourhood and the influences on livelihood

Experiences of the relocated communities in Labuy and Neuhuen show the examples of how reliable transportation influences livelihood options of a disaster-induced relocated the community to a considerable degree. Substantial investment in public transportation is needed to improve access to employment sources. Lack of public transportation limits accesses to employment and non-local markets for people operating micro-enterprises.

3) Responsibility transfer path

A relocation process should not stop at moving impacted people to the housing provided. In this instance, there was a replication of practices in which the agencies failed to make a transitional arrangement to ensure that community, local or national authorities holding the responsibility for the operation or maintenance of the facilities and infrastructure provided (Mulligan et al., 2012). Partnering with the private sector such as a public-private partnership for the provision of basic education may be the solution to the challenge of operating facilities in cases of limited community or governmental resourcing (Akyeampong, 2009), or maintenance of the urban infrastructure (Koppenjan & Enserink, 2009).

4) Importance of bridging the connection with the host community

Livelihood rehabilitation should not be perceived as a purely economic term. It cannot be separated from the community and social parameters that facilitate it. Suddenly integrating relocated people with a host community might generate friction due to the differences in characteristics. The stakeholders in a relocating process should think about

how to create a cohesiveness that will lead to an increase in the participation of the relocated people in community activities

5) Assistance type and time frame for livelihood support

One of the big questions in post-disaster livelihood intervention is: When should it launched and when should it be terminated? (Barenstein, 2006). Many humanitarian agencies inserted the policy to shift from relief to community development within two years for the purpose of avoiding aid dependency (Mulligan et al., 2012). However, in this case, a follow-up after the agencies left has not eventuated in practice. Longer empowerment programs had been expected by communities to help them deal with their livelihood vulnerability. In relation to promoting livelihood initiatives, provision of adequate skills is very effective in supporting entrepreneurship.

Nevertheless, it must be noted that the lack of consideration to the local condition has marred the success of the initiatives. To create better employment opportunities for low-income communities, there needs to be more investment in education and training. However, there is no evidence to suggest that such long-term investment in human capital and social inclusion are part of post-relocation in most of the communities affected.

4.2.2 Indicators of livelihood resilience

In order to understand the livelihood resilience indicators, a questionnaire survey was undertaken from October–November 2015 in the five relocated communities. Participants were asked to rank the formulated indicators based on their perceived importance. 1 is the most important, while a higher score represented less significant indicators. Descriptive statistical analysis was done using SPSS 24, with a comparison of means to arrange the ranking of importance.

Table 4.2. Relocated Communities Livelihood Resilience Indicators

Category	Indicators	Mean	SD	Rank
Individual Coping Ability *Mean = 1.00* *SD = 0.00*	House entitlement	2.42	2.05	***1***
	Expertise and skill	2.45	0.97	***2***
	Job/income stability	2.90	1.37	***3***
	Financial circumstance	3.61	0.82	***4***
	Previous experience of individual	4.06	1.30	***5***
	Level of education	5.65	1.02	***6***
	Exposure to social and cultural norms	6.88	0.60	***7***
Individual Wellbeing *Mean = 2.17* *SD = 0.395*	Physical and mental health	1.30	0.56	***1***
	Sense of security	2.09	0.79	***2***
	Quality of life	3.13	0.93	***3***
	The living environment of the local community	3.49	0.54	***4***
Access to Livelihood Resources *Mean = 2.87* *SD = 3.00*	Access to livelihood support	1.22	0.56	***1***
	Recovery and policy decisions	2.67	0.90	***2***
	Level of Participation in income generating activities	3.09	0.79	***3***
	Availability of social capital	3.02	0.99	***4***
Socio-physical Robustness of the local community *Mean = 3.95* *SD = 0.282*	Infrastructure and services	1.60	0.65	***1***
	Safety of the neighbourhood	2.08	0.93	***2***
	Social cohesion	2.64	0.85	***3***
	Location	3.93	0.90	***4***
	The economic condition of the local community	4.75	0.56	***5***

Table 4.2 shows that 'Individual Coping Ability' was considered the most important category of livelihood resilience by the relocated communities. The standard deviation for this criterion is 0.00, indicating that all of the respondents ranked it as the most important contributing factor to their livelihood resilience. The respondents claimed that the level of reliance was highly associated with their capacity to recover from livelihood disruption (see Figure 4.17).

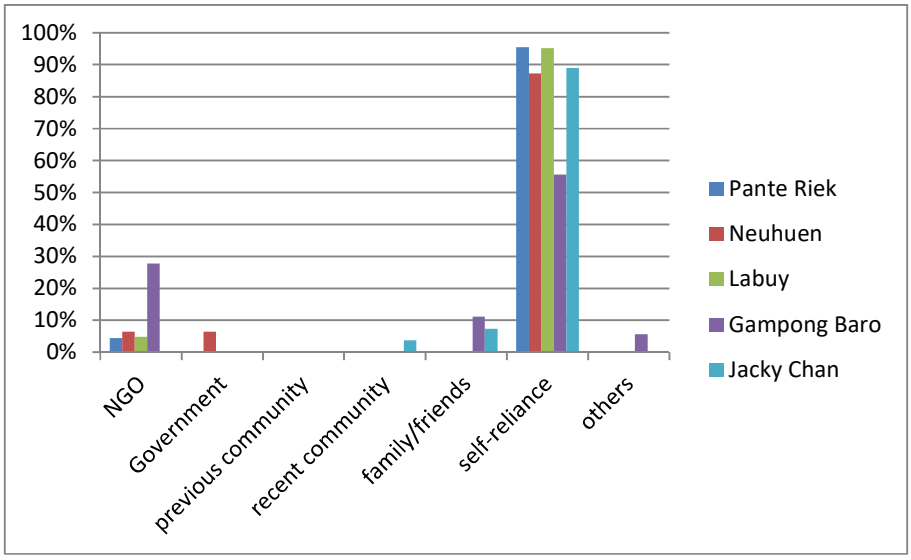

Figure 4.17. Main Actors of livelihood recovery

'Individual Wellbeing,' 'Access to Resources' and 'Neighbourhood' were chosen in that order after 'Individual Coping Ability.' Unlike the first category, the ranking of these categories was more diverse, as shown by the standard deviation. This indicates that a category considered to play a significant role in one person's livelihood resilience might not have been considered to have contributed significantly to others. The difference could be caused by factors such as economic or financial circumstances (Tafti & Tomlinson, 2015).

In addition to the categories, Table 4.2 also shows the ranking of indicators within each category. Housing entitlement was cited as the factor most influencing the capacity of recovering livelihood in the aftermath of a disaster. This finding is consistent with Tatsuki and Hayashi (2002), who stated that housing is the most critical factor influencing the recovery of normal life in the event of a disaster. This could be linked to the use of the house as a workplace, which is common in developing countries (Ahmed, 2011). The housing entitlement also shows the feeling of permanence, which eventually influences the motivation to strongly involve in the community.

> *"One of the reasons people have not extended or renovated their house until now is the ownership status of this relocation houses. We have only been given a building rights title, not a freehold title, so most of us have not felt secure about our ownership of the house", (CN6).*

Interestingly, the standard deviation of this indicator is also high, indicating that many of the respondents put it in a lower position. We do not have enough data to look into the factors contributing to this variation, but the previous findings of Tafti and Tomlinson (2015) might explain this. They argued that house ownership is likely to be valued highly by middle-income households groups who are more likely to have a house and value its ownership while having other assets and access to finance with which to address their income recovery. For lower-income groups, housing might be ranked lower than the financial flexibility to establish enterprises for securing a livelihood. This finding implies livelihood recovery has a strong tie with housing. Housing and livelihood should not be treated as separate interventions.

Expertise or skill, income stability, and financial circumstances are in the second group of important contributors to livelihood resilience. These factors enable people to improve their livelihood options. The mean of those factor rankings does not differ much, indicating only a slight difference in their level of importance to livelihood recovery. Level of education and exposure to social and cultural norms were grouped as the least important indicators for livelihood resilience.

Given that most of the respondents work in informal employment sectors such as fishing or trade, work skills, and better financial conditions increase their chances of starting to rebuild their income-generating activities. This situation might be different if a disaster impacts people who have relied on formal sectors as a source of income. In that case, education could be the most important contributing factor for getting a job (Crittenden et al., 2011). This finding implies that, in addition to the provision of housing, recovery agencies need to place attention on equipping disaster impacted people with skills for expanding their livelihood options.

For the individual wellbeing category, physical and mental health is cited as the most influential indicator, followed by a sense of security, quality of life, and satisfaction with their neighbourhood. This is concordant with the study of Norris et al. (2008), which concludes that good physical health is a basis for the capacity to work, thus being able to pursue a livelihood and successfully adapt to the disruption to livelihood stability.

Infrastructure and services available in the neighbourhood were cited as the most influential factor in socio-physical robustness, which enables disaster-impacted people to thrive after livelihood disruption. Interestingly, location occupies a relatively low rank in the factors influencing livelihood resilience. Provided that amenities such as markets, basic services such as power, water, and good transportation are available and affordable,

the location may not necessarily determine livelihood resilience. However, this factor should still be considered in the case of location-dependent livelihoods, such as fishing or farming (Pomeroy et al., 2006).

The ranking of indicators related to access to livelihood resources are displayed at the bottom of Table 4.2. Access to livelihood support was perceived to influence the capacity to cope and adapt to livelihood perturbation after the 2004 Indian Ocean tsunami. Following this is recovery and policy decisions. The variation of ranked indicators in each. Table 4.2 implies that indicators for livelihood resilience and adaptive capacity are somewhat difficult to discern and it is not possible to provide a list of 'off-the-shelf' indicators as they vary from entity to entity, even in the same locality (Brooks & Adger, 2005). The higher ranked indicators suggest a need for a more intense focus on disaster-impacted livelihood recovery as they seem to contribute more to livelihood recovery.

A detailed grouping of indicators and the contribution of each of them to livelihood resilience in the aftermath of a disaster is shown in Figure 4.18. This framework consists of two hierarchy layers. The first ones consists of several indicators to measure each criterion as the direction shown by the narrow arrows. The numbers displayed next to the indicators and categories represent their ranked influence. The second layer accommodates the four categories, namely, Individual Coping Ability, Individual Wellbeing, Neighbourhood, and Access to Resources to measure the post disaster livelihood in the direction shown by wide arrows. All of the categories could be measured simultaneously without a sequential order. The second layer consists of several indicators to measure each criterion as the direction shown by the narrow arrows. The numbers displayed next to the indicators and categories represent their ranked influence.

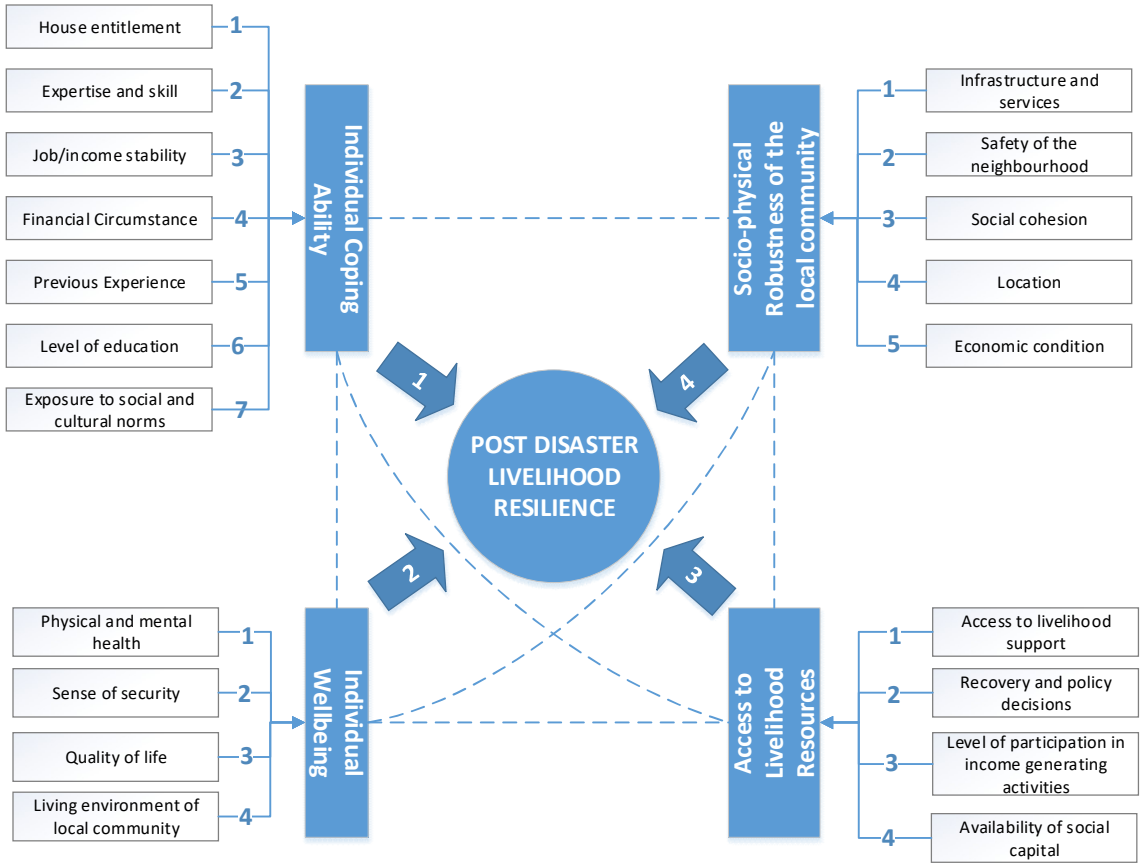

Figure 4.18. Framework for assessing livelihood resilience in post-disaster relocation[a]

[a] Small arrows show the direction of first layer to measure the criterions while big arrow show the direction of second layer measurement to assess the livelihood resilience based on the criterions

4.2.3 **Factors affecting livelihood resilience**

The respondents in the relocated areas were also asked to rank the factors affecting livelihood resilience catalogued in Table 2.3 based on their perceived importance of the factors affecting livelihood resilience in a five Likert-scale. 1 represents “not important at all” while 5 symbolises “very important.”

The t-test analysis of results displayed in Table 4.3 shows the significance level of the age of household head, access to credit, level of education and neighbourhood economic condition is greater than 0.05 which shows that these factors are not statistically important for the livelihood resilience of the relocated communities. Some other factors such as household size, access to credit, participation in social activities, insurance, neighbourhood economic condition and resource distribution equity, even though they have a mean which is significantly different from the H_0 which is $\mu = 3.00$, they have a negative t value which indicates that their influence is considered less important.

Table 4.3. One-sample t-test of Factors affecting livelihood resilience

No	Factors influence livelihood resilience following a large disaster	Mean	SD	t-value	Significance (2 tailed)
Factors related to individuals/households					
1.	Gender of the household head	3.93	0.76	14.23	0.000
2.	Age of the household head	3.09	0.66	1.58	0.122
3.	Household size	2.51	0.83	-6.96	0.000
4.	Physical and mental health	4.90	0.31	72.53	0.000
5.	Early recovery income support	5.00	0.00	-	-
6.	Financial circumstances	3.26	1.16	2.60	0.010
7.	Access to credit	2.97	1.03	-0.33	0.740
8.	Ability to shift to other livelihoods (skill and expertise)	3.94	0.90	12.19	0.000
9.	Participation in social activities	2.89	0.61	-2.18	0.035
10.	Level of education	3.10	1.02	1.09	0.275
11	Availability of insurance	1.35	0.48	-40.42	0.000
12.	Relative/extended family support	3.92	0.77	13.91	0.000
13.	Previous work experience	3.74	0.69	12.58	0.000
Factors related to local communities					
1.	Location/distance to working place	4.54	0.68	26.49	0.000
2.	Infrastructure and basic services	4.69	0.59	33.42	0.000
3.	Environmental resources nearby	3.70	0.78	10.41	0.000
4.	Social capital	3.41	0.73	6.62	0.000
5.	Social cohesion among the community	3.39	0.71	6.39	0.000
6.	Information accessing capacity	3.33	0.78	4.95	0.000
7.	Network with other people from outside communities	3.51	0.84	7.02	0.000
8.	Neighbourhood safety	4.34	0.56	27.83	0.000
9.	Neighbourhood economic condition	2.96	0.72	-0.59	0.555
10	Resources distribution equity	2.55	0.63	-8.30	0.000
Recovery agencies related factors					
1.	Governance of livelihood support	4.28	0.74	20.24	0.000
2.	Availability of long-term livelihood support	4.82	0.41	51.99	0.000
3.	Culturally appropriateness of livelihood support	4.79	0.41	51.55	0.000
4.	Lead time of livelihood support initiatives	4.78	0.42	49.86	0.000

Note: Scale range from 1 = 'not influencing at all" to 5 = 'very influencing". With μ is the population mean and $\mu_0 = 3$ is the critical rank, the null hypothesis H_0: $\mu = \mu_0$ while the alternative hypothesis H_1: $\mu > \mu_0$. The level of significance for the one-tailed test is 0.05

The ranking hierarchy of those influencing factors further ordered based on the mean. Table 4.4 shows the top 10 influencing factors.

Table 4.4. Ranking of the significant factors that influence the livelihood resilience in the aftermath of a large-scale disaster

Factors influence livelihood resilience following a large disaster	**Mean**	**Rank**
Factors related to individuals/households		
Early recovery income support	5.00	1
Physical and mental health	4.90	2
Ability to shift to other livelihoods (skill and expertise)	3.94	10
Factors related to local communities		
Location/distance to working place	4.54	7
Infrastructure and basic services provided	4.69	6
Neighbourhood safety	4.34	8
Recovery agencies related factors		
Availability of long-term livelihood support	4.82	3
Cultural appropriateness of livelihood support	4.79	4
Lead time of livelihood support initiatives	4.78	5
Governance of livelihood support	4.28	9

Note: Significance is less than 0.05

The questionnaire results show that income support during the early recovery stage was considered the most important factor for achieving a resilient livelihood for those relocated. The need to access monetary or financial aid in the immediate stage of relocation was also highlighted in the follow-up interviews, as the interviewee JC3 indicated,

> *"I lost everything at the event, my house, my dump truck. Only the clothes I wear left. Luckily, I could find all of my family after that. In the first months, I just rely on NGOs. No job, no income. While living at the shelter, I participated in Cash for work programs through the NGO for five months. Even only a little, I could save some money which I later I could use as the down payment for credit a motorcycle. Using this, we could minimise the expense of commute to Banda Aceh for working" (JC6).*

This finding, however, echoes the advocation by Davis and Alexander (2015) that timely cash grant has a positive 'buffer' effect that can cushion the impact of a disaster on people's livelihood. In a post-disaster situation, the distribution of cash grants is a common practice used by government agencies and NGOs to ease the financial hardship of the affected people. The purpose, however, is to help people transit from relying on external aid to being self-sufficient (International Labour Organisation, 2005). In

studying the livelihood recovery in coastal Bangladesh following the Ailia Cyclone in 2009, Masud-All-Kamal (2013) pointed out that for people to secure a long-term working opportunity, they would need temporary relief support which acts as a safety net at the initial stage of recovery to help them with financial hardship. However, the income support, especially in the form of a cash grant, should be accompanied by routine follow-ups and monitoring to prevent the misuse of funds for the purchase of consumable goods rather than productive assets (Daly et al., 2017; Thorburn, 2009).

On the other hand, instead of promoting self-reliance, the abundance of livelihood support might also generate independence. As suggested by the interviewee CP1,

> *"Most of the people now have a perception that all the available funding whether from the government or NGOs are granted, they keep thinking like ten years ago when everything was given for free. It is the reason why most of the empowerment loans programs could not sustain us (CP1)"*

Surprisingly, physical and mental health was regarded by the respondents as the second most important factor in affecting their livelihood resilience. Follow-up interviews later explained that physical fitness is a basis for people to carry out labour-intensive types of jobs. Mental wellness and 'state of their mind' however, play a significant role in affecting the physical fitness and work performance. In particular, most interviewees pointed out, the impact of the tsunami and the losses they had experienced caused individual acute and chronic stress affecting their ability to make decisions and take action for making a living. As Norris et al. (2008) had previously indicated, psychological wellness enhances the adequacy of role performing at home, school, or work. Therefore, the effective livelihood intervention should go beyond providing physical support but also look at the physiological aspect to improve the wellbeing of the affected people.

Availability of long-term livelihood support was considered as the third most important factor in this research. From the community's perspective, long-term livelihood support includes the skills of training and business mentoring and lending programs provided by both public and private organisations (Daly et al., 2017; Thorburn, 2009). The majority of interviewed people spoke highly of the interventions that met their sustained income generation needs although, in the long run, there was a lack of conviction about the consistency of support across levels and sectors. For example, the interviewees CP4 and CP5 indicated that they had to sell work assets such as carpentry

tools and sewing machines which had been gifted by the NGOs at the start of relocation due to the lack of cash flow and difficulties in marketing the products they made. CP4, in particular, emphasised that their employment could have been sustained if long-term business mentoring had been provided to help them manage their business. Among the initiatives tabulated in Table 4.1, the informal microfinance credit was more readily available compared to the services provided by the formal banking system. Many interviewees such as JC3, GB3, and LB2 commented that loans from relatives or informal sources of credit could create dependence and lack of motivation to pay back, which would exacerbate their vulnerability in the future. This is perhaps the reason why 'relative/extended family support' was given a low ranking in the survey (mean 3.92, ranked eleventh, is not shown in Table 4.4 top 10 lists).

Cultural appropriateness of livelihood intervention was also considered to greatly influence livelihood resilience (ranked 4th with a mean of 4.79). This result is in line with the findings of Joakim and Wismer (2015). The cultural tradition of Acehnese was for housing to be part of the livelihood of a household. The majority of the surveyed people had their houses altered to serve multiple purposes, including an extension used for a coffee shop, Figure 4.19, or a small retail business selling basic groceries, Figure 4.20. According to a female interviewee GB2, this is extremely important as most of the Acehnese women were tasked with primary care responsibilities for children or the elderly. Having a multi-functional house means that they are able to earn income by running the business and household simultaneously.

Figure 4.19. Coffee stall at the Budha Tzu Chi Neuhuen relocation site

Figure 4.20. A Small kiosk installed in the front yard of a house in Jacky Chan Village

The lead time of livelihood support initiatives was highly regarded by most of the questionnaire respondents as being a critical factor in this research (ranked the 5th with a mean of 4.78). This result, however, indicates that the timing of any recovery support should be aligned with the livelihood needs, which may evolve over time (Joakim & Wismer, 2015). As suggested by many interviewees (e.g. CP3-4, CN5, CN8, JC2, GB1-3 and LB1-3), income support in the form of a cash grant was extremely instrumental in relieving their financial hardship and helping them to re-start their livelihood in the short-term, whereas, in-kind and technical support from the government or NGOs tended to help them upskill and be able to sustain themselves. Some others, such as CP1 and CN2-3, complained about the one-off nature of the assistance provided by some agencies and the lack of the timeliness of certain policies. To build a resilient livelihood, however, requires effective configuration of policy support and initiatives that are grounded in the understanding of the needs of those affected. Davis and Alexander (2015) suggested that livelihood need assessment also requires a participatory approach with local communities so that the aspirations of those affected can be better articulated.

It is also interesting that basic infrastructure such as transportation and water services were considered as being important in influencing the way people build a resilient livelihood. As highlighted by most of the interviewees, infrastructure is the 'blood vessel' that facilitates mobility and connections to the workplace, markets, administrative centres, schools, and health services, and is essential for the socio-economic improvement of the relocation sites. In the initial relocation stage, there was a lack of reliable transportation means, and people found it hard to commute. For example, most people living in the Neuheun relocation sites worked as laborers in construction or small trading businesses in the capital city Banda Aceh, and they had to spend more than 30 percent of their income on travel. The interviewee CN7 suggested that,

> *"Good infrastructure makes a huge difference in our daily work life. We only felt less pressure when the roads from the relocated village to Banda Aceh were built a few years after the relocation" (CN7).*

Previous research also shows that infrastructure not only connects households but also connects people with their jobs. Therefore, integrating the relocation sites into development programs and allowing a longer timeframe for the provision of infrastructure could help prevent the community from being abandoned (Matsumaru et al., 2012).

It is not surprising that the location of relocated sites also matters in livelihood resilience. van den Berg (2010) discovered that some types of livelihood are location-reliant such as the farming and fishing industries, post-disaster livelihood recovery should consider the spatial effect of the relocated sites on employment. The importance of the proximity of relocated sites to economic activities was expressed by the interviewees (GB2-4) from Gampong Baro who had to commute to their previous village for work.

Another critical factor in relation to the relocated site is neighbourhood safety. For many relocated individuals, according to the interviews, had to change jobs or start a new enterprise which was mainly home-based. Their livelihood resilience could be enhanced by the physical health and social well-being of the community. A safe neighbourhood, according to Tellman et al. (2014), can promote economic and social connectedness, which leads to improved socio-economic conditions for the community. When asked why a safe neighbourhood is important for livelihood resilience, one of the interviewees emphasised that a sense of security can elevate confidence to work and gives them certain motivation to pursue a better means of livelihood.

The governance of livelihood support from the government agencies was ranked as the ninth important factor. This relates to how local communities participate in decision-making activities and policies for income generation, increased self-sufficiency and education and training and partnerships between agencies and communities. Many of the interviewed people commented that the governance of livelihood support post-disaster should dynamically evolve over the course of recovery. In the early recovery stage, a traditional top-down and government-led approach could serve well in lifting affected communities out of shock; as the recovery continues, governance should evolve to encourage extensive community participation and ownership. Certain principles behind this type of governance rationale were suggested by Davis and Alexander (2015) that all the interventions should be targeted to allow survivors to build their own social and economic capital, to organise their own lives and return to a situation of comparative autonomy.

The factor ranked tenth is the skill and expertise to shift or diversify livelihood. It is critical for individuals to cope with any type of stress and shock. Nearly half of the interviewed people had changed their type of employment after the relocation, and they spoke highly of the skills training programs such as carpentry, food production, and sewing provided by the ILO. Those interviewees were positive about the skills they had obtained through training and commented that these new skills had boosted their

confidence to deal with any livelihood challenges in the future. As commented by the interviewee CP4,

> *"I was in the construction business before; I had never used a sewing machine, never sew. But after the tsunami, there was sewing training. Yeah, the most important thing is motivation. The skill I got from that training is my capital for setting up this business" (CP4).*

5. Experience from Canterbury and Kaikoura

5.1 Overview

This chapter presents the experience of the 2010/2011 Canterbury earthquake and 2016 Kaikoura impacted people in recovering their livelihood. The discussion focuses on the indicators of livelihood resilience.

5.2 Post 2010/2011 Canterbury and 2016 Kaikoura Earthquakes livelihood

On 4 September 2010, at 4.35 am, a magnitude 7.1 earthquake occurred on a previously unknown fault 35 kilometers from Christchurch, New Zealand. This earthquake caused few injuries due to the distance of the centrum to the main population. Nevertheless, on 22 February 2011, another 6.3 magnitude earthquake struck, centred directly under the city resulting in extremely violent ground shaking in the centre and east of the city that resulted in extensive damage to buildings within the central city business district (Mamula-Seadon et al., 2012). In addition to the central city, the eastern suburbs of Christchurch including Lyttleton, a small port town of approximately 3000 people located about 12 kilometers from Christchurch central, suffered extensive damage in both the February 2011 and September 2010 earthquakes. Significant damage to residential houses and infrastructure was reported including physical isolation of the city of Christchurch due to landslides and concerns over the safety of the main access route through a road tunnel (Greenhill, 2011). The town suffered power, telecommunication, and water supply failures. It was difficult for households to know what was happening and to decide whether or not to stay or evacuate, even if they could (Cretney, 2016; Idle, 2012).

Business owners claimed that up to one year after the earthquake, they still could not operate normally due to the prolonged assessment of building safety; however, this assessment was not followed by appropriate measures to repair buildings (CH7, CH8). This situation affected the convenience of doing business. For the severely damaged buildings, there were even longer delays allowing the demolition of previous structures (CH6). Nevertheless, at the time of the survey in 2018, all of those affected claimed that their businesses had recovered to pre-earthquake levels.

Five years later, on the 14th of November 2016, an M7.8 earthquake tore through 150 kilometers of land from Waiau Plain in North Canterbury to Marlborough in the upper South Island of New Zealand (Woods et al., 2017). State Highway 1 (SH1) between Seddon and Cheviot via Kaikoura and the Inland Kaikoura Road were closed immediately following the earthquake. In addition, the Main North Line railway was also closed, effectively cutting off all land routes into Kaikoura putting the community in isolation. The road and rail outrages impacted the transportation of goods and commodities from and into the area. Even though Road SH1 was opened on 15 December 2017 still may have to be closed if there is heavy rain due to the potential of further landslides.

The survey conducted in July 2018 found that apart from buildings damaged, as shown in Figure 5.1, which disrupted the operation of the business (K5, K6), recreation and tourism were the most impacted sectors and have not yet fully recovered (K1, K5, K7, K8, K12, K14). Souvenir stores and art shops (Figure 5.2) are struggling to sustain (K1, K8) while accommodation, food, and alcohol selling industries have benefited from the incoming of laborers to work on the reconstruction (K2, K5, K6, K7).

Figure 5.1. Damaged Building in Kaikoura. (Courtesy of Fish and Hunting Kaikoura)

Figure 5.2. Souvenir stores and art shops in Kaikoura town centre

5.3 Livelihood resilience indicator

Interviews from Lyttelton and Kaikoura reveal that the livelihood resilience of the impacted people could also be assessed through individual coping ability, individual wellbeing, the physical and social robustness of the neighbourhood, and access to livelihood support.

Individual coping capacity

The results of the interviews suggest that job or income stability is associated with the individual capacity to cope after livelihood disruption. For instance, respondent K5 and CH9 claimed that the reason for keeping all the workers employed, despite the fact that businesses had been negatively affected, was based on the perception of long-term working opportunity being far more beneficial for sustaining livelihood than other types of relief support.

The interviewees also perceived skill as the ability to do something well combined with expertise in a particular area, in some cases allowed people to invest in alternative livelihood sources to achieve diversity when the main source was disrupted for instance shifting from a recreation flight operator to a chartered air transport provider (K14). In addition to that, experience working in a business for more than ten years also indicated resilience to livelihood disruption following the earthquake (CH6, K2, K3, and K4).

"I have never experienced an earthquake before, but as this shop has been a family business for five generations in 147 years, I am pretty sure that we have learned a lot from the past to deal with the disruption (CH6)"

It is also noted that insurance as a financial asset, in some circumstances had not been really associated with business resilience. Respondents K5, CH1, CH9, revealed that an insurance policy is not easy to understand. The payment received is not matched with the claimed amount. This implies that it is essential to employ the appropriate type of insurance (K6, CH5, CH6). These findings elaborate on Zhang, Lindell, and Prater (2009), who argued that small businesses are less likely to be able to afford insurance.

Individual wellbeing

The ideas of wellbeing stand out as informative surrogates in capturing locally appropriate notions of livelihood resilience. This aspect also allows for assessment of locally determined thresholds of livelihood resilience within a particular area. Most of the interviewees suggested that physical and mental fitness indicate the capacity to maximize the livelihood options as well as proof of the successfulness of adaptation. Positive and optimistic thinking about the future helps people to move forward rather than just complaining about the past (CH6). This is in line with Pomeroy (2011), who argued that self-belief in solving problems helps in coping with disaster. On the contrary, it prolongs the ability of traumatically constrained people to take measures to cope.

"It took me three years to fully recover from the trauma. At the time, I was stuck, without doing anything (CH9).

In terms of a sense of security and living environment of the local community, all the respondents from Lyttelton and Kaikoura claimed that they were satisfied with their place of living. The peace and liveable environment, combined with the generous community, has encouraged them to blend with their neighbourhood. This in line with Hansen and Oliver-Smith (1982) who promoted that permanency eventually motivates people to rebuild their lives.

Socio-physical robustness of the local community

Socio-physical robustness of the local community was the most quoted by the respondents in Lytellton and Kaikoura when being asked about the livelihood resilience indicators. Interviews and field observations affirmed that location in terms of access

availability was highly influential in the resilience of both areas. Highway SH1 from Canterbury to Marlborough and the port of Lyttelton serve as the main and only access route in respect to both Kaikoura and Lyttelton. Access is crucial for the recovery of the economy and other sectors of the communities (K1-KK14, CH7, CH9). Economic condition also signals the level of livelihood resilience (CH2, CH4, K6, K11).

> *"The economics of the area has grown better, as the newcomers come which boosts up economic and business opportunity. However, the number of businesses nearby is not adequate to accommodate all the people, so people commute every day to work in Christchurch. As you can see, many cafes only open at dinner time (rearranged from CH6 and CH5)."*

Interviewees also conceded that social cohesion highly demonstrates the Socio-physical robustness of a community. The high level of involvement of all community members in public activities such as Sunday markets, music festivals, or other outdoor activities, bonds the people together in Kaikoura and Lytellton which eventually generates the willingness to support each other (K4, K11, CH5). For instance, a community movement named the Lyttleton project was initiated "to help each other" (CH7). This strong community cohesion also promotes the "sense of local proud" and willingness to "buy local," which helps to keep money in the neighbourhood and support the local economy (CH9).

Neighbourhood economic condition also evidently indicates the livelihood resilience of interviewees. Being highly dependent on tourism, many of the businesses in Lytellton and Kaikoura struggled to recover when the sector was stuck due to lack of access to areas. Nevertheless, in the case of Kaikoura, the reconstruction activity boosted the economy which benefitted the accommodation, and hospitality sectors

Access to livelihood resources

Livelihood resources refer to all assets, including physical or social, that can be used to create a livelihood (Frankenberger et al., 2000; Krantz, 2001). The possession of resources, no matter the amount, the diversity or balance between assets, positively influences livelihood strategies (Speranza et al., 2014). The interviews exposed that access to livelihood support, recovery and policy decisions, and availability of social capital are the attributes of access to the livelihood resources found in Kaikoura and Lytellton.

Following the earthquake, many businesses were forced to shut down their operations. Having lost their own income, business owners were also responsible for the sustainability of their worker's daily lives. To assist those companies who had experienced a sudden, large, sustained, drop in revenue for retaining staff while the district recovered, The New Zealand government, through the Ministry of Business Innovation and Employment, launched a wage subsidy package on 16 November 2016. The subsidy covered up to a total of sixteen weeks at a rate of $500 gross per week for a full-time employee ($4,000 per person) and $300 gross per week for a part-time employee ($2,400 per person) (Ministry of Business Innovation and Employment, 2016). The temporary government wage subsidies not only helped workers to survive the income lost but also reduced the pressure on business owners, allowing them to concentrate on resources for business recovery (CH5, CH6, K4, K5).

In Kaiapoi, the establishment of a community information centre, such as *i*site, benefiting the local economy. The office operating under the collaboration of the Waimakariri City Council private sponsorships, not only provided tourism information for more than 4,500 visitors per year but also served in the area of giving advice and generating business establishment (CH5).

The availability of social affiliations and associations, including networks, social claims, social relations, allows for people pursuing different livelihood strategies requiring coordinated action. Respondent K4 admitted that membership of a professional association had facilitated him in accessing the technical and financial support to sustain and thrive.

5.4 Validation of livelihood resilience assessment framework

This section provides the comparison of livelihood resilience indicator between the post-tsunami relocation in Aceh, Indonesia, and two earthquake reconstruction projects in New Zealand. The comparison is focussed on identifying the indicators that work in the general disaster reconstruction context and the indicators that only apply specifically in a post-disaster relocation situation.

The purpose of this validation is to test the ability of the framework to measure livelihood resilience. It is also intended to explore the possibility of implementing the measurement in other disaster contexts. This study implemented the case of the

2010/2011 Canterbury earthquakes and the 2016 Kaikoura earthquake to validate the findings in Aceh.

As the three disastrous events happened at relatively different times, it can be concluded that the reconstruction and recovery efforts in each area have been reached at different stages. Implementing Contreras (2016)'s time frame, it could be concluded that at the time of the survey, the relocated communities in Aceh should be at the development stage, while the Littleton community is in the transition of recovery to development stage and Kaikoura is starting the recovery process. All communities have passed the relief stages and are aiming for livelihood recovery which consists of livelihood protection and promotion (UNDP, 2013)

Interviews and field observations reveal that the impacted people in 2004 Indian Ocean tsunami in Aceh worked in the fishery, agriculture, small scale trade or worked as laborers while the Earthquake impacted people in Lyttelton and Kaikoura worked in the Tourism and hospitality sectors, agriculture, trade, and manual work. The research shows that the resilience of site-dependent livelihood such as fishery, and tourism are strongly associated with access to a particular location. The Gampong Baro community found that it was a greater challenge to recover due to their unreliable access to their previous fishponds and the farms while the tourism sector in Kaikoura struggle to sustain itself as the SH1 was not fully functional. This finding implies location and infrastructure are valid indicators with which to measure the livelihood resilience of disaster impacted people. Both those indicators reveal the socio-physical robustness of a particular local neighbourhood.

The study also found that some commonality in livelihood resilience indicators were observed in both cases, as shown in Table 5.1. Apart from housing entitlement, which employs specific to the specific relocation context's needs, a stable income, skill and expertise and financial circumstance, indicate the coping ability of individuals in relocation schemes and businesses. However, the variable for each indicator may be different. For instance, insurance might show financial circumstance in New Zealand but is unlikely to work in the case of Aceh where saving is preferred as a contingency plan. None of the interviewees from all the relocated communities acknowledged having any insurance policy. This finding elaborates on Surminski and Oramas-Dorta (2014)'s argument that disaster insurance is not yet customary in developing countries. Estimates

indicate that, in developing countries, only 3% of natural disaster losses are insured, compared to 40% in developed markets.

Table 5.1. Livelihood resilience indicators applied in Aceh and New Zealand

Category	Livelihood resilient indicators	
	Aceh, Indonesia	**Christchurch & Kaikoura, New Zealand**
Individual coping ability	Housing entitlement, Expertise, and skill, Stable income, Financial circumstance, Experience, level of education, exposure to social and cultural norms.	Stable income, skill and expertise, financial circumstance, and experience.
Individual wellbeing	Physical and mental health, sense of security, quality of life, living environment.	Physical and mental health, sense of security, quality of life, living environment of the community.
Socio-physical robustness of local neighbourhood	Infrastructure and services, the safety of the neighbourhood, social cohesion, location, economic condition.	Infrastructure, the safety of the neighbourhood, social cohesion, location, and economic condition.
Access to livelihood support	Access to livelihood support, recovery and policy decisions, level of participation in income generating activities, availability of social capital.	Access to livelihood support, recovery and policy decisions, availability of social capital.

For the criteria of individual wellbeing and socio-physical robustness of the local neighbourhood, all the indicators work in both cases — these indicators surrogate the capacity of disaster impacted people in Aceh, Lyttleton, and Kaikoura.

The study also found that the mixing of communities, which is customary in post-disaster relocation, affects the social cohesion in a community. With the exception of Gampong Baro community, which was entirely relocated within the same village, all the relocated community in Aceh found it was that it is challenging to build a cohesive society for encouraging participation in community activities. It may be argued that the level of cohesiveness was high at the moment of disaster where people are supportive of their fellows, but this decreases as the time pass. However, the experience from Lyttelton proved the opposite.

Moreover, this study also reveals that there is likely to be some interconnection among the indicators. For instance, social cohesion might influence the living environment and exposure to social and cultural norms. This finding implies that each criterion in the livelihood resilience assessment framework, namely, individual coping ability, individual wellbeing, socio-physical robustness of the local neighbourhood and

access to livelihood support cannot be separated from each other to represent the actual ability for measuring livelihood resilience.

The validated livelihood resilience assessment is shown in Figure 5.3. The brown coloured boxes represents indicators applied only for the case of Aceh, Indonesia while the gray ones represents the remaining indicators which could be used to measured post-disaster livelihood resilience both in Aceh and New Zealand.

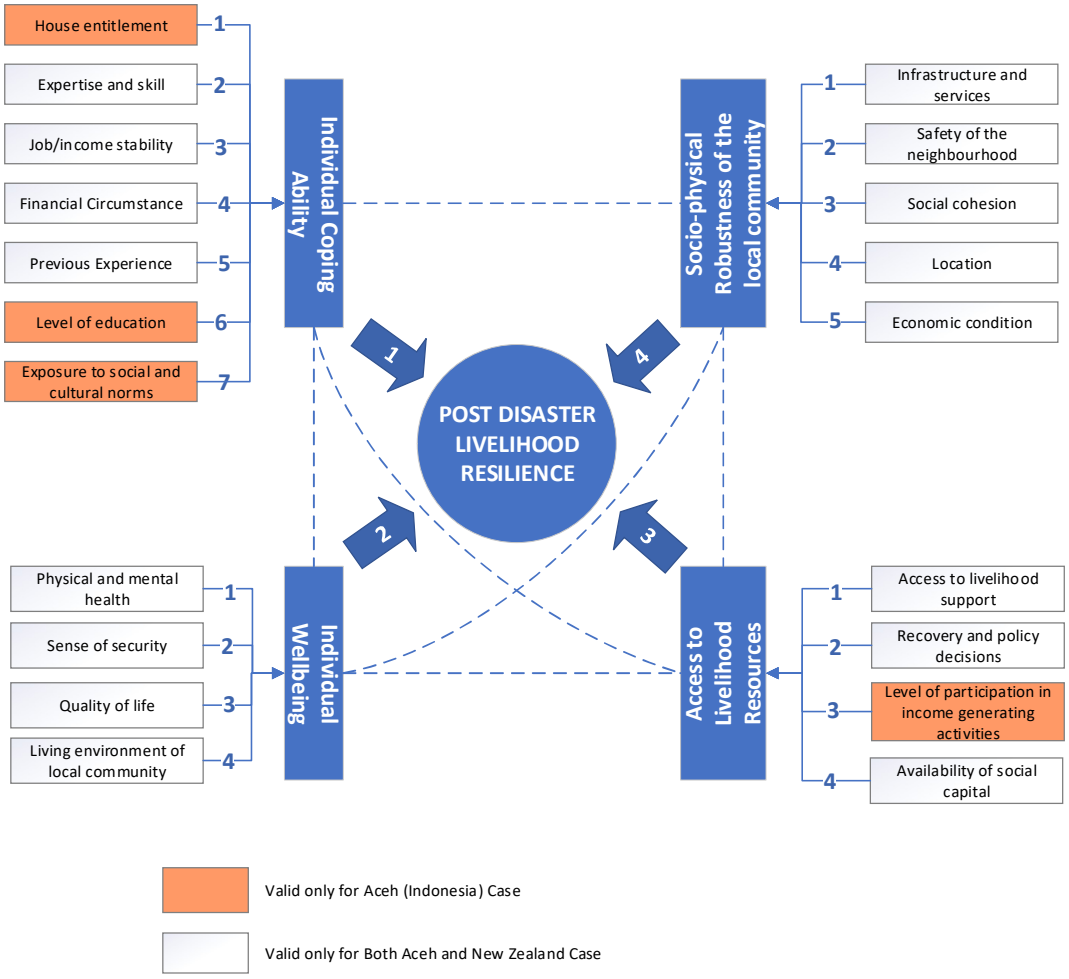

Figure 5.3. Validated Livelihood Resilience Assessment Framework

6. Conclusion and Recommendations

The extensive literature review presented in Chapter 2 of this thesis has helped develop guideline tools to understand livelihood resilience in a post-disaster relocation context. In Chapter 3, the methodology implemented in this study is explained, including how the background theories, tools, and methods align with the research objectives presented in Chapter 1. All the findings are then discussed in Chapters 4 and 5, in terms of livelihood challenges, indicators of resilience, and the factors affecting it. Validation of the developed framework in Chapter 6 complements the two preceding chapters and leads to the recommendation for post-disaster relocation agencies that are presented Chapter7. The thesis is wrapped by this final chapter to conclude the main findings. This chapter is divided into three sections. The first part summarizes the major findings to address the research question followed by the second section that presents an explanation of the handicaps of this study, the limitations of the methods implemented in achieving the research objectives. Furthermore, the final section recommends suggestions for future study.

6.1 Summary of the findings

It is critical that the world has learned as much as possible from post-disaster reconstruction, given the increasing likelihood of hazards and vulnerability in today's world. There seems little doubt that the global community has learned much from previous disaster reconstruction projects about how to address displaced people and resettle them in housing reconstruction schemes. However, the literature review suggests that much less has been learned about livelihood resilience and the recovery of relocated people. The implications of post-disaster relocation on the livelihood indicator, and the factors affecting the capacity of the relocated people to cope, adapt and transform in response to livelihood change after being relocated, have not yet been investigated thoroughly.

This research has studied the long-term livelihood recovery experience in disaster-induced relocation contexts that would complement existing relocation studies by providing a realistic evaluation of the factors that need proper attention during the planning, designing and implementation of resettlement schemes to ensure that

beneficiaries optimize the opportunities offered through the approach, and could maximize all the livelihood options available. It has also looked at the literature on livelihood resilience for the inventory of factors influencing it and to reviewing prominent frameworks for assessing resilience levels. It may be concluded that most of the frameworks focus on slow onset change, and therefore this research has focused on a proposed framework for measuring livelihood resilience to the sudden livelihood shocks caused by disasters to breach the gap in the literature.

The findings reveal the large problems occurred in shifting the emphasis from short term relief to longer-term recovery and our study concludes that there is little evidence of adequate social planning in trying to rebuild viable local communities and resilient household livelihoods. Responsibility transfer from the humanitarian agencies to the local community is essential to enable the optimization of all the benefits provided. Given that livelihood is derived from a development context, linking post-disaster strategy with sustainable development objectives which must be appropriate for local social and economic needs consideration of the urban development program.

To support the livelihood recovery of the relocated people, an understanding of the livelihood resilience of the targeted community is essential in providing the benchmark for livelihood intervention planning. This research proposes a framework measuring four aspects of livelihood resilience, which are; individual coping ability, individual wellbeing, the socio and physical robustness of the local community, and access to livelihood resources. Measurement is undertaken through indicators within these aspects. The study suggests that the categories and indicators in this framework have varying levels of influence on livelihood resilience in the aftermath of a disaster. It implies the importance of prioritizing housing entitlement, strengthening physical and mental health, enhancing access to livelihood support and the provision of infrastructure and basic services in developing livelihood support programs to assist disaster-impacted people in the recovery of their livelihood in order to thrive after a traumatic event.

Building livelihood resilience to natural disasters holds the key to sustained income generation and economic development in disaster-affected areas. Past disaster experience shows that there is a need to study factors that impinge upon livelihood. This study identified the critical factors that affected the livelihood resilience of those relocated communities. Early recovery income support, physical and mental health support,

availability and timeliness of livelihood support, together with cultural sensitivity and governance structure, are among the most important factors. Given the nature of resettlement; access to infrastructure, location of relocated sites, the safety of the neighbourhood and the ability to transfer to other jobs/skills also play an important role in establishing sustained employment for relocated communities in Indonesia.

6.2 Recommendations for future post-disaster relocation

Experience from the post-disaster relocation in Aceh, also the livelihood recovery in Lyttelton and Kaikoura, illustrate the importance of livelihood intervention in post-disaster relocation, which must be appropriate and relevant to local needs. Based on the discussion of the findings in Chapters 4, 5, and 6, this study recommends strategies to pave the way for livelihood recovery support and assistance in post-disaster relocation projects.

- Relocation planning with the adequate intention to livelihood

  Relocating disaster impacted people does not only mean providing housing. More important that housing is the sustainability of livelihood. Livelihood intervention for relocated communities should be concerned on continuity beyond the emergency relief and be linked to development objectives and focus on ongoing community development to build more secure livelihoods. International aid agencies largely adopt the aim of getting people back on their feet by replacing housing assets and equipment needed to generate a household's livelihood. However, those strategies do not address livelihood vulnerability. Only community development strategies, combined with effective long term social and economic planning, can support the aim of building back better.

- Ensuring access to the neighbourhood and the influences on livelihood

  The experiences of the relocated community in Labuy and Neuhuen show the example that reliable transportation highly influences the livelihood options of a disaster-induced relocated community. Substantial investment in public transportation can broaden access to employment sources. Lack of public transportation limits accesses to employment and non-local markets for people operating microenterprises.

- Adequate concern of responsibility transfer path.

  A relocation process should not stop at moving impacted people to provided housing. In this case, there was a replication of practices where the agencies failed to

make a transitional arrangement to ensure that community authorities, both local and national, hold responsibility for the operation or maintenance of the provision of facilities or infrastructure. Partnering with the private sector may solve the challenge of operating the facilities in case of limited community or government resources such as a public-private partnership in the provision of basic education or maintaining urban infrastructure.

- Importance of bridging the connection with hosting community

  Livelihood rehabilitation should not be perceived as a purely economic term. It cannot be separated from the community and social parameters that facilitate it. Suddenly integrating relocated people with a host community might generate friction due to differences in characteristics. The stakeholders in a relocation process should think about how to create a cohesiveness which leads to an increase in the participation of the relocated people in community activities. The basic principles behind these measures should be that this would enable the new migrants who have suffered from disaster-induced displacement to be socio-economically integrated into the existing society, with a strong sense of security, safety, and a sense of belonging.

- Assistance type and time frame for livelihood support.

  The timing of different initiatives should be aligned to the needs of the local people as they go through the different stages of recovery. Long-term livelihood support should focus on helping people to develop the ability to transfer to other skills or forms of employment so that they are able to adapt to future shocks or stresses. A constant needs assessment is instrumental in guiding policymaking. To enhance the "buy-in" from local communities in participating in the livelihood support programs; any measure should be consulted upon with locals to ensure that it is culturally sensitive and responsive.

  Longer empowerment programs had been expected by the communities to help them deal with their livelihood vulnerability. In relation to provoking livelihood initiatives, providing adequate skills is very effective in supporting entrepreneurship. Nevertheless, it must be noted that lack of consideration to the local condition considerably affects the degree of the success of the initiatives. To create better employment opportunities for low-income communities, there needs to be greater investment in education and training. However, there is no evidence to suggest that

such long-term investment in human capital and social inclusion was part of post-relocation initiatives in most of the communities.

Livelihood assistance in disaster recovery should be implemented continuously through a long-term commitment to enhancing resilience. This can be achieved through providing livelihood promotion by supporting income-generating activities such as increasing skills and providing work tools.

- Importance of psychological treatment in disaster recovery intervention

  Psychological assistance for disaster victims should go beyond reducing trauma to include increasing psychological wellbeing as this enhances livelihood capability. It is well recognised that mental health is associated with the social resilience of an individual, as revealed in this research. However, it is also highly influential in affecting a person's livelihood resilience. Therefore, in a post-disaster setting, the interventions from the government or NGOs should not only focus on providing income-generating measures but should also include continuing and consistent psychological services to increase workforce participation and performance.

- Importance of linking relocation projects with infrastructure development planning.

  Livelihood goes hand-in-hand with infrastructure development. When planning and developing the relocation sites, the establishment of the basic services must come as a priority in order for the new sites to be fully functional. A better approach could be that disaster-displaced people can be a workforce employed in temporary jobs for the construction of new facilities in fresh locations to which they are allocated. This would also help create initial contacts and links for the new migrants to existing communities.

This study also suggests that prior to implementing any livelihood intervention programs, the reconstruction and recovery agencies need to gain an understanding of the existing livelihood resilience of the relocated communities. By knowing this, the designed programmes could aim for appropriate targets helping relocated people, strengthening their livelihood resilience, which supports their recovery.

The framework developed in Chapter 4 presents the work in measuring the existing livelihood resilience of a relocated community. It could be beneficial for recovery agencies, whether governmental or NGOs and could be applied for the assessment of livelihood resilience at household level in the community. Furthermore, this framework could be used to promote the capacity of households to recover their livelihoods.

The framework developed based on relocated people's experience in Aceh; it has been tested in different post-disaster contexts in Christchurch and Kaikoura. This testing recommends that generally speaking, the assessment framework could be implemented in the assessment of existing the livelihood resilience of disaster-impacted people. However, there is a need for the adjustment of some of the indicators to suit each particular condition. For instance, housing entitlement for measuring the individual coping ability which worked in the post-2004 Indian Ocean relocated community in Aceh does not apply to the business resilience case in Kaikoura and Christ

6.3 Limitations of this study

While mixed method design implemented in this study to capture both qualitative and quantitative information on livelihood resilience in the relocated community, it must be acknowledged that there are some handicaps in the methods and approaches used to fully address the research objectives.

Time and budget constraints are unlikely to allow the researcher to do a longitudinal observation to explore the livelihood states over a longer time frame. Being undertaken at a specific time point is likely to diminish the opportunity to catch the livelihood changes over the time frame, the determinants of the changes, and how the relocated people respond to the changes. This limitation also constraints the researcher to a structural equation modelling to see how the factors affecting livelihood resilience are related to, and at some points also serve as the livelihood resilience indicators

The other limitation is laid in the type of information gathering used in the survey. The ranking of indicators and factors influencing livelihood resilience is based on the perception of the respondents. Hence, the results are less likely to represent the tangible measurement of livelihood changing and resilience, and thus, the scientific accuracy of measurement might be questionable.

It is also well known that livelihood is comprised of a number of interdependent attributes. It is essential to explore how the attributes in the framework influence each other and the interconnection among them in the measurement. However, this research has not yet done this.

6.4 Future research directions

The research in this study could provide valuable lessons which can be used to devise better plans for the design and delivery and the aspects that should be promoted or avoided to ensure livelihood recovery in post-disaster resettlement programs. However, it anticipated that the research constitutes an approach for understanding the post-relocated livelihood complexity and sets up a baseline for a multi-disaster context.

While this study was undertaken solely in relocated disaster-impacted communities in Banda Aceh and Aceh Besar, the proposed framework could be applied to many other similar communities, regionally and worldwide, underscoring the need for a deeper understanding of the local cultural character and its implications for livelihood resilience in the aftermath of a disaster. This research opens up broad channels for future study. Further research is needed in formulating the weight of those indicators in the proposed framework in order to develop an implementable tool in assessing post-disaster livelihood resilience.

This study reveals that at some points, the factors that affect livelihood resilience also serve as the signs that indicate the resilience itself. Further statistical analysis, such as structural equation modelling, is recommended to explore the connections between the factors and indicators of livelihood resilience.

An empirical application of the proposed framework in other disaster reconstruction context also needs to explore further the possibility and limitation of implementing the framework beyond the relocation schemes. The study in Christchurch and Kaikoura has indicated the prospect of a framework for assessing livelihood resilience in different reconstruction situations. However, there is still a need for investigating the application of the framework to a local livelihood context.

[1] Badan Rehabilitasi dan Rekonstruksi (BRR) NAD-Nias, or Agency for the Rehabilitation and Reconstruction of Aceh and Nias, was an Indonesian government agency which coordinated and jointly implemented the recovery programme following the December 2004 Indian Ocean earthquake and tsunami that mostly affected Aceh and the March 2005 Nias–Simeulue earthquake. The institution established on 16 April 2005 operated for a four-year period based in Banda Aceh with a regional office in Nias and a representative office in Jakarta.

[2] Areas within 2 km of the shoreline where restricted to be built in. The policy was established in the 2005 BAPPENAS (Indonesian Ministry of National Development Planning) blueprint for reconstruction, but never been implemented due to reluctance of the land owners.

[3] A website owned launched by the Centre for Research on the Epidemiology of Disasters (CRED) in 1988 as database to serve the purposes of humanitarian action at national and international levels. EM-DAT was created with the initial support of the World Health Organisation (WHO) and the Belgian Government.

[4] A Funding institution consists of six international donor organisations, established for 2006 Yogyakarta and Central Java earthquake reconstruction.

[5] A relocation site in Neuhuen, Aceh. Named after Chinese actor Jackie Chan, who, with other Hong Kong actors, helped fund the building of the community and purchase of the hill. Jackie Chan also campaigned with the Hong Kong Red Cross to raise additional relief funds that went to reconstruction of the site.

[6] A Christian NGO, Based in the USA

[7] A National Programme of the Government of Indonesia for subsiding rice for poor families

[8] The Government of Indonesia's National Programme for Community Empowerment

[9] Local Branch of Department of Social Welfare

[10] Aceh Government's agency for managing the zakat (Payment made annually under Islamic law on certain kinds of property and used for charitable and religious purposes)

[11] Local NGO in Aceh

[12] Village business unit, a profit-oriented co-operative that focusing mainly on village economic activities

[13] Aceh Provincial agency of Village Community Empowerment

[14] Indonesian government body for Electricity.

[15] Drinking water provider

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Appendix A

ENGINEERING

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
Faculty of Engineering

The University of Auckland
Private Bag 92019
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PARTICIPANT INFORMATION SHEET

Research Project Title: Livelihood resilience to large disasters

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You are invited to participate in the interview for the research project titled 'Livelihood resilience to large disasters' undertaken at the University of Auckland. This project aims to investigate the progress and trajectory of livelihood resilience to large disasters.

Why and how are you invited in the interviews?

Your participation will be voluntary. You are chosen randomly from your community, and your participation in the interview is based on your willingness. Your insights and the data from you will help us with our research about understanding the challenges and opportunities that are inherent in the process of building livelihood resilience.

When is the interview happening?

The interview asks about the basic information about the recovery process of your housing reconstruction, employment recovery, and well-being status. It will not cover any sensitive questions related to the earthquake losses. The interview will be undertaken between July and August 2018.

How will the interview be conducted?

Upon taking part in this research, you may reserve the right to withdraw at any time during the interview. The interview will take approximately 30 minutes. The researcher will end the interview if you show any unforeseen signs of trauma or discomfort, and the researcher will refer you to the local Red Cross Society for support or counseling services. The contact details of the local Red Cross Society is shown at the bottom of this document. If you wish to withdraw before the interview, it is recommended that you inform the researcher at least one week before the actual investigation. If you wish to discard any of the interview data, once the interview is complete, this must be done within two weeks after the interview.

Is there an audio recording during the interview?
There will not be any audio recordings during the interview. All records of the interview will be written by researchers and completely anonymous.

What are the benefits of taking part in the interview?

The possible benefits to interview participants in taking part in the research include:

(1) Participation in the project can provide participants with an opportunity to reflect their status about the livelihood, which may help with further enhancement of post-disaster recovery decision making
(2) The participants can get copies of interview data analysis in the first instance and provide further inputs during the report writing process;
(3) Upon request, the participants can also get a copy of the final report from their community centre to improve their understanding in livelihood recovery (The researcher will post a number of copies of a summary of the results to your community centre).

How is confidentiality addressed?

The risks associated with taking part in this research are limited to confidentiality concerns and issues arising. Confidentiality will be addressed in the following ways:

(1) The results of the project will be used in the researcher's postgraduate thesis and will be published in reports and/or academic journals, but the identity of the participant will be kept confidential at all times. The name and personal details of the participant will never be divulged to anyone, nor used in any written or published material from the project;

(2) The interview transcription will be conducted by the researchers without the involvement of a third party;

(3) All collected data including interview notes and consent forms will be separately and securely kept in the locked cabinet within the University of Auckland premises for a period of six years and securely destroyed by September 2021 by appropriate means of incineration or refuse disposal.

If you have any queries, please contact:

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APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON **11/06/2015** FOR **6** YEARS REFERENCE NUMBER 014782

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CONSENT FORM

THIS FORM WILL BE HELD FOR A PERIOD OF 6 YEARS

Research Project Title: Livelihood resilience to large disasters
Research Supervisor: Dr Alice Chang-Richards
Researcher: Gujun Pu, Dantje Sina, Gerald Kwazu

I have read the **Information Sheet** concerning this project and understand what the study is about. I understand that I am free to request further information at any stage.

I know that:

1. My participation in the project is entirely voluntary.
2. I am free to withdraw from the interview at any time without any disadvantage.
3. I understand that the researcher will terminate the interview if I show any signs of trauma or discomfort, and the researcher will refer me to the local Indonesian Red Cross Society for support or counseling services.
4. Personal identifying information will be securely stored independent of the interview data, which itself will be stored in an anonymised form. Data will be retained in secure storage for six years after the project's completion.
5. The interview will take approximately 30 minutes, and the analysis of the interview notes will be conducted by the researchers without the involvement of a third party.
6. I understand that I have the right to edit the transcript of the interview notes within two weeks on receipt of the copy.
7. I understand that I can withdraw data within two weeks of the interview.
8. The results of the project will be published in reports and academic journals, but my identity will be kept confidential at all times. My name and personal details will never be divulged to anyone, nor used in any written or published material from the project.

Name_____ Signature_____
Date_____

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON **11/06/2015** FOR **6** YEARS REFERENCE NUMBER **014782**

ASSESSING LIVELIHOOD RESILIENCE OF POST-2004 INDIAN OCEAN TSUNAMI RELOCATED COMMUNITIES IN ACEH, INDONESIA

DEMOGRAPHIC

1. Village :
2. Age :
3. Gender :
4. Education :
5. Marital status : single/married/widow/widower
6. Number of family members :
7. Previous village :

EMPLOYMENT AND INCOME

8. Where was your main income coming from before relocation? …….
9. what is your current employment status:

   ☐ Self-employed ☐ employed ☐ under-employed ☐ unemployed

   If employed, what is your current job? .....

10. Have you changed your job more than once since been relocated?

    ☐ Yes ☐ No

    If yes, how many times? …….

11. Are you satisfied with your job?

    ☐ Yes ☐ No

12. In 5 next years, are you planning to change the job?

☐ Yes ☐ No

HOUSING

13. Which year did you move to the relocated house?

    ☐ 2006 ☐ 2007

    ☐ 2008 ☐ 2009

    ☐ After 2009

14. Which of the following financial assistance di you receive for your relocated house

☐ Donor ☐ Government ☐ Financial-market instruments (loans, credit, bonus, etc.)

☐ families/friend ☐ Other: ……

15. Who managed to construct your house?

    ☐ Donor ☐ Government ☐ yourself

    ☐ Community-committee ☐ Contactors

    ☐ Others: ……

16. Have you done any extension or renovation to your relocated house?

☐ yes ☐ no

If yes, how long after you live in the house you did the extension/renovation

☐ < 1 year ☐ 1 – 3 years ☐ 3 – 5 years ☐ > 5 years

17. Which are the following features is/are to your satisfaction when you moved in or before you renovating

☐ Size ☐ Architecture and design ☐ Material

☐ overall-quality ☐ Other: ……

LIVELIHOOD PROTECTION, PROMOTING, AND RECOVERY

18. Are there any ongoing programs offered by NGOs or government agencies to support community organizations to assist your livelihood recovery?

☐ Yes ☐ No

19. Did you get any of the following livelihood support when you moved to the relocation site?

a. Food or in-kind aid: ☐ Yes ☐ No

b. Cash grant : ☐ Yes ☐ No

c. Working tools : ☐ Yes ☐ No

d. Vocational training : ☐ Yes ☐ No

e. Credit for business enhancement : ☐ Yes ☐ No

f. Other ……

20. Which one of the following, from your perspectives, played a major role in your livelihood recovery?

☐ NGO' Programs ☐ Govt. Support

☐ Community before relocation ☐ community in the relocation site

☐ family/friends ☐ self-reliance

☐ Other: ……

21. Which one of the following, you found to be a challenge (s) in your relocation site?

☐ finding a job ☐ children schooling

☐ connecting to neighbours ☐ distance from relatives

☐ changed lifestyle ☐ wellbeing of family members

☐ Access to infrastructure, medical, entertainment facilities

☐ Other: ……

FACTORS INFLUENCING LIVELIHOOD RESILIENCE

The items below are the factors that influence the capacity of individuals to cope and recover after their livelihood has been disrupted.

Please rank factors below according to the importance in your capability to cope and recovering your livelihood after being relocated.

Scale 1 = not important at all for your livelihood recovering
Scale 3 = neutral
Scale 5 = very important for your livelihood recovering

No	Factors influencing livelihood resilience following a large disaster	Survey scale: 1 = "not important at all." 5 = " very important"				
Factors related to individuals/households						
1.	Gender of the household head	**1**	**2**	**3**	**4**	**5**
2.	Age of the household head	**1**	**2**	**3**	**4**	**5**
3.	Household size (number of people in living in your house	**1**	**2**	**3**	**4**	**5**
4.	Physical and mental health	**1**	**2**	**3**	**4**	**5**
5.	Early recovery income support (financial, food, shelter)	**1**	**2**	**3**	**4**	**5**
6.	Financial circumstances (saving,jewelry and other colletariseable assets)	**1**	**2**	**3**	**4**	**5**
7.	Access to credit (bank or any other microfinance sources)	**1**	**2**	**3**	**4**	**5**
8.	Ability to shift to other livelihoods (skill and expertise)	**1**	**2**	**3**	**4**	**5**
9.	Participation in social activities	**1**	**2**	**3**	**4**	**5**
10.	Level of education	**1**	**2**	**3**	**4**	**5**
11	Availability of insurance	**1**	**2**	**3**	**4**	**5**
12.	Relative/extended family support	**1**	**2**	**3**	**4**	**5**
13.	Previous work experience	**1**	**2**	**3**	**4**	**5**
Factors related to local communities						
1.	Location/distance to working place	**1**	**2**	**3**	**4**	**5**
2.	Infrastructure and basic services (transportation, electricity, water supply, telecommunication)	**1**	**2**	**3**	**4**	**5**
3.	Environmental resources nearby	**1**	**2**	**3**	**4**	**5**
4.	Social capital (norm, contention or institution such as RT, RW, pengajian etc)	**1**	**2**	**3**	**4**	**5**
5.	Social cohesion among the community	**1**	**2**	**3**	**4**	**5**
6.	Information accessing capacity	**1**	**2**	**3**	**4**	**5**
7.	Network with other people from outside communities	**1**	**2**	**3**	**4**	**5**
8.	Neighbourhood safety	**1**	**2**	**3**	**4**	**5**
9.	Neighbourhood economic condition	**1**	**2**	**3**	**4**	**5**
10	Resources distribution equity	**1**	**2**	**3**	**4**	**5**
Recovery agencies related factors						

1.	Governance of livelihood support	**1**	**2**	**3**	**4**	**5**
2.	Availability of long-term livelihood support	**1**	**2**	**3**	**4**	**5**
3.	Culturally appropriateness of livelihood support	**1**	**2**	**3**	**4**	**5**
4.	Lead time of livelihood support initiatives	**1**	**2**	**3**	**4**	**5**

Criteria	Rank (1 – 4)
Individual coping Ability	
Individual wellbeing	
Neighbourhood	
Access to resources	

Indicators	Rank (1 -7)
Job/income Stability	
House Entitlement	
Expertise and Skill	
Financial Circumstance (saving, insurance, microcredit)	
Previous Experience of Individual	
Exposure to Social and Cultural Norms	
Level of Education	

Indicators	Rank (1 -4)
Quality of life	
Satisfaction of Neighbourhood	
Physical and Mental Health	
Sense of Security	

Indicators	Rank (1 -5)
Location	
Infrastructure and Services	
Economic Condition of your neighborhood	
Social Cohesion	
Safety of the Neighborhood	

Indicators	Rank (1 -4)
Recovery and Policy decisions	
Access to Livelihood Support	
Availability of Social Capital	
Level of Participation in Income Generating Activities	

Thank you for your time and participation

- Would you be willing to participate in a follow-up interview for this research? The interview will take approximately 10 - 15 minutes at a convenient time

☐ yes ☐ no

If yes, please provide your contact details so that we may contact you for an interview
Name :
Address :
Phone :
Preferred time of interview (between October and November 2015):
Preferred time of interview (telephone or in-person):

- Do you have any other comments you like to share with us?

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