Doctoral Thesis

Role of Risk Sharing on Post-Disaster Housing Recovery Decision-Making in the Philippines

(フィリピンにおける災害復興時の住宅再建に関する意思決定に対するリスクシェアリングの影響分析)

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ABSTRACT

Introduction. Recent natural disasters affect more people in developing economies rendering them to experience insufficiency of capital to repair damaged assets and revive livelihoods which can further hamper their future development (**financial vulnerability**). Among the different aspects in recovery phase of the built environment, one of the crucial factors to provide greater resilience to future disaster risks was ensuring that housing assets are quickly and safely reconstructed. Hence, in designing recovery programs, the strengths and weaknesses of **different housing reconstruction approaches which include on-site rebuilding and off-site relocation projects** can be considered. Moreover, based on the review paper about post-disaster reconstruction research, decision-making in these identified approaches is one of the emerging research trend recently being explored. Hence, research on how and why certain housing residency patterns are formed can be further investigated.

With this motivation, the main goal of this research was to develop a **conceptual framework for post-disaster housing residency behavioral decision-making** in the context of financial resilience and temporal choice through empirical investigation of communities in the Philippines. More specifically, this study sought (1) to determine the factors that significantly affect the rebuilding-relocation decisions over time by comparing cases of rebuilding-relocation approaches in Leyte and Manila (**modeling the behavioral mechanism**); (2) to examine the challenges encountered by analyzing if the program assistances matched the needs of the beneficiaries (**problem evaluation of housing recovery program**); and (3) to assess the feasibility or the willingness of the community to participate in a proposed risk sharing property insurance program (**feasibility of solution**). The study was designed to incorporate both retrospective and prospective observational data in capturing the past and future behavioral context in the micro-scale household level.

Literature Review. Based on the research developments and missing links related to the research fields of post-disaster reconstruction, cognitive-social psychology and migration studies, three main research gaps were outlined. First, review papers argued that there was lack of research on systems to assess the financial resilience in the household-level decision-makers and highlighted the need to shift the focus on **less conventional approach in measuring resilience** to capture the effect of processes of social, cultural and psychological elements. Furthermore, past researches claimed that existing research neglects the **temporal context of resilience indicators** which include unique characteristics of place, and suggested quantitative multivariate analysis of datasets in different timeframes involving permanent housing rebuilding and relocation. Lastly, literature emphasized that there is an increasing complexity in **decision-making after extreme disasters** compared to low-impact events and that existing behavioral theories have **limited application in developing countries** where cultural characteristics are different than developed nations. These were the main arguments that the rationale or motivation of the research was anchored on.

Methodology. Empirical case studies from two cities in the Philippines were chosen – (1) Tacloban City, Leyte Island (storm surge caused by super typhoon Haiyan last 2013 focusing on relocation cases) and (2) Muntinlupa

City, Metro Manila (extreme flooding caused by Typhoon Ketsana last 2009 focusing on rebuilding cases). In these project sites, housing reconstruction approaches were identified and compared – **(a) owner-driven on-site rebuilding in Leyte, (b) owner-driven on-site rebuilding in Manila and (c) off-site relocation sites in Leyte**. Next, the study design was divided into two parts which involved retrospective causation analysis to housing recovery decisions and the prospective feasibility testing of insurance as a proposed solution implemented through mixed method approach. For the first section, **semi-structured paper-based questionnaires** (n_1= 575) were administered last March 2015 and 2016 in the Leyte and Manila regions through two-stage cluster sampling to determine the factors affecting housing recovery rate. This was supported by key informant interviews of community leaders and government officials. Extensive literature review with regards to models of individual decision-making, concept of local or community-based resilience and theories of migration was done to establish the variables to be measured. Furthermore, statistical analyses including structural equation modeling (SEM) as core methodology were performed to explore the relationships of the variables and compare the different case sets. Finally, for the latter section, solution-testing was carried out in Manila case through the **discrete choice experiment** (n_2=201) to assess the feasibility of a proposed risk-sharing property insurance plan. It was designed through the insurance preference questionnaire by pairwise comparison of 5 insurance types (existing private company insurance, hypothetical community group insurance, hypothetical government public insurance, hypothetical public-private risk-sharing with regular appraisal and hypothetical public-private risk sharing with index parametric appraisal system) with 3 attributes (service provider, premium and appraisal or assessment type) in which discrete choice logit modeling was used. These techniques were implemented with the use of commercially-available statistical software programs.

Results I. The factors that triggered and support the reconstruction duration as dependent variables (i.e. time to start, transfer and finish) were determined. The integrated behavioral model was used as theoretical framework basis. For sample stratification-checking, group comparison test using one-way analysis of variance (ANOVA) and independent samples t-test verified that location-based reconstruction approaches affected the reconstruction rate which required stratification of the samples into 5 cases (i.e. Leyte-rebuild-start, Leyte-rebuild-finish, Manila-rebuild-start, Manila-rebuild-finish and Leyte-relocate-transfer). Next, in the data pre-processing stage aiming to reduce the dimension and address multi-collinearity of the multiple independent variables, principal component analysis (PCA) and stepwise multiple regression using backward elimination were employed to assist in the construction of the final model. Then, as the core methodology, the structural equation modeling was performed to find the not directly observable latent variables which are characterized by independent variable indicators and tested for significant relationships with reconstruction duration.

The final structural equation models showed that the **latent constructs of (1) risk perception, (2) place attachment, (3) financial assistances, (4) rebuilding assistances, (5) relocation assistances, (6) community initiatives and (7) indirect impacts** had significant and distinct influences to the time duration to decide. To discuss the linkage of these concepts to behavioral constructs, the analysis was anchored using the integrated behavioral model with the following notable interpretations:

- First, the **assistances as "behavioral control"** component including financial and non-monetary assistances triggered and reinforced the rebuilding behavior in Leyte, while Manila case was not influenced significantly. The household expectancies on the behavioral outcome motivated them to rebuild and also acted as behavioral reinforcements which assisted or discouraged the behavior.
- Secondly, **risk perception as cognitive response or "instrumental attitude"** was found to affect the recovery in Leyte case as triggering factor, while **place attachment as emotional-affective response or "experiential attitude"**, was largely affecting the Manila case. This indicated higher risk accepting behaviors of households in Manila compared to the Leyte case.
- Lastly, both **community initiatives as "subjective norm" component** and financial assistances represented significant migration drivers in Leyte.

Results II. After modeling the behavioral mechanism of the duration of housing recovery decisions in the case study areas, the research investigated the challenges to housing recovery by analyzing the gaps between beneficiary needs and the recovery program assistances. The level of beneficiary satisfaction was introduced as the parameter to evaluate the project performance in the household-level.

Using one-way ANOVA, the rebuilding case in Manila was observed to have significantly lower level of satisfaction compared to the rebuilding and relocation cases in Leyte. Hence, the underlying factors which contributed to the low satisfaction level were further explored. Based on the stepwise regression using backward elimination approach, the dissatisfaction in Manila case was attributed to low personal savings, and lower financial aid amount received. Hence, this implied **insufficiency of financial assistance** was found to be one of the critical factors affecting dissatisfaction level in Manila case in terms of the assistances offered.

In addition, in Leyte case, based on the key informant interviews, other issues in project management included the weak enforcement of the no-dwelling-zone policy in the rebuilding case and delay in relocation transfer plan by prolonged land acquisition and issues in subcontracting. Lastly, the study also found that there was lack of livelihood opportunities, basic services and educational facilities in the relocation sites which may deter the families from moving.

Results III. Due to the dependency of the households who rebuilt in Manila case to reactive options (external assistances) of disaster risk financing which affected the low satisfaction of the vulnerable population, the future tendency of the households to participate in a proactive ex-ante risk sharing insurance scheme was gauged through the discrete choice experiment. Logistic regression and conditional logit modeling were performed to understand how household characteristics and proposed insurance attributes affected their choice behavior.

The barriers to insurance acceptance among the households in the Manila case included lack of budget, lack of trust in insurance system, low risk perception of future flooding events and dependence to external government assistance. Moreover, the decision to purchase the property insurance was significantly affected by 5 household characteristics– **past flood frequency, estimated property value, monthly income, monthly savings capacity**

in percentage and educational attainment. Among these factors, the strongest predictor was the educational attainment signifying that more literate households will 3 times more likely to purchase. Interestingly, respondents who experienced higher flood frequency are less likely to buy insurance, controlling for other factors in the model. Contrary to results of some past researches where high risk people are more likely to purchase insurance, the Manila case provided contrasting evidence. After checking for associations with other variables, the households were revealed to underestimate the potential housing asset loss or damage due to their lower perceived future flooding frequency as manifested also in the barriers to insurance acceptance as low risk perception. Furthermore, based on the insurance attributes, the discrete choice experiment revealed that the average respondent was (1) more willing to pay from the base values of the private insurance if the assessment type was changed to the index type with faster settlement of claims, but (2) less willing to pay from the base values to change the service provider from private to risk sharing type. For the proposed risk sharing property insurance between the public and private sectors, an **uptake rate of 30-39%** can be expected if this insurance type will be offered in the market.

Conclusion. The study had identified specific socio-psychological factors in the behavioral decision-making framework, which significantly affected the housing reconstruction decisions over time. These key conceptual factors were empirically-tested in case studies in Leyte and Manila, Philippines. Moreover, these inferred factors were extracted from measured variables by structural equation modeling. These factors were identified to trigger and reinforce the rebuilding and transfer behaviors showing distinct influences in the project areas (Leyte-rebuilding: Risk Perception and Assistances; Manila-rebuilding: Place Attachment and Leyte-relocation: Community Initiatives and Assistances).

The main **academic significance** of the research was on linking the research gap by providing multivariate quantitative analysis of post-disaster housing recovery which (1) focused on psycho-social cognitive aspect of resilience assessment in disaster events; (2) integrated rebuilding and relocation cases in analyzing recovery rate measured through temporal scale and (3) empirically-tested the behavioral decision-making framework through communities in the Philippines as a developing nation after extreme events. More importantly, the analysis provided the **initial set of latent socio-psychological constructs** which future researches can further explore with additional predictors in better understanding not only how decisions were formed based on their motivations, but also how decisions are maintained through time until the desired outcome is achieved. Lastly, as a recommendation for future research works, inclusion of spatial considerations in household decision-making, application of longer longitudinal study that can widely capture the progress of reconstruction and the impact of actual policy to individual decision-making are further suggested.

The **practical implications** of the research rested on the understanding of the current and future behavioral mechanism of the households in the Philippines. These consequences of the research findings were mainly focused on how the research can be used to form better strategies in the design of future housing recovery programs and policies. For a successful housing recovery, considering the **concept of risk perception and place attachment** as triggering factors of the vulnerable population can be incorporated in the design of the programs. For groups that placed high significance on place attachment indicators as portrayed in the Manila case, the households will more likely trigger on-site rebuilding despite insignificant level of external assistances. These rebuilding cases if

situated in safe zones can be **offered with property insurances** to increase their financial capacity to cope up in the next disaster. In line with this, based on the result of the feasibility study for proposed property insurance scheme, reaching agreement of interests between the organizational insurer units who will offer lower premium insurance for shared goal (private insurers and government) and disseminating awareness campaigns (through media or social dialogues) among communities about how insurance works targeting the lower literacy regions are imperative steps to increase the acceptance of insurance. The risk sharing between the public government and private companies lowering insurance premiums was expected to increase the demand for insurance and financially protect these households from the negative impacts of these future extreme weather events. These recommended cues to action can be strategically planned in the supply-side of the insurance market.

(2157 Words)

***Keywords*:** Relocation, Risk Perception, Shelter Options, Social Behavior, Coping Responses, Financial Resilience, Temporal Choice, Place Attachment

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LIST OF ACRONYMS OR SYMBOLS

Acronym	Meaning
DSWD	Department of Social Welfare and Development
4Ps	Pantawid Pamilyang Pilipino Program (Poverty Alleviation Cash Transfer Program)
ESA	Emergency Shelter Assistance
DENR	Department of Environment and Natural Disaster
NHA	National Housing Authority
CFW	Cash-for-work
CA	Cash Assistance
IOM	International Organization of Migrants
PhP	Philippine Pesos (local currency)
ILO	International Labor Organization
CRS	Catholic Relief Service
SEM	Structural Equation Modeling
ANOVA	Analysis of Variance
DCE	Discrete Choice Experiment
PCA	Principal Component Analysis
NGO	Non-governmental Organization
IEDA	International Emergency and Development Aid (NGO)
GDP	Gross Domestic Product
OECD	Organization for Economic Co-operation and Development
APEC	Asia Pacific Economic Cooperation
UNU	United Nations University
NHRC	National Hydraulics Research Center (University of the Philippines)
GIZ	Gesellschaft für Internationale Zusammenarbeit
ADB	Asian Development Bank
UNHCR	United Nations High Commissioner for Refugees
DOST	Department of Science and Technology
PARR	Presidential Assistant for Rehabilitation and Recovery

1. INTRODUCTION

Overview

Recent natural disasters affect more people in developing economies rendering them to experience insufficiency of capital to replace or repair damaged assets and restore livelihoods which can further hamper their future development (financial vulnerability). Among the different aspects in recovery phase of the built environment, one of the crucial factors to provide greater resilience to future disaster risks was ensuring that housing assets are quickly and safely reconstructed. This aspect of recovery programs can consider the strengths and weaknesses of different housing reconstruction approaches which include on-site rebuilding and off-site relocation projects. Moreover, based on the review paper about post-disaster reconstruction research, decision-making in these identified approaches is one of the emerging research trend recently being explored. Hence, research on how and why certain housing residency patterns are formed can be further investigated.

With this motivation, the main goal of this research was to develop a conceptual framework for post-disaster housing residency behavioral decision-making in the context of financial resilience and temporal choice through empirical investigation of communities in the Philippines. More specifically, this study sought (1) to determine the factors that significantly affect the rebuilding-relocation decisions over time by comparing cases of rebuilding-relocation approaches in Leyte and Manila (modeling the behavioral mechanism); (2) to examine the challenges encountered by analyzing if the program assistances matched the needs of the beneficiaries (problem evaluation of housing recovery program); and (3) to assess the feasibility or the willingness of the community to participate in a proposed risk sharing property insurance program (feasibility of solution). The study was designed to incorporate both retrospective and prospective observational data in capturing the past and future behavioral context in the micro-scale household level.

1.1 Background of the Study

1.1.1 Recent Disasters in the Philippines

The Philippines experiences an average of 20 typhoons annually. It is ranked as the 3rd most natural disaster risk-affected country based on the 2013 World Risk Index Report (United Nations University-Environment and Human Security (UNU-EHS), 2013) which is mainly attributed to tropical storms and floods (Guha-Sapir et al. 2013). Moreover, climate change projections predict increases in annual mean temperatures for the country ranging from 1.8°C to 2.2°C in 2050. These temperature changes are expected to lead to more severe and frequent meteorological disasters (Bowen, 2015).

In recent decade, the archipelagic nation was devastated by typhoons Ketsana in 2009 and Haiyan in 2013. These extreme events, both with more than 100-year return periods, led to damages of buildings and infrastructures in

Metro Manila and the Central Philippines. Unfortunately, figures showed that there were limited insured losses over economic losses of only around 26% and 12% (Aon Benfield, 2009; Swiss Re, 2014), respectively with which the rest had to be shouldered by the government and the public sector. In a more global perspective, the sustainability issue that this study sought to address was the financial resource gap among developing nations or "financial vulnerability". As natural disasters are becoming more common and affect more people in developing economies of low- to middle-income countries compared to others (Laframboise and Loko, 2012), these countries were rendered to experience insufficiency of capital to replace or repair damaged assets and revive livelihoods which can trickle down to disaster shocks on poverty and further hamper the countries' future development (Mechler et al. 2010).

1.1.2 Approaches to Disaster Recovery

Disaster recovery processes are composed of the rehabilitation and reconstruction stages where complex decisions must be taken. The rehabilitation phase denotes repair of infrastructure and facilities to restore the economic and social functions of disaster-affected areas which typically takes several weeks to more than a year, depending on the extent of the damage (Matsumaru, 2015). After rehabilitation, the reconstruction phase follows and emerges as long-term restoration that includes revival of livelihoods, economy, industry, social capital, culture, and environment (Matsumaru, 2015; Esteban et al., 2015a, c). In this stage, decisions must be urgently but carefully chosen as they have long-term developmental effects (World Bank, 2010). Poor recovery efforts can lead to vulnerability, instability and poverty especially in developing countries (El-Masri and Tipple, 2002).

Recent post-disaster reconstruction strategies have generally focused on enhancing resilience against future disasters. In this dissertation, resilience is defined as the system's capacity to absorb disturbance and re-organize into a fully functioning system. It involves not only the system's capacity to return to its original state, but also to move to a more advanced state through learning and adaptation (Adger et al., 2005; Klein et al., 2003; Folke, 2006; Cutter et al., 2008). Considering the viewpoint that the post-disaster recovery phase can be considered as a window of opportunity for disaster risk reduction (Paul, 2011) and can foster sustainable development (Wisner et al., 2004, Harrington, 2005, Asgary et al., 2006, Thiruppugazh, 2007, Palliyaguru and Amaratunga, 2011), reconstruction projects should not only focus on the reconstruction of physical structures, but also provide new employment opportunities, improve the quality of life, and maintain resource equity inclusive of service distribution and delivery to the affected communities (Palliyaguru and Amaratunga, 2011). In contrast, unsustainable development practices can propagate socio-economic vulnerability (Mileti, 1999), which often compels poorer families to live in informal settlements situated in disaster-prone areas.

To address the growing concern of the impacts of disaster, the risk layering approach (Linnerooth-Bayer and Mechler 2009) encourages both risk reduction protective measures and risk financing as coping response dependent on the level of impact. For low to medium-sized losses following the disaster with more frequent but low return periods, the framework promotes risk reduction measures (ex. protection of communities by structural engineering measures). This type of response is composed of measures employed for anticipating future disaster risk aiming to reduce existing exposure, hazard, or vulnerability (IPCC, 2012) by constructing engineering protective structures as an example. However, to address the severe losses due to recent extreme disasters, disaster

risk financing is said to be more effective coping strategy for lower frequency or longer return period hazard partnered with the conventional risk reduction mitigation measures. This type of response involves financial protection against financial losses from natural disasters that enable greater financial resilience (ADB, 2013) or the coping capacity measured by the available financial resources (Mechler et al. 2006). Under disaster risk financing is the concept of risk sharing or risk transfer, which is defined as the process of formally or informally shifting the financial consequences of particular risks from one party to another (UNISDR). This type of social investment is already adopted in the Sendai Framework for Disaster Risk Reduction 2015-2030 as local to national level guideline (UN, 2015).

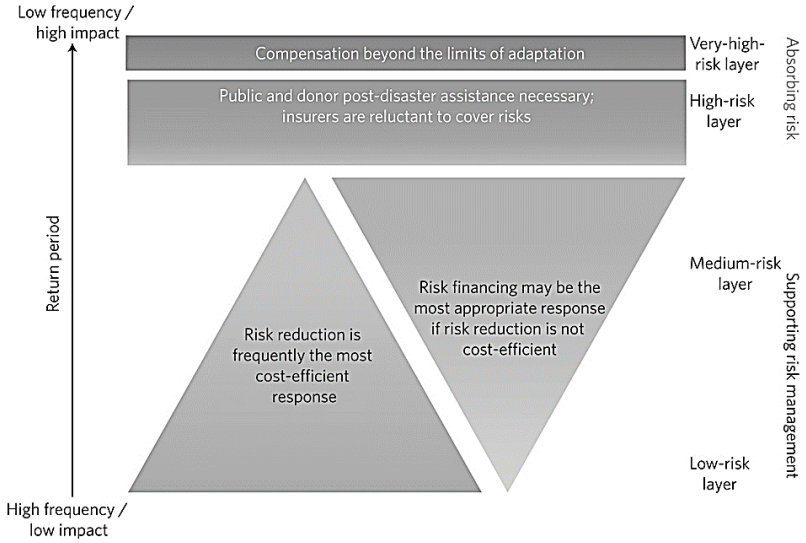


Figure 1. Layering Approach for Risk Reduction and Risk Coping (Linnerooth-Bayer and Mechler 2009)

1.1.3 Disaster Risk Financing in the Philippines

There are several available options of disaster risk financing in the Philippines ranging from the ex-post (i.e. calamity loan from government, credit from private institutions, and informal type) and ex-ante (i.e. private insurance) strategies. However, the market penetration of risk transfer mechanism in the Philippines is generally limited to the informal type (Fafchamps and Lund, 2003), government loans and donor aids (World Bank, 2005).

Furthermore, poor households in the Philippines are more extremely affected by disasters due to the amplification of vulnerabilities and relatively fewer options of coping resources. From 2003-2009, 44% of the population was poor at least once. As of the first semester of 2014, the poverty threshold was set at US$198.6 per month for the basic food and non-food needs of 5 family members (Philippine Statistics Authority – National Statistical Coordination Body, 2014). Rapid urbanization and the propagation of informal settlements and urban slums have intensified vulnerabilities. Due to the fewer coping resources to manage frequent or repetitive disaster risk, this normally leads to the adoption of negative coping measures of households (asset-selling, food consumption reduction or removal of children from school to work for additional family income) (Bowen, 2015).

Moreover, many poorer nations are highly relying on external aids in the form of loans or grants to meet their post-disaster reconstruction needs. In this past decade, half of post-disaster borrowing from World Bank is reserved for the housing reconstruction. New programs including insurance as financial instrument should involve the participation of household, community and private sector in deciding on investing in resilience (ADB, 2012). With ineffective measures, there is a need to diversify the strategies from a reactive to a proactive approach. In terms of the current insurance market trend, according to the Swiss Re (2015), non-life premium growth in the emerging markets has been supported mainly by the strong performance of emerging Asia in 2014. In the Philippines, the government is considering the introduction of a compulsory earthquake insurance pool for private residential properties.

With new modeling techniques for estimating the risks of natural disasters, the donor community can better assist the poor with the economic repercussions of disasters before they happen. Insurance instruments for transferring catastrophe risks to the global financial markets are now possible (Linnerooth-Bayer, Mechler and Pflug, 2005). In other frequently disaster-wrought countries (ex. Turkey, Caribbean and Pacific Islands), one of the risk transfer scheme being applied is the intergovernmental risk pooling, where financial risks are to be spread among a large number of contributors aiming to lower the premium cost for low income individuals and lighten the financial burden of the government. Local government units (LGUs), individuals, re-insurers and insurers pool their financial resources creating a form of cooperative insurance. This is highly recommended by World Bank to the Philippines as an archipelagic nation with dispersed population around coastal areas.

1.2 Research Gaps or Academic Contribution

Research on post-disaster reconstruction is a relatively new theme with rapid development potential. In the review of post-disaster reconstruction researches by Yi and Yang (2014), past literatures focused mainly on identifying problems or issues and transitioned to recent works on theory- building using more quantitative calculations. Major growing research themes found dealt with stakeholder analysis and reconstruction approaches, which involved decision-making in these different reconstruction approaches. The review paper concluded that the emerging trend is to integrate the concepts of sustainability and resilience in future studies to better understand the system. One recommendation is to improve the assessment of the system's capacity to be resilient and to provide proactive goals in future planning. Sustainability considerations should be integrated not only in new project deliverables but also during the processes of reconstruction planning to be able to reduce vulnerability and improve the community preparedness in face of future disasters.

In the more specific aspect of post-disaster housing reconstruction, Peacock, et al. (2007) suggested that quantitative multivariate analysis of future, existing, and historical datasets should be undertaken in the temporary to permanent housing continuum and should include displacement as subject to research. Consequently, this research will deal with understanding both rebuilding-relocation decisions using a quantitative approach. Secondly, further research investigation emphasized the need to assess the financial resilience of decision-makers in the household-level (Rose, 2009). Hence, the paper focused on micro-level analysis on how to improve the financial capacity of households. Lastly, Birkmann et al. (2008) argued that extreme disasters have the potential to change dominant ways of thinking and acting in the societies and organizational structure due to increasing

complexity in decision-making unlike low-impact disasters. Hence, this will provide additional empirical reference to the limited but currently growing literature on documenting social recovery after extreme disasters. These identified research gaps were attempted to be linked in this study.

1.3 Research Objectives

Based on these defined research gaps as motivation, the main goal of this research was to develop the conceptual framework for post-disaster housing residency behavioral decision-making in the context of financial resilience and temporal choice through empirical investigation of communities in the Philippines. For the success of future housing recovery programs, understanding how and why certain residency patterns are formed is essential (whether to reconstruct in their original community or to relocate in another area).

More specifically, the study sought (1) to determine the factors that significantly affect the rebuilding-relocation decisions over time by comparing cases of rebuilding-relocation approaches in the Leyte and Manila (Chapter 4 – Behavioral Mechanism Modeling); (2) to examine the challenges encountered by analyzing if the program assistances matched the needs of the beneficiaries (Chapter 5 – Evaluation of Housing Recovery Program); and (3) to assess the feasibility or the willingness of the community to participate in a proposed risk sharing property insurance program (Chapter 6 – Solution-testing). It is important to note that the objectives incorporated the retrospective and prospective timeframe analysis in the micro-scale household level which addressed the research gaps mentioned in the earlier section.

In summary, the study aimed to answer the following research questions:

- What factors (ex. financial risk transfer, socio-economic, risk perception, etc.) trigger and support the rebuilding-relocation temporal decision-making measured through reconstruction duration (start and completion time and transfer rate)?
- What problems can be identified by evaluating which assistances can be attributed to the level of beneficiary satisfaction?
- How does changing the insurance policy attributes (i.e. premium, service provider and assessment system) and household characteristics affect the willingness to participate (to purchase or not and actual willingness-to-pay) of the households in risk sharing property insurance scheme?

1.4 Structure of the Paper

The dissertation was designed to follow the typical introduction, methods, results, and discussion (IMRaD) structure. Chapter 1 elaborated on the background of the study and explained the general and specific objectives of the research. Next, Chapter 2 outlined the reviewed literatures related to the fields of post-disaster reconstruction, cognitive-social psychology and resettlement or migration studies focusing on finding the missing links. Furthermore, Chapter 3 was intended to provide the overview of the materials used for data collection and methods for analysis. Chapter 4 tackled the results of the first survey with the primary objective of determining

the factors affecting the reconstruction rate, while Chapter 5 sought to identify the challenges or problems encountered. Next, Chapter 6 presented the results of the survey for the discrete choice experiment. Lastly, the results will be summarized and integrated in Chapter 7 emphasizing the main research output, academic significance and practical implications of the study.

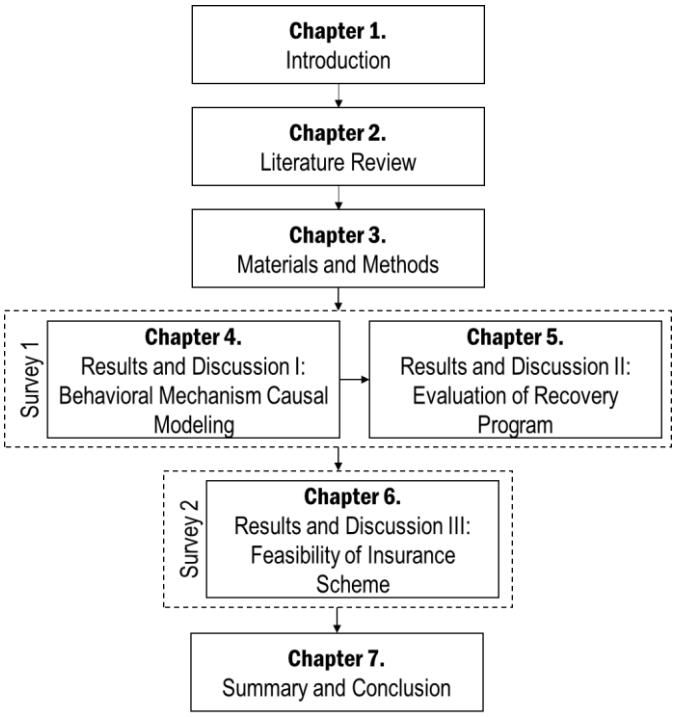


Figure 2. Structure of the Dissertation

2. REVIEW OF RELATED LITERATURE

Overview

Based on reviewing the research developments and missing links related to the fields of post-disaster reconstruction, cognitive-social psychology and migration studies, three main research gaps were outlined. First, review papers argued that there is lack of research on systems to assess the financial resilience in the household-level decision-makers and highlighted the need to shift the focus on less conventional approach in measuring resilience to capture the effect of processes of social, cultural and psychological elements. Furthermore, past researches claimed that existing research neglects the temporal context of resilience indicators which include unique characteristics of place, and suggested quantitative multivariate analysis of datasets in different timeframes involving permanent housing reconstruction and relocation. Lastly, literature emphasized that there is an increasing complexity in decision-making after extreme disasters compared to low-impact events and that existing behavioral theories have limited application in developing countries where cultural characteristics are different than developed nations. These were the main arguments that the rationale of the research was anchored on.

2.1 Post-disaster Housing Reconstruction Studies

Housing reconstruction is one of the most important activities during the post-disaster reconstruction phase. In their work on post-disaster housing recovery, Peacock et al. (2007) argued that "without re-establishing homes, the ability of a household to carry out normal activities is hampered." Hence, ensuring that houses are quickly and safely reconstructed is a crucial factor to successful recovery and greater resilience to future disaster risks. In this specific aspect, recovery programs can consider the strengths and weaknesses of different housing reconstruction approaches which include on-site rebuilding and off-site relocation projects. Moreover, based on the review paper about post-disaster reconstruction research (Yi and Yang, 2014), decision-making in these identified approaches is one of the emerging research trend recently being explored. Hence, research on how and why certain housing residency patterns are formed can be further investigated.

There are various approaches to housing reconstruction. Examining the case of Gujarat, India, Barenstein (2006) was able to identify 5 different approaches to housing reconstruction: (1) owner-driven or self-recovery cash-based approach, (2) subsidiary housing approach, (3) participatory or community-driven housing approach, (4) on-site contractor or donor-driven approach and (5) off-site contractor driven approach. Among these approaches, on- and off-site contractor-driven approaches were the most widely used in housing reconstruction projects (Wu and Lindell, 2004).

However, housing reconstruction usually perpetuated situations of vulnerability, failing to promote recovery and development (Lyons, 2009). Analyzing the strengths and limitations of the contractor and owner-driven

approaches, Karunasena and Rameezdeen (2010) found that the level of beneficiary satisfaction (based on parameters of durability, functionality, beneficiary preference inclusion and location) was generally higher in the owner-driven approach. Although the contractor-driven approach is often considered more effective and efficient, it typically leads to the construction of houses that do not respond to the specific needs of the beneficiaries.

Following this, recent studies have pointed out the need for greater community participation in housing reconstruction. Bouraoui and Lizarralde (2013) conducted a study in Tunisia to examine the merits of a post-flood reconstruction project characterized by a high level of centralized decision-making, in terms of beneficiary satisfaction and organizational structure. The study found that decentralized decision-making can optimize the efficiency of local stakeholders, promote the participation of end-users, and redistribute the responsibilities and risks among the involved parties. Similar studies found that the level of satisfaction of the beneficiaries is not only affected by project performance (Lizarralde et al., 2009), but also by community participation (Davis, 1981; Barenstein, 2008). In a more general sense, project management literature has also suggested that the interaction of beneficiary satisfaction and the critical success factors in projects should be further explored (Belassi and Tukel, 1996).

Apart from community participation, there are various other challenges to housing reconstruction based on the series of post-disaster case studies. Following the 2004 Indian Ocean Tsunami, the permanent houses provided by the national government to Indonesian victims were of low-quality, expensive, and culturally inappropriate. The houses were also unequally distributed, and had ineffective designs (Steinberg, 2007; Sadiqi et al., 2012). On the other hand, housing recovery in Sri Lanka after the 2004 disaster faced challenges relating to high NGO competition, inaccessible relocation sites, and inconsistent buffer zone policy and implementation (Boano, 2009). Kennedy et al. (2008) also argued that community involvement, better understanding of organizational capacity and having long-term planning were essential in order to implement the 'build-back-better' principle for both the cases of Indonesia and Sri Lanka. Furthermore, after the 2008 Wenchuan earthquake in China, housing reconstruction programs experienced problems with resourcing, poor management, and internal and external conflicts among stakeholders (Lu and Xu, 2014). Lastly, following the 2011 Tohoku Earthquake and Tsunami, relocation projects encountered difficulties in the communities reaching consensus decisions, given the differences in opinion among beneficiaries. (Shiozaki, 2013). Ryo (2012) also noted the challenges related to safety, housing design and function, harmony with the environment, history and culture, guaranteeing employment, fund procurement and delays in the housing reconstruction after the earthquake.

Past studies also described factors that can ensure the success of post-disaster housing reconstruction projects. Oliver-smith (1991) emphasized site selection, settlement layout, housing and participation as crucial issues in the success or failure of resettlement projects after examining resettlement cases from Turkey, Peru and Guatemala. Meanwhile, Chang et al. (2010) claimed that multi-stakeholder collaboration and the development of policies for market flexibility, government intervention and donor management played a critical role in addressing challenges for the cases of China, Indonesia and Australia. More importantly, based on a comprehensive literature review, Ismail et al. (2014) outlined some critical success factors for post-disaster housing recovery projects, which include transparency and accountability, appropriate policy, clear definition of goals, trust, community capacity-building and participation, coordination, government support, political-cultural needs, safety and security,

resource availability, time management, organizational competency and planning (Ophiyandri et al., 2013; Ahmed, 2011; Wardak et al., 2012).

In the Philippines, disaster induced resettlement projects after Tropical Storm Washi in 2011 were bombarded with challenges on lack of integral disaster management measures as reactive response, lack of clear guidelines for housing reconstruction, land acquisition, household security, and lack of community involvement due to the top-down approach of the agency-driven reconstruction type (Carrasco, Ochiai and Okazaki, 2016).

2.2 Application of Existing Frameworks or Theories to Disaster Management

In order to describe the behavioral mechanism of post-disaster housing reconstruction decisions, the study attempted to integrate relevant theories from cognitive and social psychology to crisis management and migration studies to develop the main constructs of the framework. This included incorporating the key theories of psychosocial cognitive individual decision-making in the context of community resilience and resettlement studies.

Past literature emphasized that there is an increasing complexity in decision-making after extreme disasters compared to low-impact events (Birkmann et al. 2008). Furthermore, based on the review article of Ejeta, Ardalan and Paton (2015), the application of behavioral theories to disaster management is mainly from developed countries. The usefulness of the results in developing countries is yet to be clearly examined due to the different cultural characteristics. Moreover, most studies also did not explain how the different behavioral constructs or elements influence each other. It has been suggested to describe the interdependencies of the psychological concepts using structural equation modeling instead of the traditional regression models. More specifically to resettlement studies, the behavioral theories had incorporated climate change-induced migration in past studies of Kniveton et al. (2011) and Smith (2014).

2.2.1 Individual Behavioral Decision-making

Theory of Bounded Rationality

The theory argues that the rational approach is often inappropriate, because of bounded rationality (limited time and mental capacity, information, and resources). Moreover, this becomes more complicated with the inclusion of personal and social constraints on the individual. The influence of bounded rationality constraints become more prominent for decisions where selection is non-repetitive, poorly defined and with non-programmed procedure for finding a solution.

Theory of Planned Behavior

This theory was developed from the theory of reasoned action. Based on Ajzen (1991), the theory expounded on the psycho-social concepts as motivational factors towards the achievement of the actual behavior including components of (1) attitude or personal judgment based on experience (degree to which a person has a favorable or unfavorable evaluation of the behavior), (2) ability or perceived behavioral control (perceived ease of

performing the behavior) and (3) social or subjective norms (perceived social pressure to perform the behavior or not). This has been extended to more recent models such as the integrated behavioral model where additional predictors were proposed.

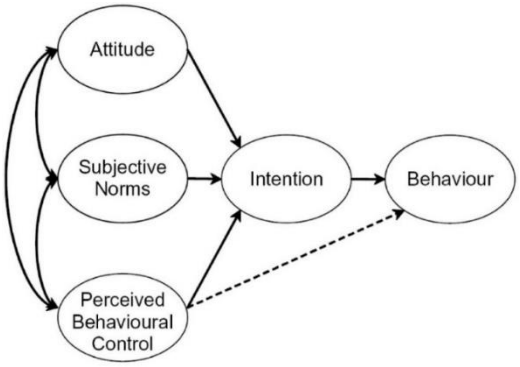


Figure 3. Theory of Planned Behavior (Ajzen, 1991)

Integrated Behavioral Model

The integrated behavioral model (IBM) or Integrative Model of Behavioral Prediction, developed in the early 2000s, is a general theory of behavioral prediction that proposes that intentions as function of attitudes, subjective norms, and perceived agency control are the primary determinant of behavior. (Fishbein, 2000 and IOM 2002) Four additional components directly affect behavior involving environmental constraints, knowledge and skills to perform the behavior, salience of the behavior, and habit. In this study, only the environmental constraints or external effects were considered. In this study, the behavior is defined as the temporal rate of reconstruction. Moreover, as a retrospective observational study, the factors are directly modeled to the actual behavior instead of the intentions as what was attempted in the migration study of De Jong et al. (1986).

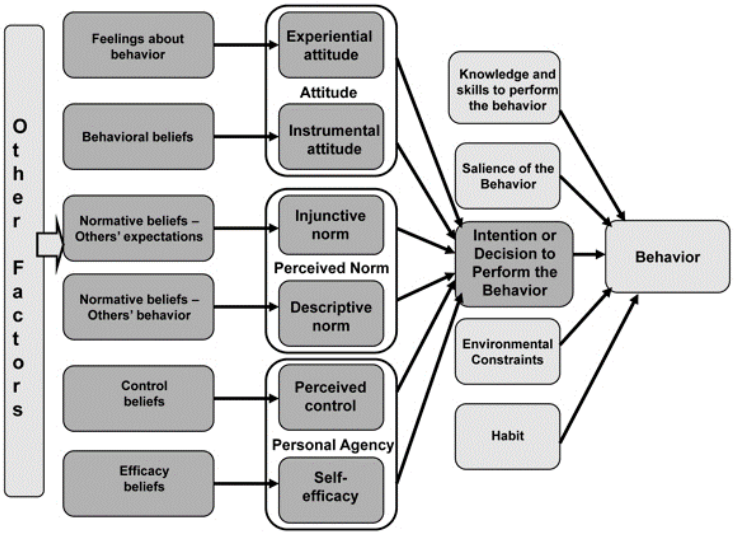


Figure 4. Integrated Behavior Model (Fishbein, 2000 and IOM 2002)

Behavioral Belief or Health Belief Model

This model was initially developed as a structural style for the expression and prediction of health and preventive behaviors in the 1950s by social psychologists in the U.S. Public Health Service (Hochbaum, 1958 and Campbell, 2001). The main principle is that the likelihood for individual behavioral change is influenced by (1) individual beliefs on trade-offs of benefits and barriers, (2) modifying factors and (3) cues to action. For this research, this theoretical framework is used to describe the effect of these factors to the willingness-to-participate in insurance systems.

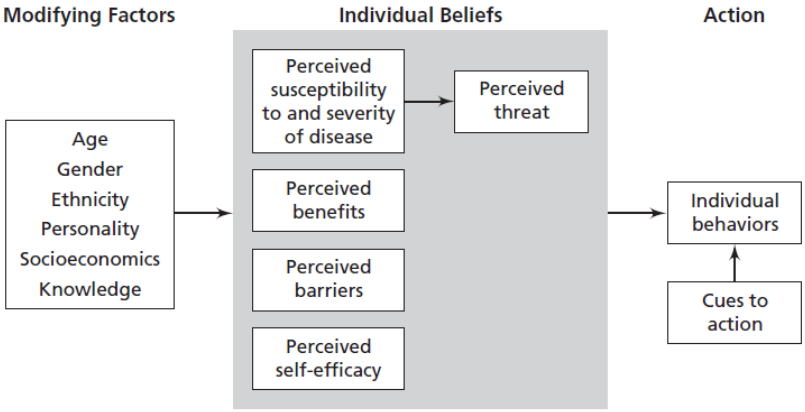


Figure 5. Health Belief Model (Glanz et al. 2002)

Social Cognitive Theory

Social Cognitive Theory (SCT) by Bandura (1986), explains human behavior as dynamic, reciprocal model in which personal cognitive factors, environmental influences, and behavior constantly interact. A basic principle is that people learn not only through their own experiences, but also by observing the actions of others and the outcome of those actions. Some elements of behavioral change include expectancies, self-control, observational learning, reinforcements, emotional coping responses and reciprocal determinism.

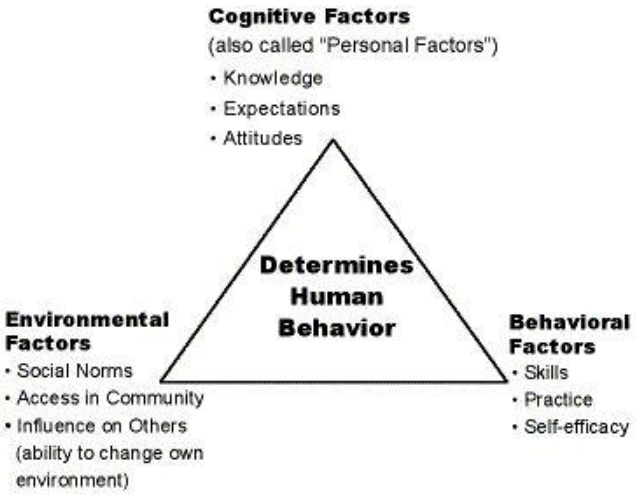


Figure 6. Social Cognitive Theory (Bandura, 1986)

Cultural Theory of Risk

Based on the work of Wildavsky and Dake (1990), the cultural theory of risk deals with classifying the risk attitude into mainly 4 types- fatalist (risk avoiding attitude and passive management type; generally follows rules of a larger hierarchical entity but not social groups), hierarchist (risk-accepting and controlling; generally follows rules and social beliefs); individualist (risk-seeking individuals with adaptive management type) and egalitarian (risk-aversive types with preventive management strategy).

2.2.2 Migration

Migration Decision-making Conceptual Model

Adapted from a conceptual model devised by De Jong and Fawcett (1981) and revised by De Jong (2000), the migration process have three major stages including: (1) the propensity to migrate, (2) the motivation to migrate to a specific location, and (3) the actual decision to migrate. The migration process begins with individuals and household members in the context of a given culture and society, represented by the community in which they live. The decision about who will migrate, when and where to move is steered based on the household strategy in improvement of the quality of life. Furthermore, the household decision is influenced not only by individual and household characteristics but also by the sociocultural environment in which the household members live. Social and cultural norms are important because they provide the context in which people might perceive the desirability of migration. Moreover, social norms can play a role in deterring migration behavior by emphasizing the importance of sense of place and community bonds. On another hand, political and economic instability may cause people to rethink this commitment to the place.

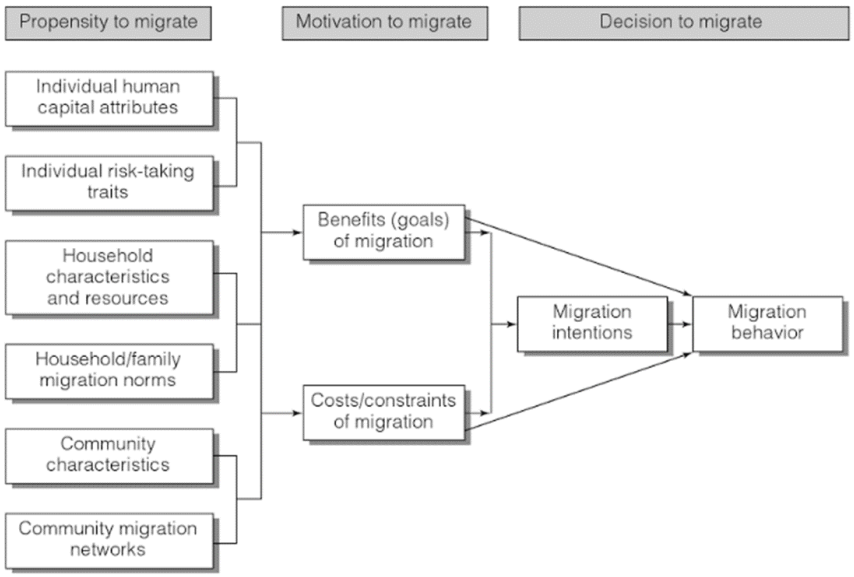


Figure 7. Conceptual Model of Migration Decision-making (Adapted from De Jong and Fawcett, 1981)

Adaptation Stages to Involuntary Resettlement

Migration progresses in the temporal and spatial contexts (Malmberg 1997) as defined against thresholds of distance and time period (Cwerner 2001). Due to the complexity, an interdisciplinary approach was strongly argued in recent papers in understanding the migration mechanism. Scudder and Colson (1982) suggested that adaptation to involuntary resettlement follows four stages: (i) recruitment; (ii) transition; (iii) potential development; and (iv) incorporation. Among the different stages, the present study focuses on the potential development stage, on which displaced families start to rebuild their economy and social networks.

Push-Pull Framework

This model by Lee (1966) frames migration as driven by set of push factors operating from the origin such as poverty or unemployment, and pull factors functioning from the destination (ex. better income and good environmental and living conditions). There is also a set of 'intervening obstacles' which have to be overcome (ex. physical distance, cost of making the journey and cultural barriers). Moreover, personal factors serve a role in which different people will react differently to various pushes and pulls due to their personality and economic status.

2.2.3 Resilience and Recovery Models

Disaster Resilience of Place (DROP) Model

Developed by Cutter et al. (2008), the DROP model was designed to improve comparative assessments of disaster resilience at the local or community level. Variable sets for measuring community resilience include ecological, social, economic, institutional, infrastructure and community competence dimensions. The model starts with antecedent conditions, which involve processes within social, natural, and built environment systems. Antecedent conditions interact with the hazard event characteristics. Next, the disaster impact is the accumulation of the antecedent conditions, event characteristics, and coping responses. Lastly, the degree of recovery ranges from high to low (ex. if absorptive capacity is not exceeded, higher recovery rates are achieved faster) which can then lead to improvements in resilience capacity by mitigation or preparedness measures. This framework is integrated with the behavioral theories in creating the study design which structured the linkages of the research elements in this research.

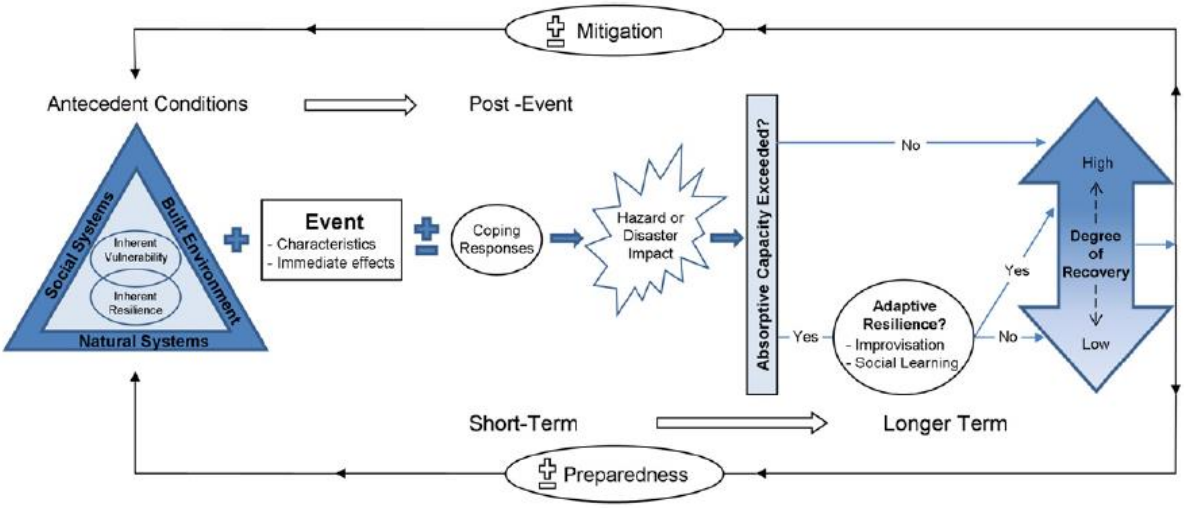


Figure 8. Disaster Resilience of Place (DROP) Model (Cutter et al. 2008)

Risks and Reconstruction Model for Resettling Displaced Population

From the paper of Cernea (1997), this model identified key risks and impoverishment processes in relocated population including – landlessness, joblessness, homelessness, marginalization, food insecurity, loss of access to common property resources, increased morbidity and community disarticulation (disperses and fragments communities and social network for forced displacement case).

Simulation Model of Urban Disaster Recovery and Resilience

In the technical report done by Miles and Chang (2007), the model simulated the dynamics of recovery of households, businesses and community after a disaster. It emphasized on recovery time paths, spatial disparities and linkages of community sectors. In the study, household recovery was influenced not only by housing damage but socio-economic attributes such as income level, business recovery level and loss and restoration of critical lifelines or infrastructures.

2.3 Financial Aspect in Post-disaster Reconstruction

Review papers argued that there is lack of research on systems to assess the financial resilience in the household-level decision-makers (Rose, 2009) and highlighted the need to shift the focus on broader less conventional approach in measuring resilience to capture the effect of processes of social, cultural and psychological elements (Jones and Tanner, 2015). In line with this, the overarching sustainability issue that the study tried to address was the financial vulnerability among developing countries following large-scale disasters. Especially in highly exposed developing countries, governments frequently lacked the liquidity of state assets, even including international aid and loans, to fully repair damaged assets or provide adequate support to household or business recovery. Public sector financial vulnerability is defined as the degree to which a public authority or government is likely to experience a lack of funds for financing post-disaster reconstruction investment and relief (Mechler et

al. 2006). If the government had sufficient financial reserves, insurance coverage, or can easily raise capital through its budget or borrowing, then it is financially resilient to the disaster. However, if the government cannot cover the anticipated losses due to high asset risks, a financing gap may occur.

The most apparent policy recommendation consequently had been to fill the financial resource gap with foreign aid (Easterly, 1999) which has its advantages and disadvantages. Based on the study of Raschky and Schwindt (2009), foreign aid can have two opposing effects (preventive and crowding) on the recipient nation's disaster preparedness. First, aid flows can have a preventive effect by directly or indirectly improving the preparedness of the nation against natural hazards. Second, as human reaction to exogenous disaster events is driven by incentives, foreign aid received in the past increases the predictability of future relief and induce decision-makers to avoid responsibilities by reducing protective measures. This large amount of aid will likely worsen the sustainable development of vulnerable regions to large scale disasters as crowding-out effect. In the findings of the study, crowding-out effect of foreign aid overshadows the preventive effect in the case of storms, while there is mixed evidence in the case of floods and earthquakes. In addition, Riddell (2014) suggested that aid can ironically harm by focusing on short-term aid to work better rather than assessing how aid can contribute to the recipient's own future development goals. Improving knowledge about how assistance can contribute to strengthen development outcomes can reshape the prevailing aid model based on two recommendations: (a) donors need to align strategy to the country's development goals, and (b) aid can be allocated based primarily on results that can be monitored (Bourguignon and Sundberg, 2007). It must also be noted that the prediction of the volume of humanitarian aid that will be given is precarious. In the paper of Olsen, Cardtensen and Hoyen (2003), it was revealed that the volume of emergency assistance any humanitarian crisis attracts is determined occasionally by media, security interests of donors and the presence and strength of humanitarian stakeholders. Furthermore, Rashky and Schwindt (2010) suggested that the choice of the aid channel and type of disaster assistance was mainly determined by strategic interests and transaction costs.

Based on the World Bank (2005) study, presently the Philippine government and individual households bear the majority of costs caused by natural disasters. More effective options (ex. catastrophe insurance pool) for financing disaster risk and relieving the burden of disasters from the public sector should be explored. The study found that the insurance coverage for catastrophic perils for residential dwellings is almost non-existent despite the high hazard risk in the Philippines. In addition, there is a limited risk bearing capacity of the domestic insurance market and an over-dependence on international reinsurers for paying capacity of claims. In a more recent study of Portula and Vergara (2013), the insurance penetration in year 2012 was only 1.42% of gross domestic product (GDP).

2.4 Temporal Aspect of Disaster Resilience

The research is focused on incorporating the aspect of time in reconstruction as a measure of the resilience in the household-level. Past researches claimed that existing research neglects the temporal context of resilience indicators (Cutter, Boruff, and Shirley, 2003) which include unique characteristics of place including hazard characteristics, social and biophysical factors (Cutter et al., 2008; Füssel, 2007; Godschalk et al., 2004). With this line of reasoning, Peacock et al. (2007) suggested quantitative multivariate analysis of datasets in different timeframes involving permanent housing reconstruction and relocation. Furthermore, community resilience

occurs across scales that are interdependent of the national, state and county scales (Paton and Johnston, 2006). Existing national and regional-level studies may be insufficient for local-level resilience analysis due to lack of attention to community needs which hinders the effective resource allocation (Berke and Godschalk, 2009). For a complete community resilience assessment, resilience indicators quantification and analysis should consider multi-scalar, temporal and spatial perspectives (Adger, Arnell, and Tompkins, 2005; Birkmann, 2007).

On the aspect of temporal decision-making, the prevailing framework of perceptual decision making upholds that time is used for collecting evidence about the stimulus for the decision (Gold and Shadlen, 2007). This proposal is corroborated by the fact that with the progression of time, the uncertainty about the decision in behavioral studies of decision making steadily decrease until they reach an asymptote (Ratcliff and McKoon, 2008). Next, Ariely and Zakay (2001) highlighted the aspects where time and decision-making are interwoven – temporal perspectives of decisions, time as medium which decisions take place, time as a resource and a contextual factor and time as a commodity. Lastly, decision-makers also display delay discounting where people behave as though readily consumable goods are more valuable or better alternative than those that they can receive only after some delay in delivery (Luhmann, 2009).

3. MATERIALS AND METHODS

Overview

Empirical case studies from two cities in the Philippines were chosen – (1) Tacloban City, Leyte Island (storm surge caused by super typhoon Haiyan last 2013 focusing on relocation cases) and (2) Muntinlupa City, Metro Manila (extreme flooding caused by Typhoon Ketsana last 2009 focusing on rebuilding cases). In these project sites, housing reconstruction approaches were identified and compared – (a) owner-driven on-site rebuilding in Leyte, (b) owner-driven on-site rebuilding in Manila and (c) off-site relocation sites in Leyte. Next, the study design was divided into two parts which involved retrospective causation analysis to housing recovery decisions and the prospective feasibility testing of insurance as a proposed solution implemented through mixed method approach. For the first section, semi-structured paper-based questionnaires (n_1= 575) were administered last March 2015 and 2016 in these regions through two-stage cluster sampling to determine the factors affecting housing recovery rate. This was supported by key informant interviews of community leaders and government officials. Extensive literature review with regards to models of individual decision-making, concept of local or community-based resilience and theories of migration was done to establish the variables to be measured. Furthermore, statistical analyses including structural equation modeling (SEM) as core methodology were performed to explore the relationships of the variables and compare the different case sets. Finally, for the latter section, solution-testing was carried out in Manila case through the discrete choice experiment (n_2=201) to assess the feasibility of a proposed risk-sharing property insurance plan. It was designed through the insurance preference questionnaire by pairwise comparison of 5 insurance types (existing private company insurance, hypothetical community insurance, hypothetical government public insurance, hypothetical public-private risk-sharing with regular appraisal and hypothetical public-private risk sharing with index parametric appraisal system) with 3 attributes (service provider, premium and appraisal or assessment type) in which discrete choice logit modeling was used. These techniques were implemented with the use of commercial statistical software programs.

3.1 Case Study Site Selection

Muntinlupa City, Metro Manila and Tacloban City, Leyte Island were both selected as project case study sites to capture both the in-situ reconstruction case and off-site temporary and permanent relocation. The heavy-rainfall type Typhoon Ketsana in 2009 caused the inland flood inundation in Metro Manila, while the high forward wind speed type Typhoon Haiyan brought the storm surge in the area which damaged and destroyed several housing structures. Both typhoons were considered to be extreme events in terms of the high return periods. In addition, with regards to the system of area classification of the urban areas in the Philippines, the region is composed

mainly of cities, which are divided into communities (barangays) under the jurisdiction of local government unit (chairman), which are further delineated into villages/ subdivisions/ housing sites usually with non-governmental homeowner's associations formed by the households. The sites were surveyed in clusters based on the existing shelter options and community characteristics.

Table 1. Comparison of Case Study Sites

Study Sites	Metro Manila	Leyte
Residency Type	Rebuilding at Original Residence	Rebuilding at Original Residence and Relocation to New Resettlement Units
City	Muntinlupa	Tacloban
Hazard	Typhoon Ketsana, 2009 (Flooding) High Rainfall Amount	Typhoon Haiyan, 2013 (Storm Surge) High Forward Wind Speed
Return Period	150 years (NHRC, 2009)	200 years (GIZ, 2014)
Estimated Damaged Houses	4,500	25,000

3.1.1 Muntinlupa City, Metro Manila Study Site: Typhoon Ketsana Experience

On 26th of September 2009, Tropical Storm Ketsana (local name: Ondoy) hit the Manila metropolitan area or Metro Manila with a precipitation amounting to 347.5 mm rainfall in only six hours and totaled 448.5 mm after twelve hours. This rainfall amount was the highest in the country's forty-year record. The rainfall volume resulted in extensive flood with high water level height making it extremely devastating. An estimated worth of damages to property and infrastructure reached PhP 2 billion (US$43.5 million) and left more than a million Filipinos homeless.

The Putatan community (barangay), Muntinlupa City, found in the southern portion of Metro Manila**,** was selected as the project site for the study. It is one of the 9 communities in Muntinlupa City with a total land area of 6.75 square kilometers. In 2011, it has a population of 91,577**.** The households are composed of Middle Class (26 subdivisions) and Low Income groups (8 Informal Settler Groups and 5 Socialized Housing Sites)**. (**Muntinlupa City Planning, 2012**)** The project area also has two seasonal variations, summer (January to May) and rainy season (during June to December). The whole Muntinlupa experiences an average annual rainfall of 1822.8 mm.

After the 2009 flooding, the survey areas near Laguna Lake were reconstructed through on-site owner-driven self-help approach. Flood level reached more than 1 meter in most areas in which housing damage varies dependent on proximity to the water body or elevated road and storm water drainage functionality level. Most of the respondents stayed in the evacuation centers (i.e. elementary schools or churches) and received financial assistance and construction materials for shelter repair. Others chose to stay in the upper floors of their house and used small improvised boats to travel around. Most of the communities visited were also experiencing flooding

repetitively in a year, twice a year on average. In this survey, low income and mid to high-income households living in low-risk or high-risk zones were included in the targeted respondents.

3.1.2 Tacloban City, Leyte Island Study Site: Typhoon Haiyan Experience

Tacloban City is classified as highly urbanized serving as the trading hub for Leyte Island and the larger Eastern Visayas region (City Government of Tacloban, 2014). It has the biggest airport and the three largest universities in the region, as well as seven major hospitals. With these, Tacloban's night-time population of 221,174 (National Statistics Office (NSO), 2010) usually doubles in the daytime due to the influx of workers, businessmen, students and visitors. However, it is important to note that most of these developments are concentrated on the southern coast of Tacloban, with the north coast being far less developed. The city has a land area of 201.72 sq. km. and is divided into total of 138 communities (NSO, 2010).

On 8th of November 2013, as one the strongest typhoons ever recorded, Typhoon Haiyan (local name: Typhoon Yolanda) struck the Philippines, with severe human and economic consequences. With wind speeds exceeding 300 km/h, Typhoon Haiyan is the most powerful storm to have made landfall in the history of the Philippines. The storm prompted storm surges of over four meters in some regions. Nearly 6,300 people died and a further 4.1 million people were estimated to be displaced. The storm affected the country's poorest regions and was projected to increase national poverty incidence by 1.9 percentage points, in which almost a million of people fell into impoverishment.

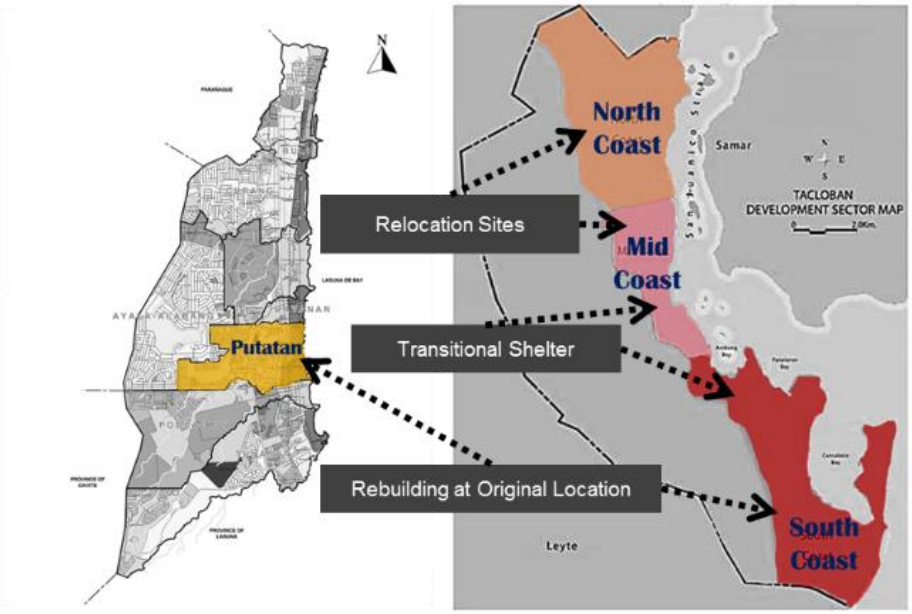


Figure 9. Case Study Site Maps indicating Shelter Options for Manila (left) and Leyte (right) (edited by authors, source: Muntinlupa City Government and Tacloban City Government)

3.2 Case Study Site Characteristics

3.2.1 Coastal Land Use Policy

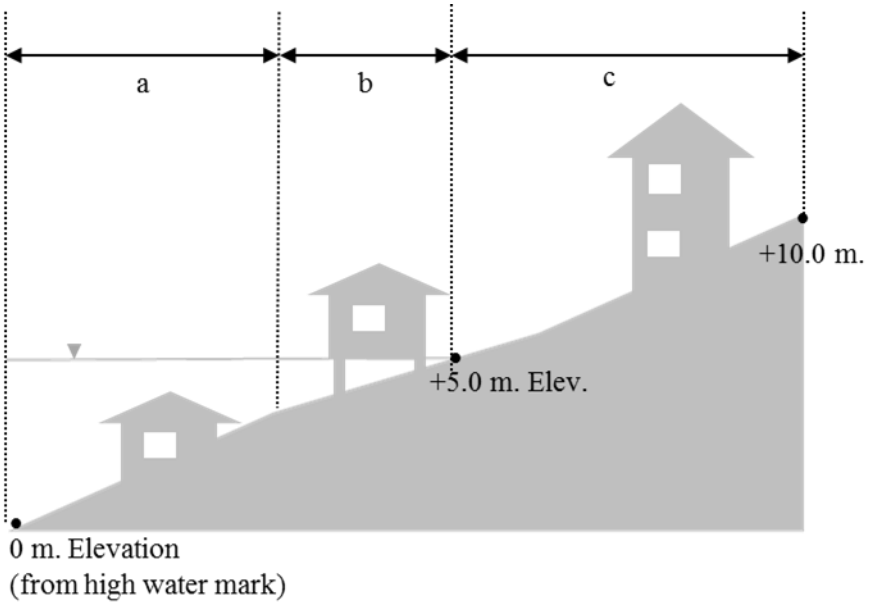
The coastal land use policy of the government defined the No Dwelling Zone (NDZ) in Tacloban City which prohibits building of residential houses as defined in Figure 4. This incited the need to provide massive housing reconstruction programs in the region for relocation sites of internally displaced population. Many of the poorest communities in Southeast Asia are coastal and dependent on fishing and other marine resources for their livelihood. Having no build zone policies prohibits resettling at the coastline and leads to a loss of livelihood for these communities (Perez et al. 2013).

Based on the recent rehabilitation plan of Tacloban City, the "No Dwelling Zone" policy bans all houses, hotels or hospitals from the area, although the provision allows some tourism, port and recreational activities to take place. Furthermore, the construction of any buildings (i.e. commercial, residential or industrial) on land that is lower than 5 meters above the high water mark is restricted to low density and low-rise developments (City Government of Tacloban, 2014). Coastal zones along the bays and San Juanico strait have been designated as recreation zones and will be replanted with mangroves for protection as a strategy to increase resilience.

For all this to happen, it is necessary for those presently living in areas close to the sea to be relocated. A number of permanent relocation projects are currently underway, with a target of more than 10,000 new houses (City Government of Tacloban, 2014). Such reconstruction not only removes people away from danger, but also improves the quality and condition of the houses. The new permanent houses that are being built (largely made of concrete with a steel roof) are generally superior to the wooden houses that were typically present in informal settlements, in accordance to the "Build Back Better" principle.

Table 2. Development of Coastal Land Use Policy in Tacloban City

Timeline of Policy Revisions	**Zoning Designation**	**Regulation**
Early Recovery Stage- March 2014	(a) 40 m. as No Build Zone (NBZ)[1]	(a) Rebuilding any structure is banned inside the NBZ.
April 2014- September 2014	(a) No Dwelling Zone (NDZ) inside Unsafe Zone set initially at 40 m. buffer distance until multi-hazard map is ready[2] (b) Unsafe Zone excluding NDZ[2] (c) Safe Zone[2]	(a) No residential structure is allowed. This zone is only for specific industries or businesses. Buffer distance is initially set at 40 m. until multi-hazard map from the national government agency is finished by May 2014. (b) Elevation is not yet specified. Policy mandated further risk assessment for (b) and (c).

October 2014 onwards	(a) NDZ as specified in multi-hazard map from government agency[3] (b) Unsafe Zone excluding NDZ but land elevation is below +5.0 meters from high water mark[4] (c) Safe Zone for areas with land elevation greater than +5.0 meters[4]	(a) No residential structure is allowed. This zone is only for fishing industry, port- and tourism-oriented businesses. National government agencies provided multi-hazard maps. (b) The zone is designated for low density and low rise developments only. Rebuilding is allowed as long as the structure is elevated to more than +5.0 meters from the high water mark (as advised by the national government). (c) Safe zone is designated for regular development and mid-rise buildings.
Diagram		

[1] (Philippine National Government- Department of Environment and Natural Resources (DENR), 1976; De Vera, 2013; DENR Region VIII, 2013)
[2] (Presidential Assistant for Rehabilitation and Recovery (PARR), March 14, 2014; Department of Science and Technology (DOST), May 20, 2014;)
[3] (Department of Environment and Natural Resources (DENR) et al., November 5, 2014; Lapidez et al., 2014; DOST-Project NOAH Multi-Hazard Map, 2015)
[4] (City Government of Tacloban, October 2014)

3.2.2 Location-based Reconstruction Approaches

Reconstruction approaches were observed based on preliminary site reconnaissance and based on information from key contact persons from International Emergency and Development Aid (IEDA) Relief Philippines (Leyte) and Putatan community officers (Manila). The on-site reconstruction where the residents rebuilt their house in the original communities mostly aided by external assistances both in Leyte and Manila. Unfortunately, shelter assistances were misallocated and distributed to non-targeted residents which triggered rebuilding of houses even inside the no dwelling zone. Next, the off-site relocation sites only in Leyte which were composed of the community-driven, contractor-driven and transitional shelters. The community-driven relocation (NGO-funded) was where beneficiaries were asked to collaborate with the donor agency in the construction as sweat equity (labor

requirement). Larger families were also prioritized in the selection. On the other hand, the contractor-driven relocation (government-funded) was characterized by the beneficiaries coming from bunkhouses or transitional shelters and are selected by drawing lots. It must be highlighted that the type of internal migration in the area transitioned from identifying it initially as forced relocation to impelled/ reluctant migration in which residents in the high risk zone were just encouraged or urged to move. Further explanation about these approaches per location is described in the following section.

After Typhoon Haiyan, government and non-government organizations provided a number of shelter options to the affected communities throughout the various stages of the recovery process, depending on whether or not they were originally located in "safe zones" or "no dwelling zones" (Department of Social Welfare and Development (DSWD) et al., 2014). The shelter options included tents and evacuation centers (short-term), bunkhouses and transitional shelters (medium-term), and permanent housing in the original settlements or relocation sites (long-term) (City Government of Tacloban, 2014). Like bunkhouses, transitional shelters also accommodated households from "no dwelling zones" awaiting permanent relocation. However, while bunkhouses were essentially wooden row houses, transitional shelters consisted of single, detached native houses. Transitional shelters were also often situated within proximity of the permanent houses to which residents would be relocated. Most affected households moved into these bunkhouses and transitional shelters, although some families opted to temporarily move in with their relatives instead.

Permanent relocation was only offered to households originally living in the no dwelling zones (NDZ). As there are numerous government agencies and NGOs offering various forms of housing assistance, the Tacloban City Housing Office acted as a coordinator during beneficiary selection to prevent the duplication of efforts. Still, these agencies and organizations ultimately applied their own processes and set of criteria for choosing target beneficiaries, based on their respective program objectives. Processes usually included beneficiaries writing letters to NGOs and/or drawing lots, or local officials endorsing a list of households in need of housing assistance to agencies and organizations. On the other hand, while selection criteria varied to a certain extent, vulnerability was often taken into account, thus giving preference to families with elderly, pregnant women, lactating mothers and children. (Ong et al. 2016)

In terms of housing design, government agencies and NGOs both complied with the revised minimum housing design standards set by the Department of Public Works and Highways (DPWH) after Haiyan. To ensure that permanent housing designs are typhoon-resilient, DPWH now requires one-storey infrastructures to withstand a wind load design criterion of 250 kilometers-per-hour (Regala, 2014). As a result, all permanent houses are now built as concrete structures with steel roofing. Moreover, in line with the Build-Back-Better principle, the standard housing design recommends stronger foundations and larger structural elements (e.g. reinforcements, beam and columns), with better connection details (Regala, 2014; Philippines Shelter Cluster, 2014b).

After preparing the reconstruction plans and housing designs, national government agencies and NGOs again coordinated with the City Housing Office to help to secure the necessary permits required during the pre-construction phase. The total combined target number of housing units is 14,433 although only a very small fraction has been completed as of March 2015. At the same time, 1,027 and 627 families are still residing in bunkhouses and transitional shelters, respectively.

Table 3. Summary of Short-, Medium- and Long-term Shelter Options in Tacloban City

Characteristic	Short-term	Medium-term	Long-term	
Housing solution	Evacuation center, tents	Bunkhouses, transitional shelters	Permanent housing	
Purpose	Emergency sheltering with temporary sleeping arrangements	Temporary sheltering for those awaiting permanent relocation	Rebuilding of homes in original locations (on-site reconstruction)	Permanent relocation in safer locations (off-site relocation)
Beneficiaries	Evacuees from all communities	Residents of "no dwelling zones"	Residents of "safe zones"	Residents of "no dwelling zones"
Funding/ implementing organization	• Tacloban city government (evacuation centers) • NGOs (tents) • National government: • DSWD (camp coordination and management)	• NGOs (transitional shelters) • Tacloban city government (land, basic services) • National government: • DPWH (bunkhouses) • DSWD (community organization)	• NGOs (materials, labor) • National government: • DSWD (Emergency Shelter Assistance)	• NGOs (housing units, construction training) • Tacloban city government (land, basic services) • National government : NHA (land developmen t, housing units)

Note: DSWD = Department of Public Works and Highways, DSWD = Department of Social Welfare and Development, NHA = National Housing Authority (Quarantelli, 1982; Peacock et al, 2006; Tacloban City Office 2014)

Figure 10. Photographs of Shelter Options by the Authors (a) Tents immediately after disaster (photo taken last December 2013), (b) Tacloban City Convention Centre served as Evacuation Center (photo taken last December 2013), (c) Government-funded (National Housing Authority) Bunkhouses (taken last September 2014), (d) Cali

Transitional Houses (taken last March 2015), (e) Owner-driven On-site Reconstruction Housing in Magallanes (taken last March 2015), (f) Community-driven Off-site Relocation Units in Santo Nino GMA Kapuso Village (taken last March 2015), and (g) Contractor-driven Off-site Relocation Housing in Cabalawan NHA-Ridgeview Park (taken last March 2015)

Manila-Rebuild: Owner-driven On-site Reconstruction (Muntinlupa: Putatan)

The Putatan community is situated in the southern part of Metro Manila and bounded by the Laguna Bay in the east which supposedly acts as a flood retention basin from the Manila Bay. Due to its proximity to the water body, the stretch of coastline is usually inundated especially when a strong typhoon hits the region. After the typhoon, some households return to their original residence, rebuilt or repaired and applied housing countermeasures such as elevating the housing floor and changing to flood-proofing structural materials.

Leyte-Rebuild: Owner-driven On-site Reconstruction (Tacloban: Magallanes)

The Magallanes area is composed of mostly informal settlements built along the coastline of Barangay 52, 54 and 57 in the South Coast of Tacloban City. The community consists of around 750 families in total, of which 53 families participated in the interview survey. Since most of the area formerly inhabited by the community is now classified as a "no dwelling zone" by the National Government, the rebuilding of houses is being discouraged. However, many residents have still opted to return to rebuild their wooden houses around the area on a self-help basis. Hence, this case was defined as "owner-driven", as residents were essentially in control of the rebuilding process of their own houses (Karunasena and Rameezdeen, 2010). The case is also considered as "on-site", as the residents rebuilt their houses in the same place where they stood prior to the arrival of typhoon Haiyan.

Leyte-Relocate: Community-driven, Contractor-driven Relocation and Transitional Shelters

- *Community-driven or Participatory Off-Site Relocation (Tacloban: NGO-funded Housing)*

Global Media Arts (GMA) Kapuso Foundation Housing is a permanent relocation site that is being constructed in Barangay 106 (Barangay Name: Santo Niño) in the North coast of Tacloban. GMA's residents originally come from the NDZ of the coastal community of Barangay 88 (Barangay Name: San Jose), about 24 km to the south. They are usually large families made up of 7 or more individuals, in line with GMA's specific criteria for beneficiary selection. GMA Kapuso Foundation Housing features concrete row houses with a floor area of 42 sq. m. The houses were mainly constructed by private contractors with funding from one of the country's largest TV networks, GMA. Nonetheless, beneficiary households were also able to participate in construction via a sweat equity agreement that requires them to provide 500 hours of construction work. The case is thus "community-driven", as communities were not only consulted or informed by the donor, but also had control and participation over the project through empowerment processes and collaboration with the managing organization (Davidson et al., 2007). The case is also considered "off-site", as it involves relocation to an area away from where the

beneficiaries lived before the typhoon arrived. However, as of March 2015, most of the houses were still under construction and only 106 out of the 400 target number of units had been completed and occupied. There were 52 beneficiary households who participated in the interview survey.

- *Contractor-driven off-site relocation (Tacloban: NHA Ridgeview Government-funded Socialized Housing)*

Ridgeview is also a permanent relocation site located in Barangay 97 (Barangay Name: Cabalawan). It is one of the National Housing Authority's (NHA, a government agency), 13 project sites for Tacloban city residents. The NHA has engaged with private contractors for the implementation of its concrete row housing design across all project sites. Thus, this case is referred to as "contractor driven", as housing reconstruction is entirely handled by the donor-agency concerned, from inception to the point when the houses are handed over to the recipients (Karunasena and Rameezdeen, 2010). Each unit has a floor area of 22 sq. meters, with a further provision of 11 sq. m of loft space (as a "second floor"). However, as of March 2015, only 17 out of the 1,000 target units had been completed and occupied. The residents of Ridgeview also originally come from San Jose (Barangay 88), which is about 21 km south of the site. Due to the limited number of occupants and respondent availability at the time of the survey, only 12 samples out of the 17 completed households were interviewed.

- *Transitional Shelters (Tacloban: Abucay Bunkhouse, Cali Cabalawan)*

The transitional shelters were medium-term shelter options before the final permanent relocation. These were located away from the city center and nearby the planned relocation sites. Mostly, the housing materials used were of light to medium heavy materials (nipa huts to semi-concrete houses) with stilts foundation. The donor agencies encouraged starting to build community engagements and proper camp management (usually monitored through score sheets which can be used for prioritization of households to be transferred to the permanent relocation sites).

3.3 Study Design

Based on the key elements found by the integration of the disaster resilience of place (DROP) model of resilience and behavioral theories adopted for post-disaster housing recovery in the built environment, the first section of the study was generally designed to show how (1) internal system of pre-existing housing recovery capacity, (2) external coping responses and (3) impact or result of disturbance affect the housing residency decisions temporally. A list of variables to be measured through the survey focusing on retrospective causation analysis for housing recovery was proposed. This section attempted to integrate individual behavioral decision-making models and theories of migration or resettlement studies with the concept of local and community-based resilience (as presented in the literature review section).

After which for the latter section, assessing the prospective tendency to change the household financial behavior, solution-testing of the risk sharing property insurance scheme follows as future resilience strategy. The main

groups of variables were derived from the learning process framework and health belief model. The specific variables and the methods applied were further discussed in the succeeding separate chapters.

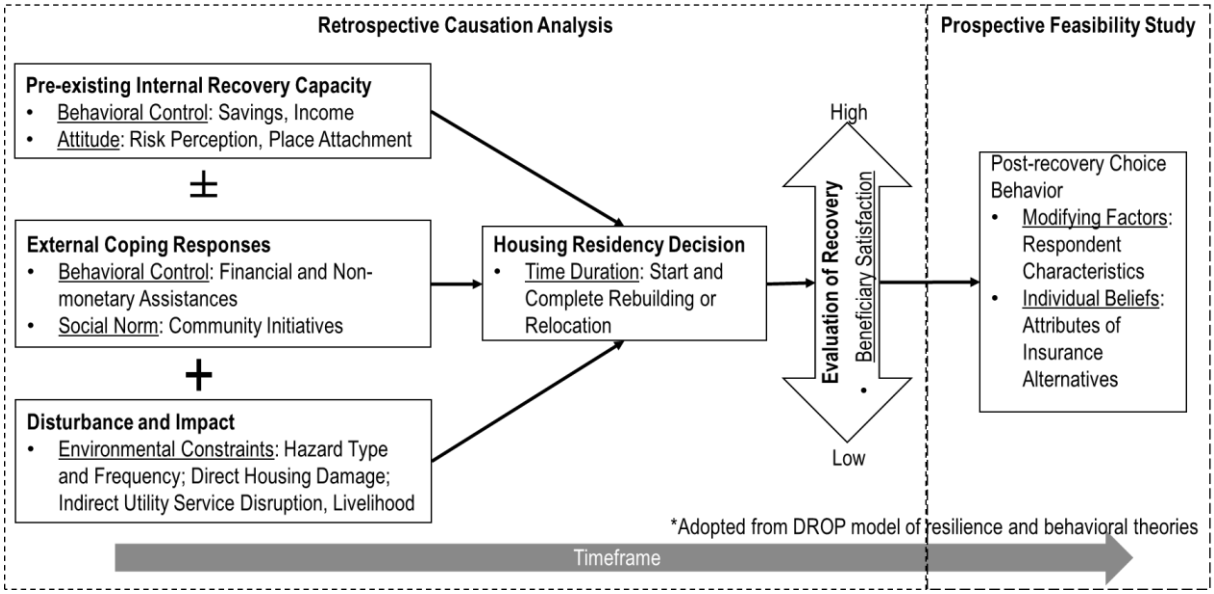


Figure 11. Study Design with Proposed Measured Variables

3.4 Data Collection

3.4.1 Social Survey 1: Determinants to Housing Reconstruction Decisions

The study selected the mixed method approach in achieving the objectives. For the quantitative section, semi-structured paper-based questionnaires (n_1=575) for the household respondents included inquiries on (1) disaster experiences, (2) residency behavioral pattern history (both rebuilding and relocation cases), (3) assistances received whether monetary or non-monetary types, (4) individual shelter decision-making, (5) community decision-making, (6) risk attitude and (7) socio-economic profile. Questionnaires were administered by face-to-face interviews in both case study sites last March 2015 and a follow-up survey last March 2016. Two different questionnaires for on-site reconstruction case (rebuilt houses in initial housing location) and off-site relocation case (moving out of the community) were administered in Metro Manila and Leyte Island. The research was conducted through multiple-case embedded case study design with retrospective time of study using two-stage cluster sampling to cover the available reconstruction approaches. Sample requirements were checked with the minimum sample size recommended by Taro (1967). This primary data collection was supported by key informant interviews of community leaders, NGO, intergovernmental organizations and government officials. Moreover, validity was cross-checked with open-ended questions, multiple sources from key informants and pilot-testing. Furthermore, main contact persons in the Leyte Island were the representatives of the IEDA Relief Philippines, an internationally-affiliated NGO working on providing livelihood training programs for the community survivors. Through the assistance of IEDA, information about the available household clusters to be surveyed was obtained. The fieldwork in Leyte Island was also implemented with a group of Graduate Program in Sustainability Science (GPSS) researchers including Professor Miguel Esteban and Ms. Ma. Laurice Jamero (GPSS Student). Meanwhile,

for the Metro Manila case, community officers, village leaders and personal contacts in the communities were directly approached for the arrangements of the survey. Data gathering of secondary data and key informant interviews were also applied in the study site after accomplishing the household survey.

Table 4. Sample Size Distribution for Reconstruction-Relocation Decision-making Questionnaire (Total Samples=575)

Reconstruction Approaches	Leyte	Manila	Remarks
1. On-site Reconstruction (outside NDZ)	169 (72)	180 (158)	Leyte: Magallanes and San Jose; Manila: Putatan Community
2. Off-site Relocation	226	-	Leyte: GMA Kapuso and Gawad Kalinga (Community-driven); NHA Ridgeview Park (Contractor-driven) and Operation Compassion Site, Abucay Bunkhouse, Cali Cabalawan (Transitional Shelters)

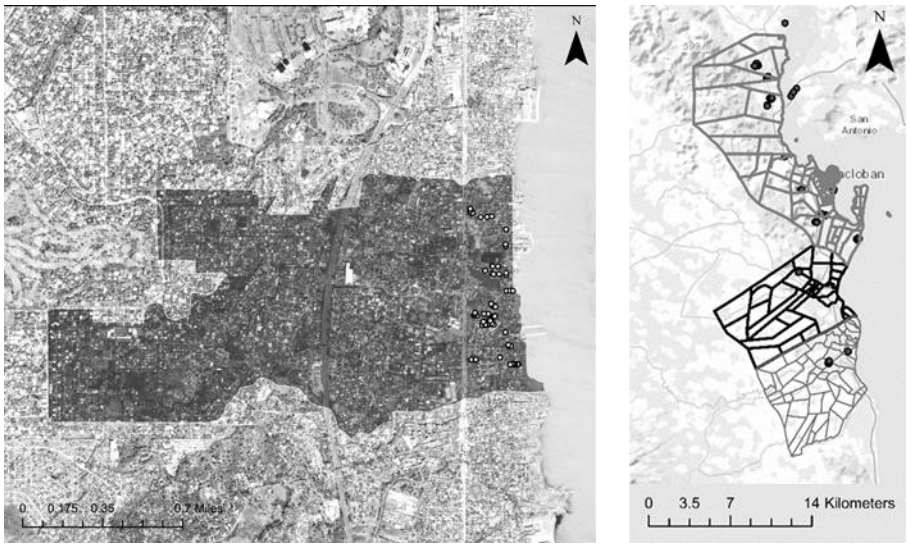


Figure 12. GPS Coordinate Points Plot of Houses Interviewed - Manila: Left, Leyte: Right (Source: Topographic Map from ESRI, GPS coordinated from authors, Boundaries from Local Government Units)

Table 5. List of Institutions Visited for Key Informant Interviews and Secondary Data Collection

Institution	Designation	Purpose
Muntinlupa City, Metro Manila		
Putatan Community-level Local Government	Local Government Officers (Barangay Secretary and BDRRM Representative)	March 20, 2015: Key Informant Interview and Data Collection (maps, types of assistance received)
Tacloban City, Leyte Island		
Tacloban City Government	City Housing Office and City Disaster Risk Reduction and Management (CDRRM) Office Representatives	March 19, 2015: Key informant Interview and Data Collection (rehabilitation plan)
International Organization of Migrants (IOM)	Representative	March 17, 2016: Key informant Interview
Community Official	Barangay Captain and Village Leaders	March 18, 2015: Key informant Interview

3.4.2 Social Survey 2: Feasibility of Risk Sharing Disaster Insurance

Last September 2-30, 2015, the household field survey using semi-structured paper-based insurance preference questionnaires conducted by personal face-to-face interviews was facilitated in Putatan Community located in the southern part of Muntinlupa City, Metro Manila. A total of 201 samples were obtained through systematic sampling from the cluster groups of the following target respondent criteria: (1) owns the house (not renter), (2) family budget decision-maker or knowledgeable about the family finances and (3) lived in the current house since 2009 Typhoon Ketsana. This fieldwork was intended to determine how households protect themselves financially from the flood losses brought about by typhoon flooding (measure the willingness-to-participate in a national disaster assistance housing recovery insurance program). This is to accomplish the second objective of my research, which attempts to test the feasibility of a proposed solution to enhance financial resilience of the communities – national property risk sharing insurance program. The questionnaire is composed of 3 sections: (1) Risk Perception, (2) Actual Choice Experiment and (3) Socio-economic Profile. The fieldwork was also implemented with the clearance or permission of the local community officer ("Barangay Secretary") and with the assistance of 7 hired survey personnel or enumerators. Village leaders in the communities were also directly visited for the arrangements of the survey.

The study investigated the viability of introducing a regional disaster risk property insurance scheme to household agents or decision-makers characterized by a tripartite agreement (private company, government and the homeowners) by measuring the willingness-to-participate and modeling its dynamics with socio-demographic variables, hazard frequency and risk perception. Choice experiment using pairwise comparison was performed among 5 different insurance policies as choice sets – (1) existing private company insurance, (2) existing community group insurance, (3) hypothetical government public insurance (4) hypothetical tripartite insurance

with regular appraisal and (5) hypothetical tripartite insurance with index-based assessment with 3 defined attributes (service provider, yearly premium and assessment or appraisal system).

Table 6. Sample Size Distribution for Choice Experiment (Total Samples=201)

Risk Level/ Income*	Low Income	Mid to High Income	Total
Low Flood Risk	39	40	79 (39%)
High Flood Risk	87	35	122 (61%)
Total	126 (63%)	75 (37%)	201

Note: Low Flood Risk: less frequent than once a year;
Low Monthly Income: Less than PhP20,000 (based on MORES study)

3.5 Data Analysis

3.5.1 Multivariate Analysis of Determinants to Housing Recovery Decisions

For the first set of results, statistical analysis was employed using statistical software package (SPSS v20 and STATA v13). For checking for sample selection biases, with regards to comparison of case groups (i.e. rebuilding and relocation cases in Leyte and Manila), independent samples t-tests or one-way analysis of variance (ANOVA) were used dependent on the number of case groups to be compared. Moreover, principal component analyses were performed to structure the data collected into groups or dimensions which were interpreted and used as basis of sets of indicators of latent variables. As a guide in the selection of the variables, to model the interaction of multiple independent variables to the dependent variables (reconstruction time-scale duration which included start or trigger of rebuilding and completion duration and relocation transfer duration from the onset of the typhoon), backward stepwise regression analysis was performed. Lastly, structural equation modeling (combining confirmatory factor analysis and multiple regression) as the main analytical technique was used to model the interaction of latent or not directly observed variables (based on principal components) with the independent variables using the plug-in extension, SPSS Analysis of Moment Structures (SPSS AMOS).

Next, backward stepwise regression was again performed for the beneficiary satisfaction as dependent variable tested with the independent variables related to program assistances. This is to check if the beneficiary needs matched the program outputs examining the effectiveness of the recovery measures available. Details of these techniques will be discussed in the next chapters.

3.5.2 Discrete Choice Experiment

For the latter section of solution-testing, logistic regression was used to find the interaction of the household socio-demographic variables to the dichotomous choice of purchasing or not the insurance. Moreover, conditional logit modeling was used to observe the response of the willingness to pay (yearly premium) to the other attributes included in the experiment (service provider and assessment system types). If deemed necessary for analysis, to facilitate stratification of cases based on income level, the Market and Opinion Research Society (MORES) in the Philippines classification was utilized as the basis. The data was delineated based on the AB (high income), C1 (upper middle income), C2 (lower middle income), D and E income group levels.

Table 7. MORES Socio-economic Classification based on Monthly Income Range (Source: MORES)

Class Type	Description	Income Range (in Philippine Pesos)
E	Lower Low Income	0-10,000
D	Upper Low Income	10,001-20,000
C2	Lower Middle Income	20,001-30,000
C1	Upper Middle Income	30,001-75,000
AB	High Income	75,001 above

4. RESULTS AND DISCUSSION 1: DETERMINANTS TO HOUSING RECONSTRUCTION DECISION DURATION

Overview

The factors that triggered and support the reconstruction duration as dependent variables (i.e. time to start, transfer and finish) were determined. The integrated behavioral model was used as theoretical framework basis. For sample stratification-checking, group comparison test using one-way analysis of variance (ANOVA) and independent samples t-test verified that location-based reconstruction approaches affected the reconstruction rate which required stratification of the samples into 5 cases (i.e. Leyte-rebuild-start, Leyte-rebuild-finish, Manila-rebuild-start, Manila-rebuild-finish and Leyte-relocate-transfer). Next, in the data pre-processing stage aiming to reduce the dimension and address multi-collinearity of the multiple independent variables, principal component analysis (PCA) and stepwise multiple regression using backward elimination were employed to assist in the construction of the final model. Then, as the core method, the structural equation modeling was performed to find the not directly observable latent variables (characterized with independent variable indicators) which affected the reconstruction duration.

The final structural equation models showed that the latent constructs of (1) risk perception, (2) place attachment, (3) financial assistances, (4) rebuilding assistances, (5) relocation assistances, (6) community initiatives and (7) indirect impacts had significant and distinct influences to the time duration to decide. To discuss the linkage of these concepts to behavioral constructs, the analysis was anchored using the integrated behavioral model. First, the assistances as "behavioral control" component including financial and non-monetary assistances triggered and reinforced the rebuilding behavior in Leyte, while Manila case was not influenced significantly. The household expectancies on the behavioral outcome motivated them to rebuild and also acted as behavioral reinforcements which assisted or discouraged the behavior. Secondly, risk perception as cognitive response or "instrumental attitude" was found to affect the recovery in Leyte case as triggering factor, while place attachment as emotional-affective response or "experiential attitude", was largely affecting the Manila case. This indicated higher risk accepting behaviors of households in Manila compared to the Leyte case. Lastly, both community initiatives as "subjective norm" component and financial assistances represented significant migration drivers in Leyte.

4.1 Rationale

Chapter 4 aimed to explain the results on identifying the influencing factors to temporal reconstruction decisions based on the length of time to start rebuilding, complete rebuilding and to transfer for relocation. Two separate questionnaires were prepared in conducting the household survey for respondents who rebuilt in the original communities or relocated to another area. It generally probed on 6 key themes comprised of disaster experience,

assistances types, reconstruction and relocation household decision-making, community decision-making, residency patterns, risk attitude and socio-economic profile.

4.2 Hypothesis: Determinants to Housing Recovery Decisions

Around 50 variables to be measured in this study and potentially affecting the time it takes for housing recovery decision were gathered based on literature review. These variables were initially grouped into main categories involving assistances, community initiatives, indirect impact, place attachment, risk perception and socio-demographic variables. In terms of terminology definition taken by this research, assistances involved monetary cash or in-kind types of aid which strengthen the coping responses of the households. Community initiatives is defined as the cumulative process through which socially-connected households develop managerial and organizational capacity to increase control over the decisions affecting their lives. Moreover, indirect impacts are losses resulting from the disaster which are more complex to be measured and modeled. In this research, place attachment can be defined as the affective component of bonding that happens between the individual and the meanings they attach to the environment, while risk perception is the intuitive and subjective judgment and evaluations of the riskiness of a hazard people are exposed to. Lastly, socio-demographic variables included the respondents' individual characteristics which can potentially have mediating effect. Moreover, these variables further requires empirical evidence to support the functionality of proposed integrated framework.

Table 8. List of Literatures as Basis for Variable Pool

Variable Category	**Variables**	**Influence in Disaster Recovery**
Assistances	Financial • Information Source • Available Type • Distribution/ Eligibility • Amount • Delivery • Usage	Poor people in terms of financial and livelihood resources have limited voice or access to governing body (Wisner, Gaillard and Kelman, 2011). Formal financial products, diversity of income sources, social capital are linked to household recovery against typhoons and perceived coping ability (Hudner and Kurtz, 2015). Availability of aid, effectiveness of distribution and area coverage served to assist people stay in the affected areas in a study in Bangladesh. Moreover, In the study in US, city leaders gave financial incentives to residents to rebuild or relocate nearby (Paul, 2005). Private insurance, restored economy and spatial externalities are crucial external control factors (Peacock, Dash and Zhang, 2007; Tierney and Dahlhamer, 1997; Chang, 2001; Alesch and Holly, 1997). Assessment model for disaster recovery includes resource set which included insurance penetration, aid, household incomes, family networks, business continuity or job security (Platt, 2015).

	Non-monetary • Housing Materials • Relocation Site • Livelihood Capital	In the reconstruction in Aceh, Indonesia after the 2004 Indian ocean earthquake and tsunami, different methods of assistances were given including shelter, materials, labor, finances and technical expertise which contributed to the housing recovery (Da Silva, 2010). In a study in India, paper showed a number of issues that should be considered in policies. This includes an increase in construction costs, inaccessibility of finance for the lower income groups, delay in reconstruction of private rental housing, and the significant presence of lower income households without formal or documented housing or land tenure. (Tafti, 2015).
Community Initiatives	• Community Meeting Participation • Level of Participative Leadership • Consultation and Influence • Community Problem-solving • Government Trust • Community Consensus	Persistence, Problem-solving, Leadership, Social Networks and Engaged Governance are important components in community resilience (Berkes and Ross, 2013; Berkes and Jolly 2001; Olsson and Folke, 2001; Seixas and Davy 2008). Post-disaster recovery showed significant reliant on social networks and psychological well-being of the households. Social networks empower collective action. Social capital leads to collective and mutually beneficial thinking and actions in communities. Moreover, the role of social capital as facilitator for post-crisis recovery was proven to be the strongest predictor in 1995 Kobe earthquake (Bolin, 1976; Barton, 1969; Bates et al. 1963; Nakagawa and Shaw, 2004; Aldrich, 2011) Moreover, kin networks are likely to seek temporary shelter together, especially if all relatives became victims because of proximity in residency (Yelvington, 1997). Involvement in organizational social capital network have benefits related to resilience: improve response, organizational capacity to survive disaster and organizational capacity to assist members during disaster (Myer, 2013).
Indirect Impact	• Livelihood Self-sufficiency • Income • Occupational Change	Diversification is a typical response as a way to spread risks and mitigate damage. For slow-onset disasters, diversification of livelihood, consolidation of savings into incontestable forms, and social investment are critical while for sudden crises require savings liquidation, service labour and movement (Naik, 2007; Raleigh et al. 2008; Shipton 1990). Income, employment and assets are cited as internal factors affecting recovery (Bolin, 1976; Bolin and Bolton, 1983; Peacock, Killian and Bates 1987).
	• Electric Utility Service Disruption • Water Utility Service Disruption	Functionality of utility infrastructure, as well as availability of schools, healthcare, and social services are other requirements to achieve normalcy (Comerio, 2014). Lack of alternative housing within an acceptable distance of jobs or peers led some households to leave the Miami area after Hurricane Andrew (Dash et al., 1997). Some households remained in severely damaged units – or even condemned units – without electric power or telephone service for months (Yelvington, 1997; Morrow, 1997).
Place Attachment	• Residency Period • Native or Migrant • Age • Fishing-related Occupation • Number of Years Since House was Built	Place attachment is a key driver of community collective engagement in disaster recovery. It is composed of place identity and place dependence. (Chamlee-Wright and Storr, 2009; Airress et al. 2008; Henry, 2013; Binder, Baker and Barile, 2015; Kick et al. 2011; Sanders, Bowie and Bowie, 2004; Greer, 2015; Shriver and Kennedy, 2005; Williams and Vaske, 2003)

Risk Perception	• Housing Damage Level • Hazard Frequency • Water Level Height • Inside NDZ or Not • Perceived Safety Level • Financial Risk Attitude	Level of damages in neighborhood and broader community affect decision-making. In a study in the US, those who rebuild were affected by housing damage situation and with a lower degree, work and family circumstances. For the ones who relocate, equal interconnected factors in decision-making included family, risk and work. For the undecided, housing and work are the main drivers. (Nejat and Damnjanovic, 2012; Henry, 2013). Severity of damage and the availability of relatives nearby predict who stays with relatives, whereas income, homeownership, and availability of relatives nearby predict who accepts relatives (Morrow, 1997).
Socio-economic-demographic	• Age • Gender • Educational Attainment • Number of Family Members • House Ownership	Wealth, home ownership, education, age, gender were studied in terms of its influence in migration (Naik, 2009; Groen and Polivka, 2010; Elliot and Pais, 2006; Lu, 1999). There are significant variations among households in their housing recovery and these are correlated with households' demographic characteristics. Lower-income households tend to have higher hazard exposure because they often live in more hazard prone locations with higher physical vulnerability. They also take longer to return to permanent housing and are forced to accept temporary housing as permanent. (Peacock et al., 2006; Bolin and Bolton, 1986; Girard and Peacock, 1997; Peacock et al., 1987; Berke et al., 1993; Rubin et al., 1985)

4.3 Residency Transition Pattern among Shelter Options

Through the questionnaire surveys, it was possible to ascertain the movement of respondents from their original residences into evacuation centers or tents (short-term), bunkhouses or transitional shelters (medium-term) and permanent relocation sites (long-term), as shown in the figures.

Figure 13. Transition of Residency in Leyte (Source: Author)

After the typhoon Ketsana in 2009, residency pattern in Manila case showed that 55% of the samples decided to transfer to evacuation centers or move to other locations, while the rest chose to stay in their original houses (opted to stay in the upper floors of their houses, if possible). Only after 4 months was when most households (80%) decided to go back to their original house.

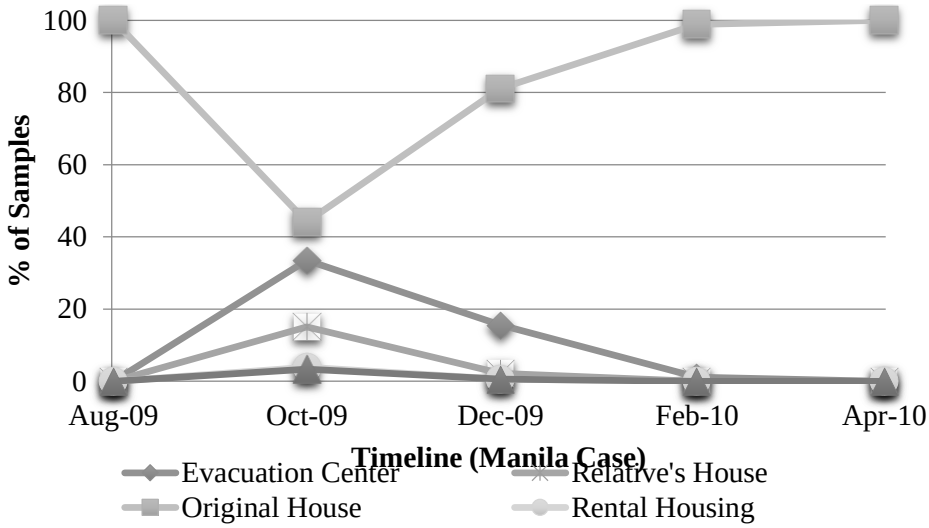


Figure 14. Timeline of Rebuilding Pattern in Manila Case

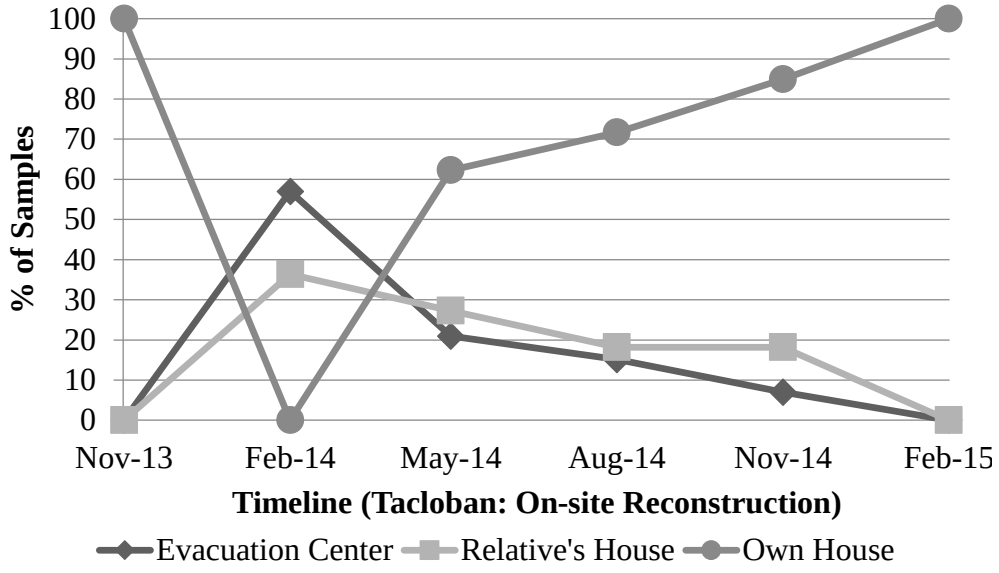
Meanwhile, at the onset of the typhoon in November 2013 in the Tacloban case, respondents from on-site reconstruction moved from their own houses to evacuation centers or tents (92%) or to their relative's houses (8%). However, it is important to note that there is uncertainty about the exact timing of this transfer due to data limitations during the immediate disaster relief period. In February 2014, about three months after the event, the households then started to leave the short-term shelter options to return and rebuild their houses at their original locations, despite these now being part of the NDZ.

Residents now living in the community-driven off-site relocation sites also left evacuation centers, tents or their relatives' houses after a three-month period. However, rather than going back to their original housing locations, they moved into transitional shelters or bunkhouses (60%), where they stayed for 9 months. Relocation to the North Coast, which is 24 km away from their original housing location, began around August 2014 once the first permanent houses were completed.

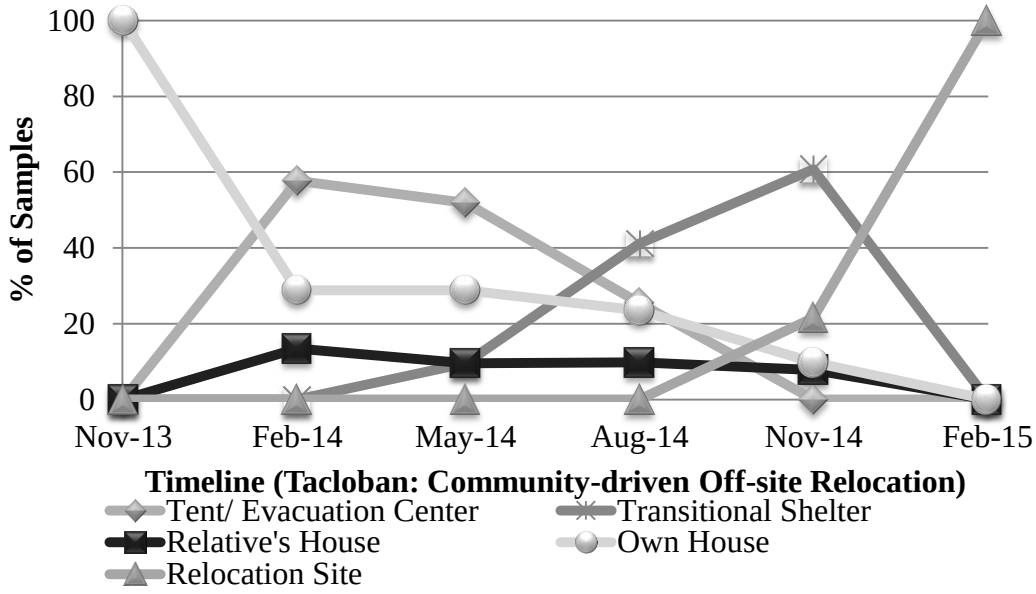
Finally, for the contractor-driven off-site relocation site, beneficiaries only began to transfer to the permanent housing units around November 2014, a year after Typhoon Haiyan struck. As of March 2015, only 17 out of the planned 1000 units have been completed and occupied, signalling delays in housing construction and overall recovery process. In comparison, the community-driven relocation site has already completed 106 out of 400 units (27%). Due to this, additional samples were surveyed last March 2016 in the contractor-driven relocation site to increase the statistical power of the data.

It is also worth noting that residents of community-driven relocation site had started to move into their housing units in August 2014, 3 months earlier than residents of the contractor-driven site, while most residents of the contractor-driven site had moved to transitional shelters (by May 2014) earlier than those of community-driven relocation site (as some residents opted to stay in tents, their own houses or their relative's houses instead). Due to the construction delays, the transfer from bunkhouses or transitional shelters was affected in which even until March 2016, most of the families were still in the transition phase in the sequence of housing recovery. According

to the key informant interviews with the community leaders, the revised plan of transfer to permanent relocation sites will be this May 2016.



(a)



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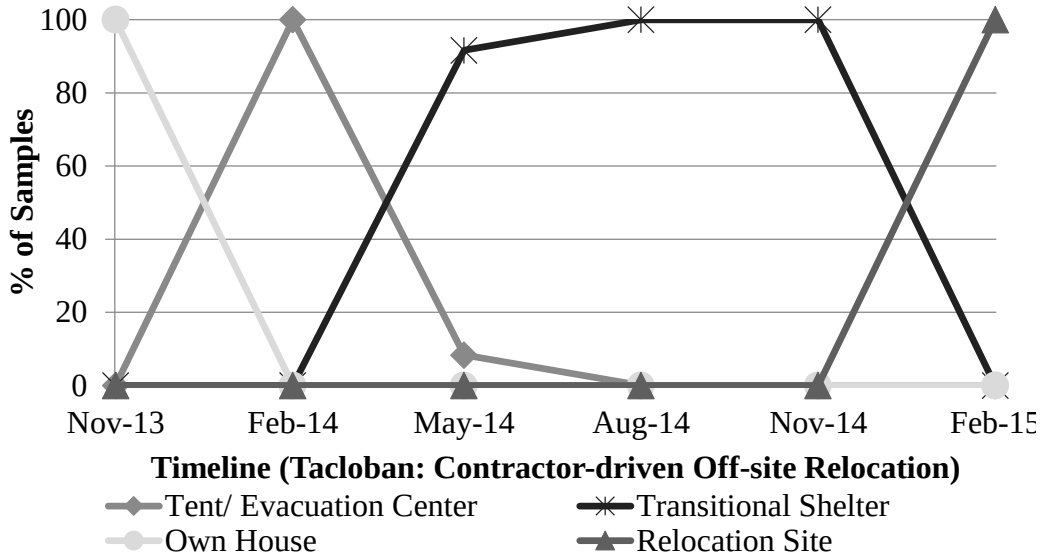

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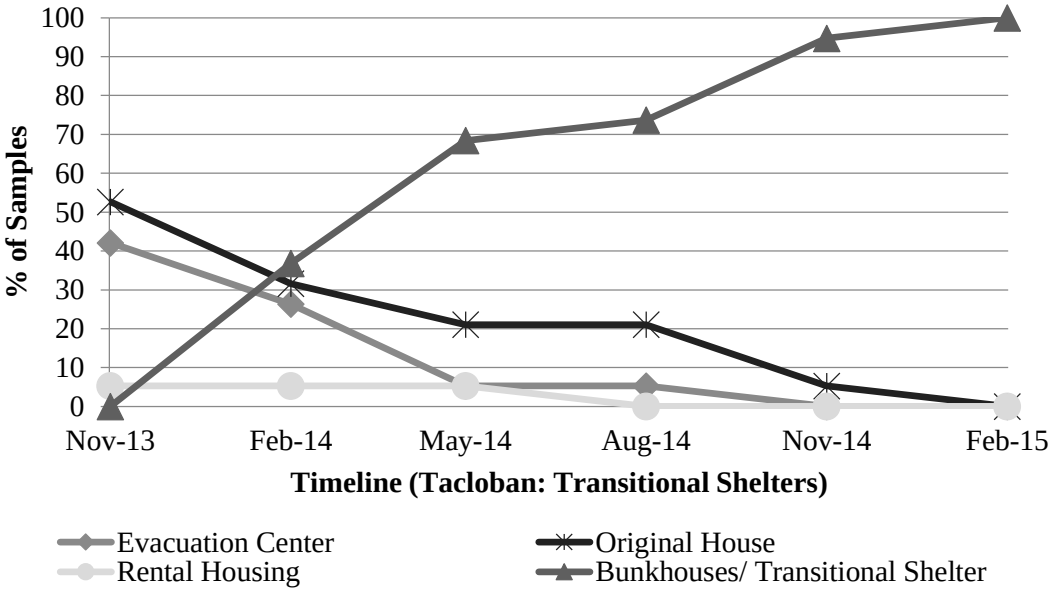


(d)

Figure 15. Timeline of Rebuilding and Relocation for Tacloban Case

4.4 Case Profiles of Rebuilding and Relocation Cases

The case groups were sampled from rebuilding case in Manila (180 samples), rebuilding case (169 samples) and relocation case in Tacloban (226 samples). The respondents were ensured to serve as the role of decision-maker or at least knowledgeable about how the family decides and were residents when the typhoon occurred in the area. Based on the MORES classification, the monthly income distribution of the respondents is shown in the figure wherein there are less low income class (PhP0-20,000) in the rebuilding case than the relocation case. Moreover,

the mean values of the number of family members were $\bar{x}_{reb}$ = 5.2 and 5.0 for rebuilding case in Leyte and Manila, respectively, which were relatively smaller than $\bar{x}_{rel}$ = 5.8 for relocation case.

In terms of age, the mean age of the respondents was 45 and 43 years old for rebuilding case in Leyte and Manila case, respectively, while 40 years old for relocation case. There were more female respondents (83% and 78% for rebuilding case in Leyte and Manila and 93% for relocation). Next, it can be observed that there were higher ownership of the house in the rebuilding case (76%) than the other group. Lastly, there were more respondents with higher educational attainment in the rebuilding case than the relocation case.

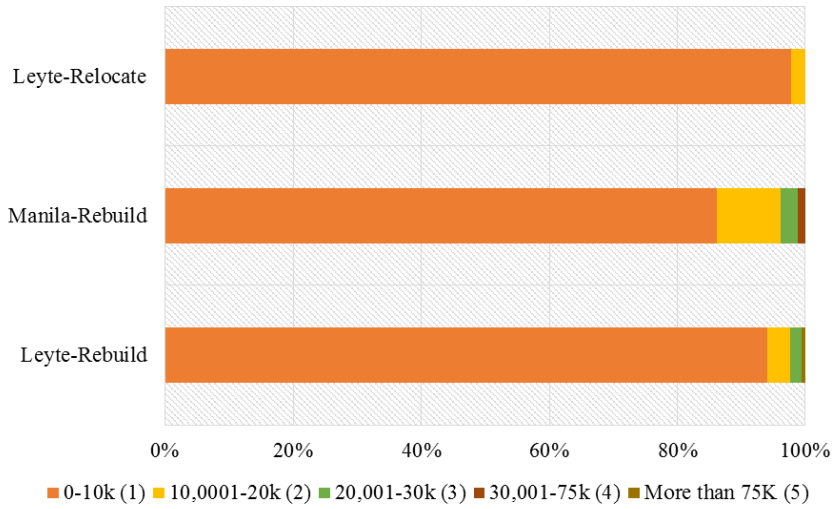


Figure 16. Monthly Income Distribution

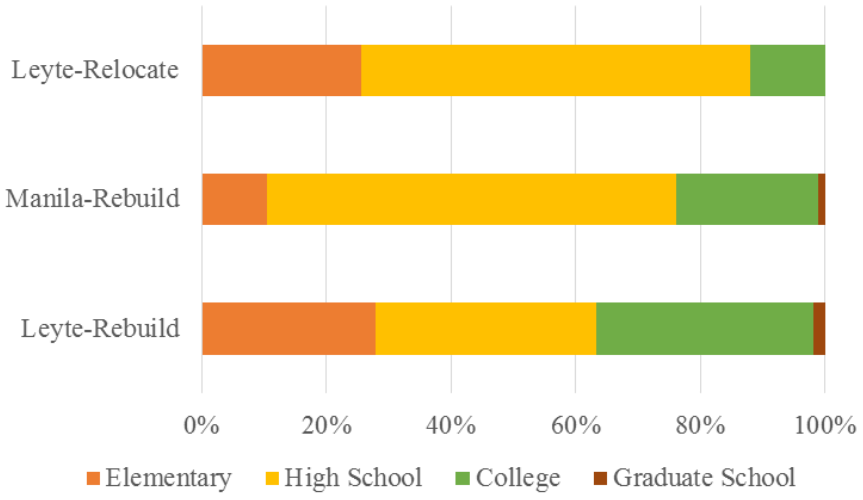


Figure 17. Highest Educational Attainment of Respondents from Rebuilding and Relocation Cases

4.5 General Observations of Variables based on Rebuilding and Relocation Cases

In this section, the distributions of the variables between the rebuilding and relocation cases were presented.

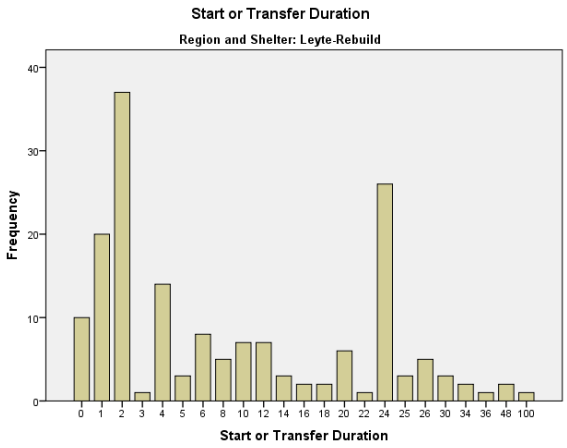
4.5.1 Dependent Variables: Reconstruction Time (Start, Finish, Transfer)

The dependent variables established in this section consisted of temporal scale values:

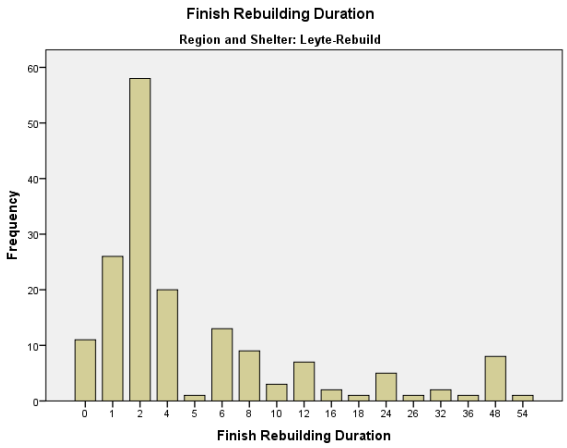
1. for the rebuilding case, (a) length of time to decide to start or trigger rebuilding from the date of typhoon and (b) duration to complete or finish the rebuilding

2. for relocation case, the time to transfer for resettlement.

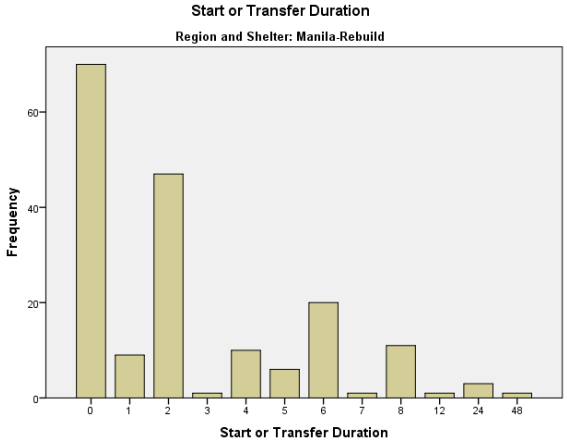
The following figure showed the distribution to the variable triggering the rebuilding and for the transfer to relocation sites. It can be observed that rebuilding was done mainly in 1-3 months with peaking after a year. While transfer to permanent relocation sites just started after a year which extended to 2 years.



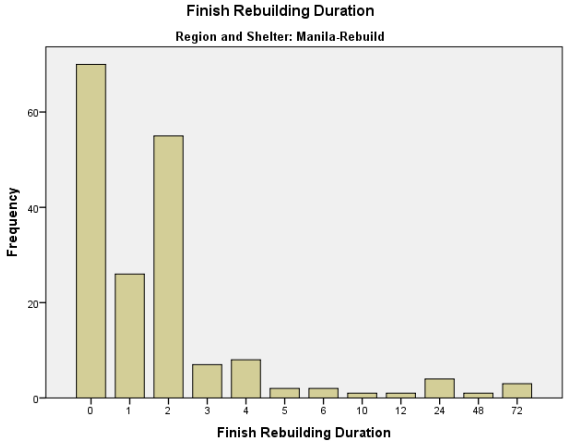
(1a)



(1b)



(2a)



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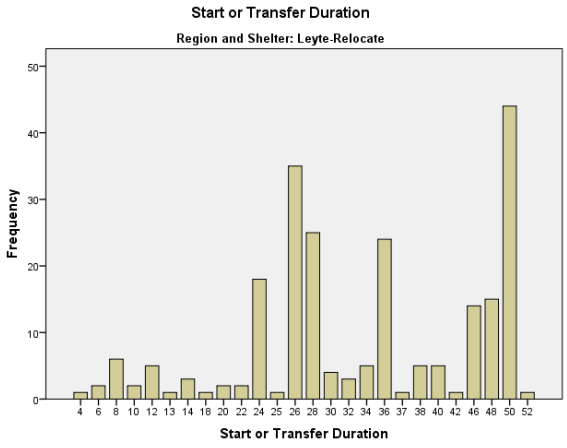


(3)

Figure 18. Distribution of Length of Time to Rebuild in Leyte (1a and 1b), in Manila (2a and 2b) and to Transfer to Relocation Sites in Leyte (3) – Note: x-axis time-scale, 2 weeks per 1 unit

4.5.2 Independent Variable: Assistance Types (Monetary and Non-monetary)

The figure outlined the types of assistances which were received in both the rebuilding and relocation cases. Respondents from all cases received a variety of assistance types. In terms of rebuilding assistances, construction materials were distributed to the households who rebuilt and for relocation assistances, relocation houses and lands who decided to relocate. Construction materials or shelter repair kits (containing plywood, lumber, galvanized iron sheet, hammer, handsaw and nails approximately, worth around US$ 400) were also provided by other humanitarian agencies (International Organization of Migrants, Oxfam International and Red Cross). However, not everyone could be relocated at the same time, and households that met a set of criteria for beneficiary selection were prioritized by government agencies and NGOs.

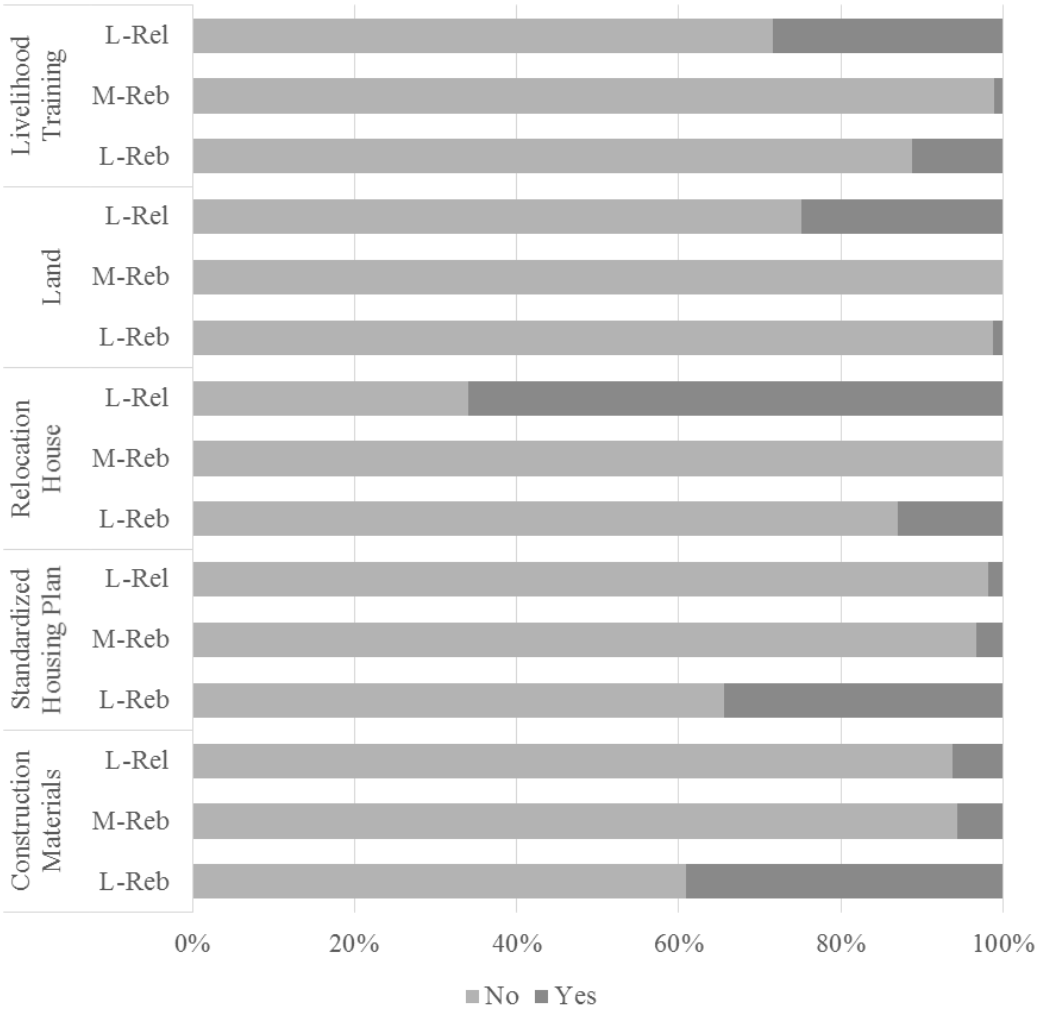


Figure 19. Types of Assistances Received
(Note: L-Reb: Leyte-Rebuild; M-Reb: Manila-Rebuild and L-Rel: Leyte-Relocate)

On the other hand, as shown in the following table and figure, financial aid was given by the government (4P Poverty Alleviation Program, Emergency Shelter Assistance and Calamity Loan) and international NGOs (Tzu

Chi Foundation via direct donations or cash-for-work and Catholic Relief Service). Aside from these formal institutions, there were also informal sources from relatives (23% for rebuilding case and 10% for relocation) and neighbours (1% for rebuilding case and none for relocation case), but these were deemed to consist only of small financial amount contribution. Respondents also relied on their personal savings (34% for rebuilding and 10% for relocation cases). In the Manila case, the informal types (personal savings, relatives) and formal types (calamity loans and private loans) were found to be present compared to mostly NGO donations and 4P program assistance in Leyte.

Table 9. Financial Assistances from Formal Institutions (based on questionnaires, online sources of donors and key informant interviews)

Sector	**Formal Institutions**	**Estimated Amount**
1. NGO	Tzu Chi Foundation[1] Catholic Relief Service (CRS)[2]	$530 $480
2. Government	Emergency Shelter Assistance (ESA) [3] 4P Poverty Alleviation Program[4] Calamity Loans[5]	$700 $55 every quarter $450
3. Private	Loan from Banks or Work	$120 - $480
Distribution Scheme: [1]Cash Assistance (CA)- through community homeowners list; Cash for Work(CFW) – debris-cleaning for 5 days, open for anyone [2]Community Homeowners List, Interview, Assessment of damage, choice of construction materials or cash [3]Assessment of damage, Interview [4]Depended on the number of children who are attending school and income level [5]Required application documents (ex. certificates for birth and employment)		

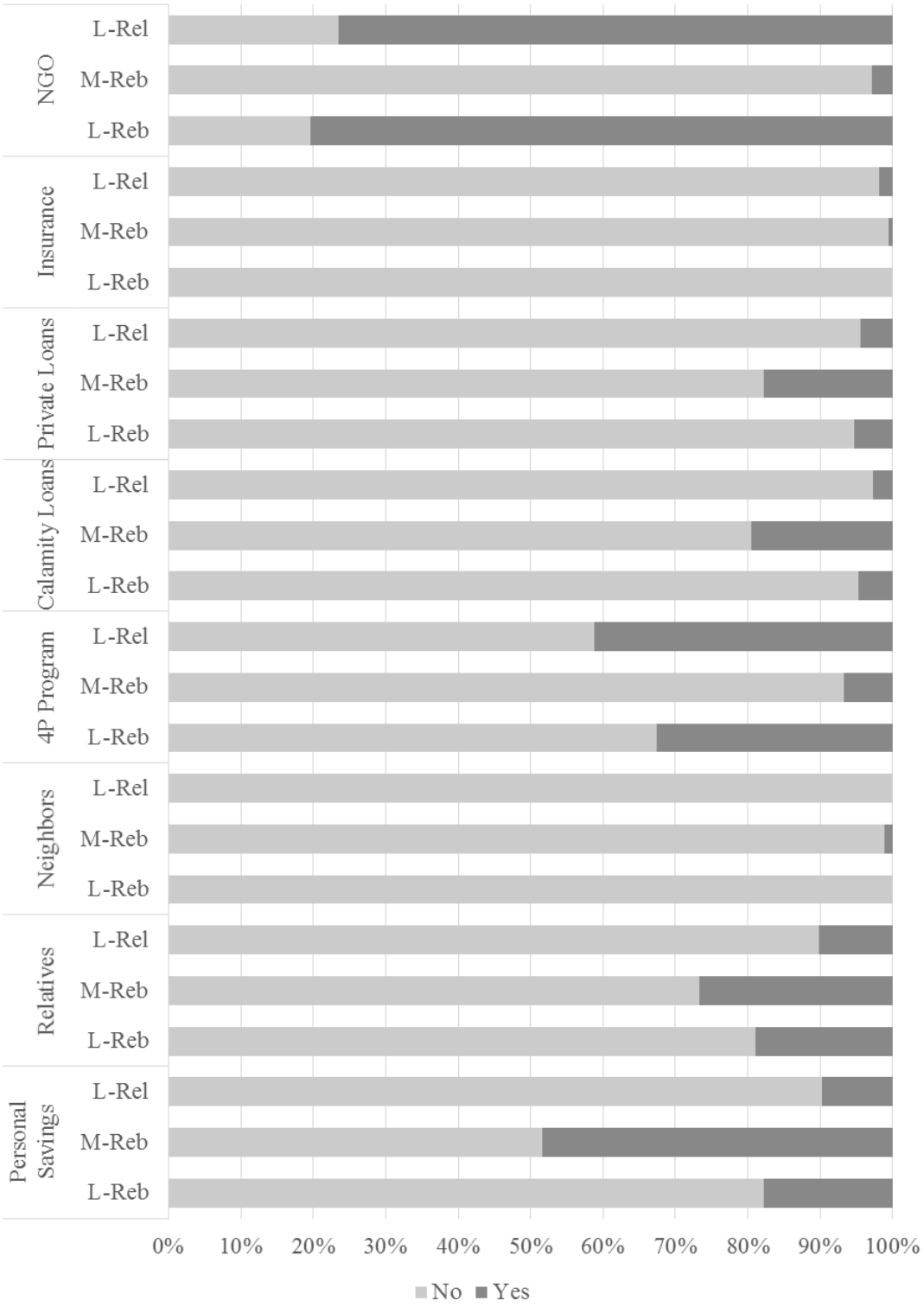
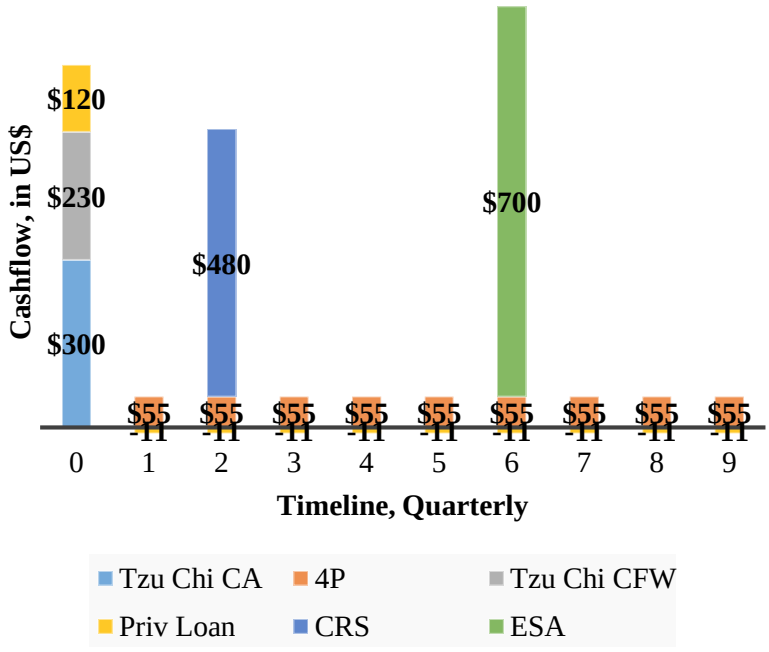


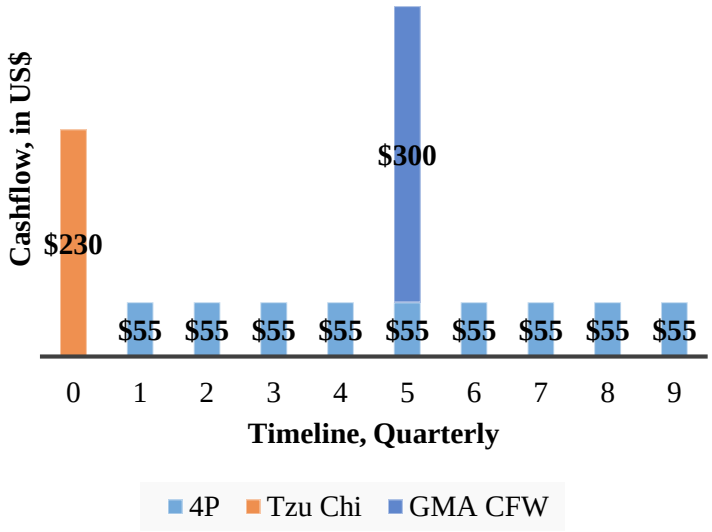
Figure 20. Sources of Financial Assistance

Another variable included in the questionnaire was the main source of information for the financial aid. For the rebuilding case, the respondents mainly received information from their personal knowledge or relative compared to the relocation case where the respondents relied generally on community leaders from transitional shelters (47%) and national government (16%).

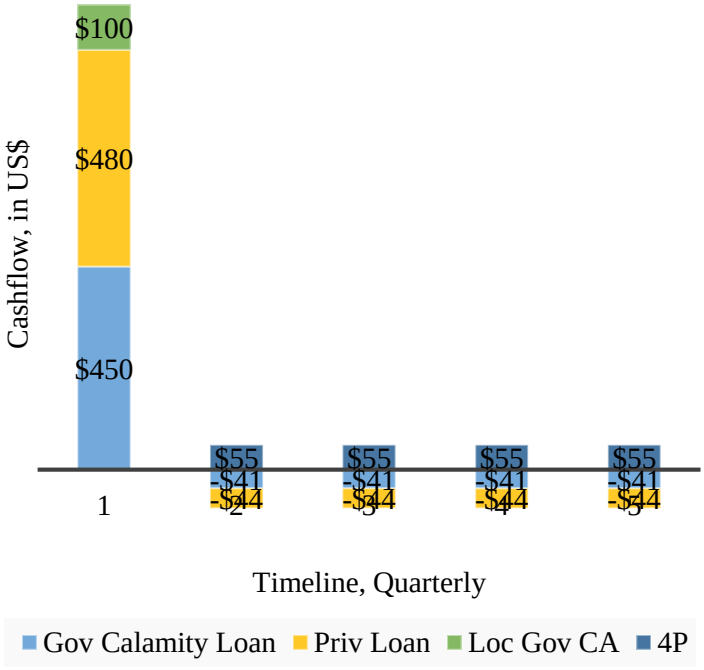
The figures also showed the typical cash-flows for Leyte-Rebuild and Manila-Rebuilding cases. Looking at the delivery schedule of the monetary support, both cases received lump sums assistances in the 1st quarter after the disaster which can probably trigger the rebuilding. Moreover, they received distributed cash-flows of the 4P program and delayed cash assistance of ESA and CRS which could have helped in completing the reconstruction. In terms of the net present worth, the Tacloban-rebuilding case received higher amount than the Leyte-relocation case and the Manila-rebuilding case.



(a) Leyte-Rebuild



(b) Leyte-Relocate



(c) Manila-Rebuild

Figure 21. Cash flow Diagrams for Rebuilding and Relocation Cases in Leyte and Manila

4.5.3 Independent Variable: Community Initiatives

As shown in *Figure 22*, the community meetings in the rebuilding case is much less frequent than the relocation sites. This can be explained by the necessary meetings required by the funding agencies of the sites which required close interaction with the newly built communities. As also presented in *Figure 23*, this was further supported by the attendance of the respondents with 77% of participants often and always attending for the relocation case compared to 40% in the rebuilding case. Moreover, based on *Figure 24*, the relocation case was observed to have higher participation or consultative strategy in community decision-making. Lastly, as illustrated in *Figure 25*, more households in the relocation sites recounted to involve the entire community when solving community issue or crisis (i.e. disaster, crime, epidemic) than the rebuilding sites.

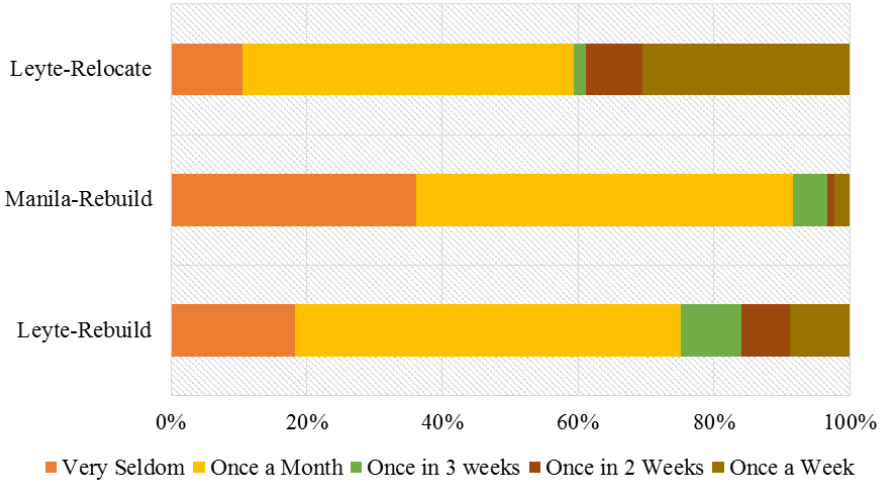


Figure 22. Frequency of Community Meetings

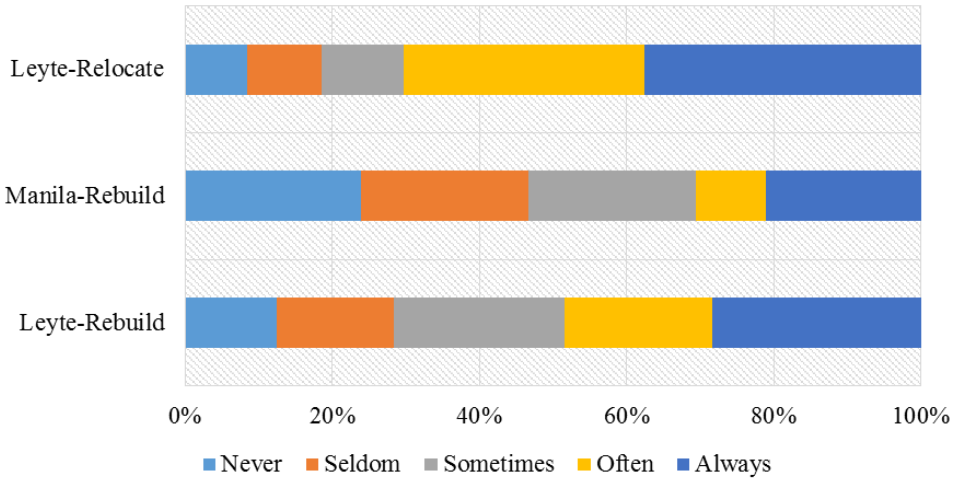


Figure 23. Frequency of Attending Meetings

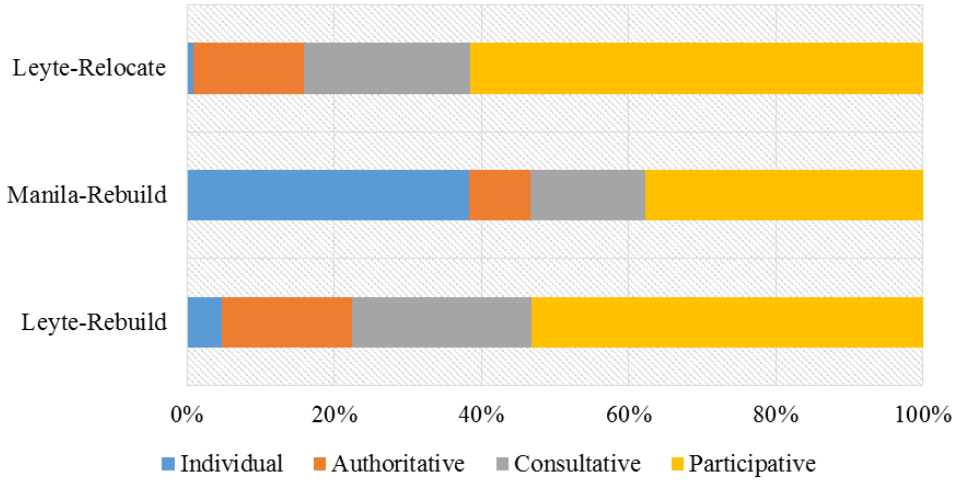


Figure 24. Level of Participative Leadership in Community Decision-making

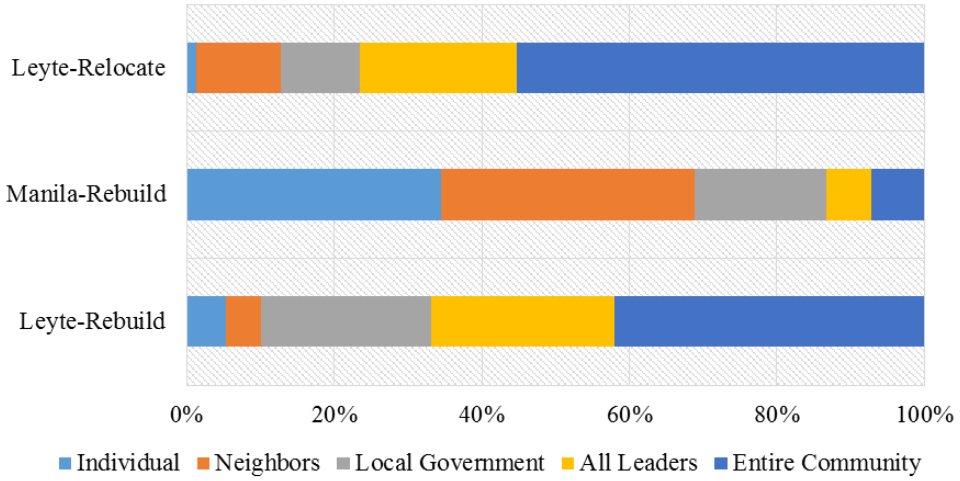


Figure 25. Community Involvement in Crisis Management

4.5.4 Independent Variable: Risk Perception

Moreover, as shown in *Figure 26*, rebuilding case had higher perception of safety of their original housing location than the relocation case ($\bar{x}_{reb}$ =1.50 > $\bar{x}_{rel}$ = 0.78). Meanwhile, in terms of their risk acceptance behavior (financial risk attitude) after the disaster, *Figure 27* presented that the rebuilding case had generally higher risk acceptance than the relocation case ($\bar{x}_{reb}$ =3.73 > $\bar{x}_{rel}$ = 2.94).

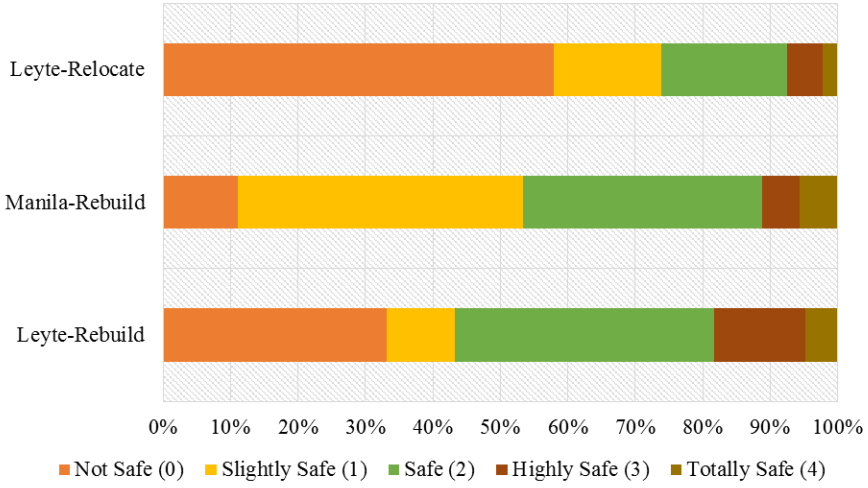


Figure 26. Post-disaster Perceived Level of Safety of Original House

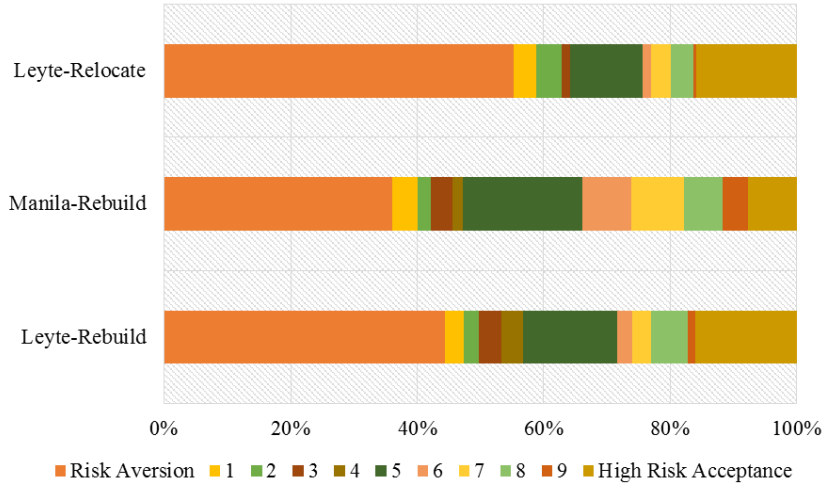


Figure 27. Degree of Risk Acceptance (0-10) after Disaster

Furthermore, the housing damage level in the rebuilding case varied with only 38% of the samples had their houses totally destroyed compared to the relocation case where almost all original houses (99%) had been completely damaged. Meanwhile, hazard frequency mean value for the rebuilding case ($\bar{x}_{reb}$=2.7) was higher than in the relocation case ($\bar{x}_{rel}$=1.13) which highlighted that some rebuilding samples (most likely due to flood in the Manila case) experienced flooding more frequently. Average housing lot size of 38 sq. m. was similar to both rebuilding and relocation cases with the average number of floors slightly greater than in rebuilding case ($\bar{x}_{reb}$=1.5 > $\bar{x}_{rel}$=1.1) and the mean number of years past when the house was built was higher also in the rebuilding case ($\bar{x}_{reb}$=22 years > $\bar{x}_{rel}$=18 years).

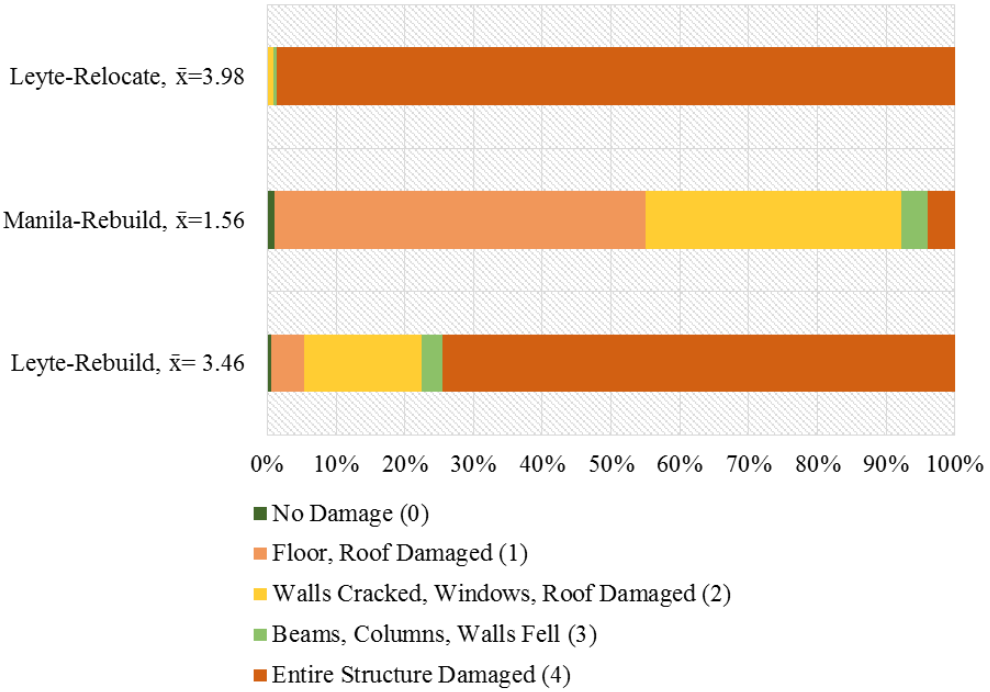


Figure 28. Housing Damage Level for Rebuilding and Relocation Cases

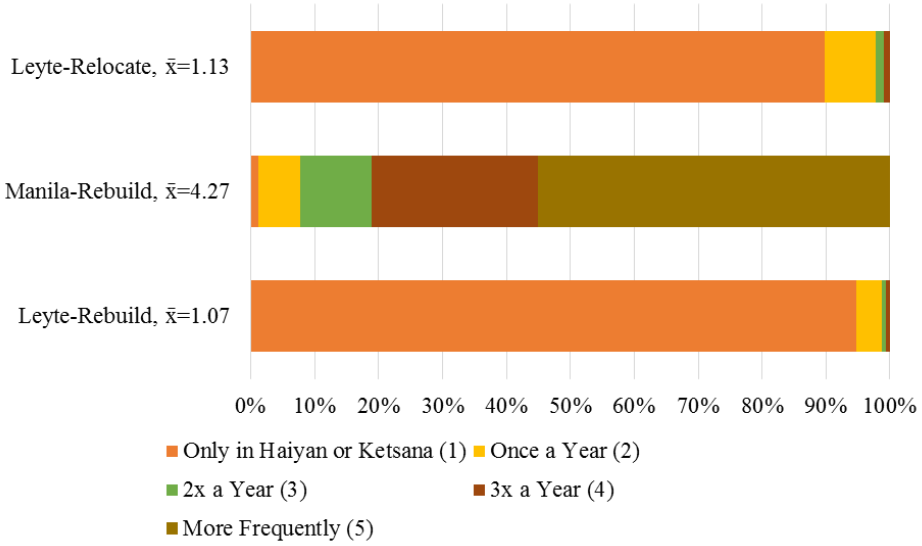


Figure 29. Hazard Frequency Experience

4.5.5 Independent Variable: Indirect Impacts

For both rebuilding and relocation sites, livelihood self-sufficiency level as described in *Figure 30* was greatly reduced after the disaster compared to their income-generating work in pre-disaster period ($\bar{x}_{reb\_before}$= 2.18 > $\bar{x}_{reb\_after}$=1.40; $\bar{x}_{rel\_before}$= 2.64 > $\bar{x}_{rel\_after}$=1.01). This was checked through paired samples t-test (t_{reb}=12.322 and t_{rel}=16.167 at p<0.01). In terms of utility service disruption, water services were available after 1-2 months and water pump wells were also available in rebuilding areas while water was delivered to the relocation areas in the early stages. Electricity supply was disrupted longer in the relocation cases than the rebuilding cases.

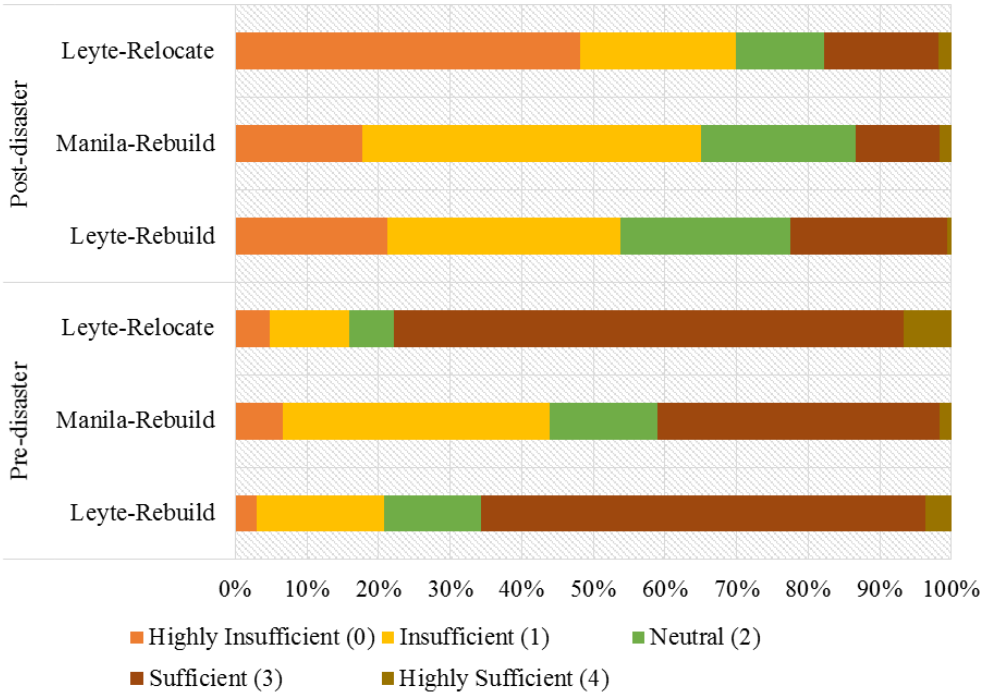


Figure 30. Pre and Post-disaster Livelihood Self-sufficiency Level for Rebuilding and Relocation Cases

4.5.6 Independent Variable: Place Attachment

The figure showed that the relocation case had higher case of fishing-related occupation (30%) compared to the rebuilding case (15%). Moreover, both rebuilding (22%) and relocation cases (25%) had to change their occupation after the disaster. Meanwhile, the length of time they were living in the same area had an average of $\bar{x}_{reb}$ = 37 years in the rebuilding case in Leyte, $\bar{x}_{reb}$ = 23 years in the rebuilding case in Manila and $\bar{x}_{rel}$ = 26 years for the relocation case in Leyte. Furthermore, there were higher number of natives or were living in the same area since birth in the rebuilding case than relocation case in Leyte (66% and 19% of the rebuilding samples in Leyte and Manila and 38% for relocation samples).

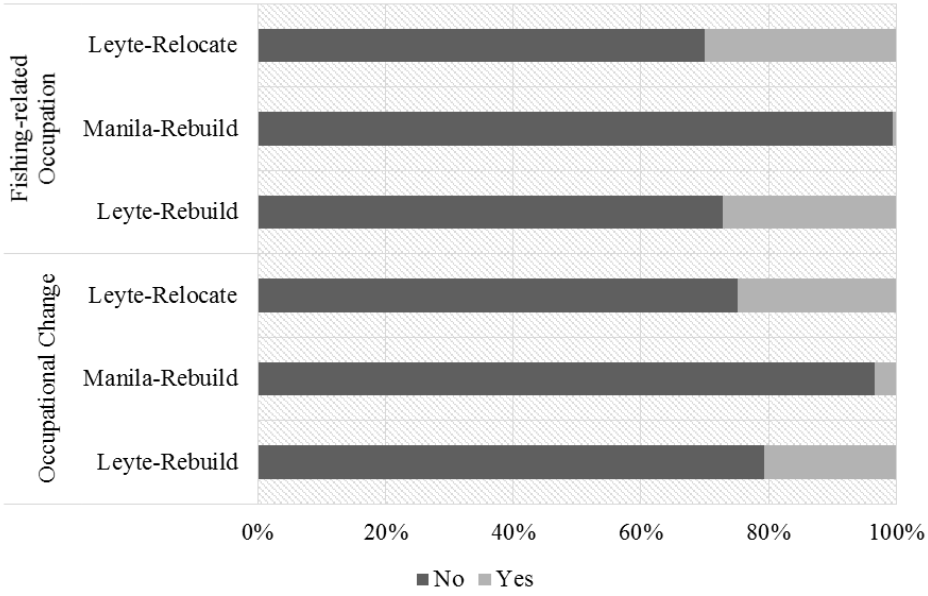


Figure 31. Fishing-related Occupation and Occupational Change

4.6 Data Analysis Method

The data collected from the first survey was first checked to identify potential sample biases that required the samples to be stratified to better understand the associations of the variables. In this case, the dependent variable of reconstruction time will be checked for the effect of location-based reconstruction approach (Leyte and Manila + rebuild and relocate) if sample stratification will be required. Next, the structure of the multiple independent variables will be determined by the principal component analysis. The reduced dimensions or components will then be used for backward stepwise regression to observe which variables significantly interact with the dependent variable. Lastly, the latent variables based on the remaining variables were proposed and confirmed by structural equation modeling which involves the combination of confirmatory factor analysis and multiple regression. The final parameters to be accounted for included indices for goodness-of-fit of the model and significance level of standardized estimates for the regression.

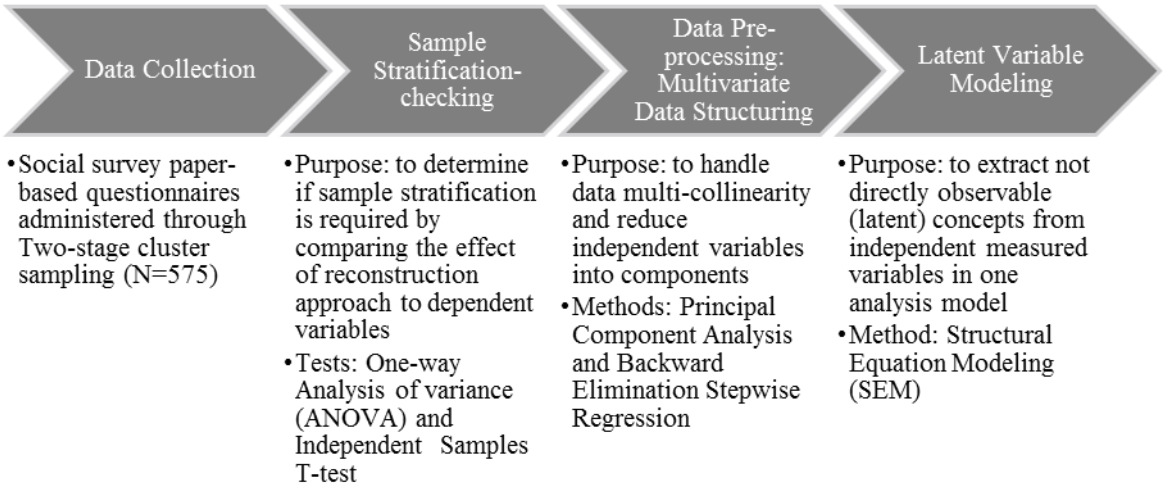


Figure 32. Methodological Framework for Behavioral Mechanism Modeling

4.6.1 Independent Samples T-test

T-tests are used for data composed of two groups and will compare the mean values of continuous, interval or ratio data. There are two main types of t-tests. First, paired sample t-tests are used for repeated measures (changes in response at Time 1, and at Time 2). Meanwhile, independent sample t-tests are used when there are two different sets of people where information is collected only once. It assumes a model where the variables in the analysis are separated into independent and dependent variables. The independent sample t-test is an analysis of dependence as this technique assumes that a mean value difference of the dependent variable is found because of the influence of the independent variable (Pallant, 2011; Miah, 2016). This method explains whether the difference between the two independent samples is a true difference or just a random effect caused by skewed sampling.

4.6.2 One-way Analysis of Variance (ANOVA)

One-way analysis of variance is similar to the t-test, but is used for two or more groups to compare their mean scores on a continuous variable. It estimates the impact of only one independent variable on your dependent variable. It shows whether the groups differ and conducting post-hoc comparisons to find out which groups are significantly different from one another can be performed (Pallant, 2011).

4.6.3 Principal Component Analysis

Factor analysis is a technique that is used to reduce a large number of variables into fewer numbers of factors which account for most the variance in correlation matrix pattern. This technique extracts maximum common variance from all variables and puts them into a common score. Under this, the principal component analysis is the most common type. Principal component analysis is a statistical procedure that uses an orthogonal transformation to convert a set of observations of possibly correlated variables (high multi-collineraity) into group of values of linearly uncorrelated variables. The number of principal components is less than or equal to the number of original variables. However, it must be noted that because the extraction of the principal components

is accomplished without any reference to the dependent variable, it cannot be expected that the dependent variable will be highly correlated with the principal components. (Pallant, 2011; Miah, 2016; Izenmann, 2013)

4.6.4 Multiple Regression Analysis

Multiple Linear Regression Model

The multiple regression assumes that a dependent variable Y is linearly related to r input/ independent/ predictor variables $X_1, \ldots, X_r$

$$Y = \beta_o + \sum_{j=1}^{r} \beta_j X_r + e \quad (1)$$

where e is an unobservable random variable or error component with mean 0 and variance σ^2 and $\beta_0, \beta_1, \ldots, \beta_r$ are unknown parameters and $\sigma^2 > 0$ is an unknown error variance. The goal is to estimate the true values of coefficients $\beta_0, \beta_1, \ldots, \beta_r$, and σ^2, and to assess the associations of each independent variable on the dependent factor, Y If the input variables have negligible effects on Y, reduction of the number of input variables is encouraged. One of the uses of multiple regression is in predicting future values of the dependent variable so the measure the predictive accuracy power is required. (Izenmann, 2013)

Stepwise Regression

Stepwise regression is an automated tool used to identify a useful subset of predictors by systematically adding the most significant variable or removing the least significant variable during each step. The main approaches include forward selection, backward elimination and bidirectional elimination. Backward elimination or backward deletion, which involves starting with all candidate variables, testing the deletion of each variable using a chosen model comparison criterion, deleting the variable that improves the model the most by being deleted, and repeating this process until no further improvement is possible.

Backwards elimination begins with the full set of variables. At each step, the variable whose F-ratio,

$$F = \frac{(RSS_0 - RSS_1)(df_0 - df_1)}{RSS_1/df_1} \quad (2)$$

is smallest will be dropped, where RSS_0 is the residual sum of squares (with df_0 degrees of freedom) for the reduced model, and RSS_1 is the residual sum of squares (with df_1 degrees of freedom) for the larger model, where the reduced model is a sub-model of the larger model. Then, we refit the reduced model and iterate again. Here, $df_0 - df_1 = 1$ and $df_1 = n - k - 1$, where k is the number of variables in the larger model. Procedure stops when all variables retained in the model are larger than some predetermined value F_{delete}. (Izenmann, 2013) In this paper, the criterion or threshold value used to eliminate was the F-test: probability of F to remove or delete ≥0.1.

4.6.5 Structural Equation Modeling

Structural equation modeling (SEM) is a multivariate statistical analysis technique that is used to analyze structural relationships between measured variables (Xs and Y) and latent constructs (U) in one analysis model. This technique is the combination of factor analysis and multiple regression analysis. Latent variables are variables that are not directly observed but are rather inferred from other variables that are measured. This method is preferred by the researcher because it estimates the multiple and interrelated dependence in a single analysis. SEM has two main parts: the measurement model is the part which relates measured variables to latent variables, while the structural model is the part that relates latent variables to one another.

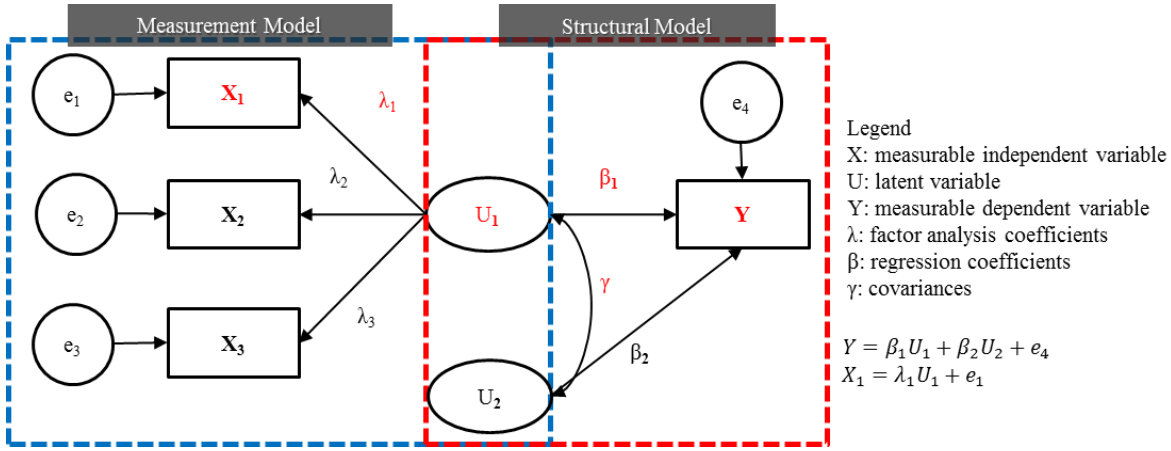


Figure 33. Parts of Structural Equation Model (Williams et al. 2009; De Stavola et al. 2005)

Moreover, one strength of SEM is the availability of measures of global fit that can provide a summary evaluation of even complex models that involve a large number of linear equations. (Bentler, 1980; Tomarken and Waller, 2005; Marsh et al. 2014; Ullman, 2001; Schreiber et al. 2006; Schermelleh-Engel, Moosbrugger and Muller, 2003). The typical presentation of result to show that the cut-off criteria of fit indices were satisfied involves showing (1) chi-squared parameter, (2) at least one error or residual fit parameter (ex. RMSEA or SRMR) and (3) at least one goodness-of-fit index (ex. GFI or CFI). The following table shows the criteria for the goodness-of-fit indices used in SEM.

Table 10. Cut-off Criteria for Fit Indices (Schermelleh-Engel, Moosbrugger and Muller, 2003)

Fit Measure	Good Fit	Acceptable Fit
χ^2	$0 \leq \chi^2 \leq 2df$	$2df < \chi^2 \leq 3df$
p value	$.05 < p \leq 1.00$	$.01 \leq p \leq .05$
χ^2/df	$0 \leq \chi^2/df \leq 2$	$2 < \chi^2/df \leq 3$
RMSEA	$0 \leq RMSEA \leq .05$	$.05 < RMSEA \leq .08$
p value for test of close fit ($RMSEA < .05$)	$.10 < p \leq 1.00$	$.05 \leq p \leq .10$
Confidence interval (CI)	close to *RMSEA*, left boundary of CI = .00	close to *RMSEA*
SRMR	$0 \leq SRMR \leq .05$	$.05 < SRMR \leq .10$
NFI	$.95 \leq NFI \leq 1.00$[a]	$.90 \leq NFI < .95$
NNFI	$.97 \leq NNFI \leq 1.00$[b]	$.95 \leq NNFI < .97$[c]
CFI	$.97 \leq CFI \leq 1.00$	$.95 \leq CFI < .97$[c]
GFI	$.95 \leq GFI \leq 1.00$	$.90 \leq GFI < .95$
AGFI	$.90 \leq AGFI \leq 1.00$, close to *GFI*	$.85 \leq AGFI < .90$, close to *GFI*
AIC	smaller than *AIC* for comparison model	
CAIC	smaller than *CAIC* for comparison model	
ECVI	smaller than *ECVI* for comparison model	

Note. *AGFI* = Adjusted Goodness-of-Fit-Index, *AIC* = Akaike Information Criterion, *CAIC* = Consistent *AIC*, *CFI* = Comparative Fit Index, *ECVI* = Expected Cross Validation Index, *GFI* = Goodness-of-Fit Index, *NFI* = Normed Fit Index, *NNFI* = Nonnormed Fit Index, *RMSEA* = Root Mean Square Error of Approximation, *SRMR* = Standardized Root Mean Square Residual.

4.7 Sample Stratification-Checking: Effect of Location-Reconstruction Type to Reconstruction Duration

The samples were collected in different areas (Leyte and Manila) with specific available reconstruction approach (rebuild and relocate) in which added to this complexity are the dependent variables (start, finish and transfer). Hence, there are five possible sets (Leyte-Rebuild-Start, Leyte-Rebuild-Finish, Manila-Rebuild-Start, Manila-Rebuild-Finish and Leyte-Relocate-Transfer) that will be checked to determine if there is need to stratify or separate the analysis for specific group subsets while retaining a good sample size for statistical modeling.

4.7.1 Independent Variables: Starting Time or Transfer Rate

Comparing three groups, one-way between-groups analysis of variance was conducted to explore the impact of location-reconstruction type on Time to start rebuilding or transfer, as collected in the questionnaire. Samples were divided into three groups according to the location-reconstruction type (i.e. Leyte-Rebuild, Manila-Rebuild and Leyte-Relocate).

Table 11. Result of One-way ANOVA for the Start or Transfer Duration

Start or Transfer Duration	Sum of Squares	df	Mean Square	F
Between Groups	107350.373	2	53675.186	458.092**
Within Groups	67021.933	572	117.171	
Total	174372.306	574		

Note: **p(0.05); Welch Statistic: 589.79**; Eta-squared: 0.62 (large effect)

Dependent Variable: Start or Transfer Duration		Mean Difference, I-J (S.E.)
Leyte-Rebuild (I)	Manila-Rebuild (J)	8.225** (1.2)
	Leyte-Relocate (J)	-22.954** (1.1)
Manila-Rebuild (I)	Leyte-Relocate (J)	-31.179** (1.1)

There was a statistically significant difference at the $p < .05$ level in for the three groups: F (2, 572) = 458, p = .0001. With statistical significance, the actual mean difference in mean scores is shown in the table. The effect size, calculated using eta squared, was .62 (large effect). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Leyte-Rebuild case (M = 11.13, SD = 12.83) was significantly different from Manila-Rebuild case (M = 2.91, SD = 5.09). Manila-rebuild case also differ significantly from both Leyte-Rebuild and Leyte-Relocate case (M=34.08, SD=12.43). Signs of the mean differences showed that the time to start rebuilding was generally faster in Leyte than in Manila. Moreover, relocation transfer was faster than the rebuilding in Leyte. Hence, there was a need to separate or stratify the data sets due to the dependence to location-reconstruction approaches.

4.7.2 Independent Variable: Finish/ Completion Duration

By comparing only two groups, an independent-samples t-test was conducted to compare the time to finish or completion duration for Leyte-Rebuild and Manila-Rebuild. There was significant difference in scores for Leyte-Rebuild (M = 7.25, SD = 11.74) and Manila-Rebuild (M = 3.29, SD = 10.31; t (435) = 3.34, p = .001, two-tailed). The magnitude of the differences in the means (mean difference = 3.95, 95% CI: 1.62 to 6.29) was small (eta squared = .031). Hence, there is also a need to stratify the cases due to the significant mean difference between the groups.

4.8 Data Pre-Processing: Data Structuring of Independent Variables through Principal Component Analysis (PCA)

Due to the multivariate data design of the study, the datasets were also initially checked for multi-collinearity in which two or more predictor variables are highly correlated which can affect the result in regression models. By considering the variance inflation factors in the collinearity diagnostics, the data independent variables were found to be collinear with each specific groups. Two possible techniques can assist in achieving better modeling. This section presented the results of using (1) PCA to cut the number of predictors to a smaller set of uncorrelated

components and (2) stepwise regression to remove the specific highly correlated independent variables through automatic removal by certain statistical criteria.

4.8.1 PCA Result for Leyte-Rebuild Case

The 50 items of housing recovery decision determinants were subjected to principal components analysis (PCA) using commercial software, SPSS version 20. Prior to performing PCA, the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Olkin value was .6, exceeding or equal to the recommended value of .6 (Kaiser 1970, 1974) and Bartlett's Test of Sphericity (Bartlett 1954) reached statistical significance, supporting the factorability of the correlation matrix.

Principal components analysis revealed the presence of more than 6 components with eigenvalues exceeding 1. An inspection of the scree plot revealed a break after the 6th component. Using Catell's (1966) scree test, it was decided to retain six components for further investigation. This was further supported by the results of Parallel Analysis, which showed six components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (50 variables × 169 respondents). The six-component solution explained a total of 37.1% of the variance. To aid in the interpretation of these six components, varimax rotation was performed. The rotated solution revealed components showing a number of strong loadings and all variables loading substantially on one component.

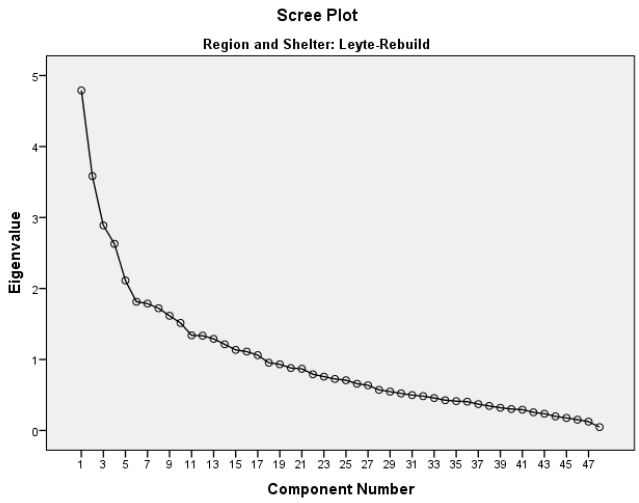


Figure 34. Scree plot for Variables in Leyte-Rebuilding Case

Table 12. Eigenvalue and Total Variance Explained by the Components in Leyte-Rebuilding Case

Component/ Value	Eigenvalue, %	Total Variance	Cumulative Eigenvalue	Cumulative Variance
1	10	6.7	10	6.7
2	7.5	6.5	17.5	13.2
3	6	6.4	23.5	19.6
4	5.5	6.1	29	25.7
5	4.4	5.8	33.4	31.5
6	3.8	5.6	37.2	37.1

The interpretation of the six components was consistent with previous research on housing recovery determinants, with Risk Perception items loading strongly on Component 1, Place Attachment on Component 2, Relocation Assistance items in Component 3, Community Initiatives in Component 4, Rebuilding Assistance items in Component 5, and Financial Assistance items loading strongly on Component 6. There was a weak correlation between the factors. The results of this analysis support the use of post-disaster recovery determinant categories as separate scales, as suggested by past literature.

Table 13. Rotated Component Matrix for Leyte-Rebuilding Case

	Component					
Independent Variables	1 *Risk Perception*	2 *Place Attachment*	3 *Relocation Assistance*	4 *Community Initiatives*	5 *Rebuilding Assistance*	6 *Financial Assistance*
Perceived Safety of Original Housing	.597					
Inside No Build Zone	-.554		.321		-.393	
Water Level Height	-.521					
Estimated Housing Damage Level	-.490	-.363	.302			
Post-disaster Livelihood Self-sufficiency	.617					
Water Service Disruption	-.561					
Ownership of House	.478		-.351			
Number of Floors	.355	.307				
Monthly Income	.311					
Residency Period in Area		.788				
Age		.636				
Number of Years Past Since House was Built		.540				
Native or Migrant		-.415				
Duration of First Receipt of Aid		.345				
Financial Source: Calamity Loans		.545				
Assistance: Relocation House			.412			

Occupational Change			-.374			.370
Fishing-related Occupation			.649			
Financial Source: 4P Program			.613			.307
Number of Family Members			.482			.320
Educational Level			-.552			
Land Size			-.526			
Financial Source: Personal Savings			-.415			
Influenced by Leaders or Neighbors				.489		
Consultation with Community				.473		
Community Consensus		.322		-.332		
Level of Participative Leadership				.328		
Trust in Government Before Disaster				.736		
Trust in Government After Disaster				.642	-.302	
Electricity Service Disruption	-.363			-.414		
Financial Source: Relatives			-.316	.352		
Assistance: Standard Housing Plan		-.434			.631	
Countermeasure	.329				.541	
Frequency of Community Meetings				.445	.446	
Post-disaster Risk Acceptance Attitude					.358	
Assistance: Construction Training					.507	.316
Assistance: Livelihood			.306		.409	
Hazard Frequency					.359	
Total Financial Aid Amount						.681
Financial Usage: Housing Repair						.589
Assistance: Construction Materials	.364					.450
Financial Source: NGO				-.354		.442
Frequency of Attending Meetings					.376	.418
Community Involvement in Decision-making	-.337					.345
Assistance: Land						-.317

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

4.8.2 PCA Result for Manila-Rebuild Case

Meanwhile, for the case of rebuilding in Manila, the 50 items of housing recovery decision determinants were again subjected to principal components analysis (PCA) using commercial software, SPSS version 20. Prior to performing PCA, the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Olkin value was .6, exceeding or equal to the recommended value of .6 and Bartlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix.

Principal components analysis revealed the presence of more than five components with eigenvalues exceeding 1. An inspection of the scree plot revealed a break after the 5th component. Using the scree test, it was decided to retain five components for further investigation. This was further supported by the results of Parallel Analysis, which showed five components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (50 variables × 180 respondents). The five-component solution explained a total of 27.3% of the variance. To aid in the interpretation of these five components, Varimax rotation was performed. The rotated solution revealed components showing a number of strong loadings and all variables loading substantially on one component.

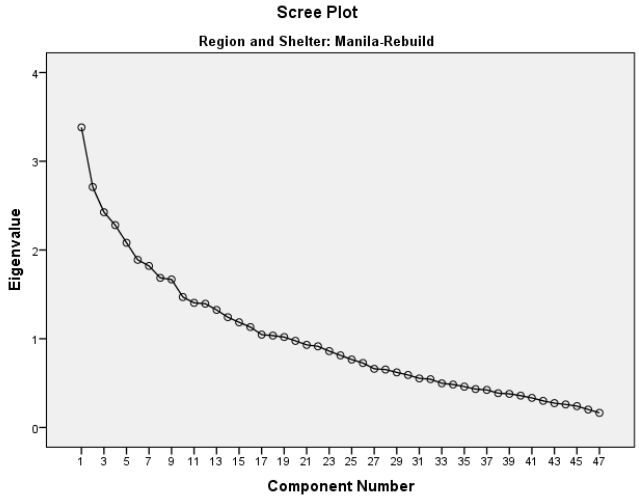


Figure 35. Scree plot for Variables in Manila-Rebuilding Case

Table 14. Eigenvalue and Total Variance Explained by the Components in Manila-Rebuilding Case

Component/ Value	Eigenvalue, %	Total Variance	Cumulative Eigenvalue	Cumulative Variance
1	7.2	6.2	7.2	6.2
2	5.8	6.0	13.0	12.2
3	5.2	5.2	18.2	17.4
4	4.9	5.1	23.1	22.5
5	4.4	4.8	27.5	27.3

The interpretation of the five components was consistent with previous research on housing recovery determinants, with Place Attachment items loading strongly on Component 1, Financial Assistance on Component 2, Community Initiatives items in Component 3, Indirect Impacts (with possible indicators for Rebuilding assistances) in Component 4, and Risk Perception items in Component 5. The results of this analysis support the use of post-disaster recovery determinant categories as separate scales, as suggested by past literature.

Table 15. Rotated Component Matrix for Manila-Rebuilding Case

	Component				
Independent Variables	1 *Place Attachment*	2 *Financial Assistance*	3 *Community Initiatives*	4 *Indirect Impacts*	5 *Risk Perception*
Residency Period in Area	.729				
Number of Years Past Since House was Built	.509				
Estimated Housing Damage Level	.491				
Financial Usage: Housing Repair	.487	.316			
Countermeasure	.374				
Native or Migrant	-.594				
Financial Source: Personal Savings		-.565			
Total Financial Aid Amount	.316	.555			
Financial Source: 4P Program		.539			
Financial Source: Calamity Loans		.482			
Assistance: Construction Materials		.313			
Duration of First Receipt of Aid	.326	.582			
Trust in Government After Disaster		.463			
Trust in Government Before Disaster		.455			
Ownership of House		-.323			
Consultation with Community			.448		
Community Consensus			.396		
Water Level Height			.547		
Hazard Frequency			-.369		
Influenced by Leaders or Neighbors			.599		
Educational Level			-.445		
Financial Source: Private Loans			-.384		
Pre-disaster Livelihood Self-sufficiency				-.640	
Post-disaster Livelihood Self-sufficiency				-.577	
Water Service Disruption				.458	
Post-disaster Risk Acceptance Attitude				-.318	
Assistance: Livelihood				.479	
Assistance: Standard Housing Plan				.445	.323

Perceived Safety of Original Housing			.321		.395
Frequency of Community Meetings			.324		.589
Inside No Build Zone					-.408
Frequency of Attending Meetings					.542
Electricity Service Disruption					-.341
Age					-.397
Level of Participative Leadership					.393

4.8.3 PCA Result for Leyte-Relocate Case

Lastly, for the relocation case in Leyte, the 50 items of housing recovery decision determinants were subjected to principal components analysis (PCA). Prior to performing PCA, the suitability of data for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Olkin value was .6, exceeding or equal to the recommended value of .6 and Bartlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix.

Principal components analysis revealed the presence of more than seven components with eigenvalues exceeding 1. An inspection of the scree plot revealed a break after the 7th component. Using Catell's (1966) scree test, it was decided to retain seven components for further investigation. This was further supported by the results of Parallel Analysis, which showed seven components with eigenvalues exceeding the corresponding criterion values for a randomly generated data matrix of the same size (50 variables × 226 respondents). The five-component solution explained a total of 35.1% of the variance. To aid in the interpretation of these seven components, Varimax rotation was performed. The rotated solution revealed components showing a number of strong loadings and all variables loading substantially on one component.

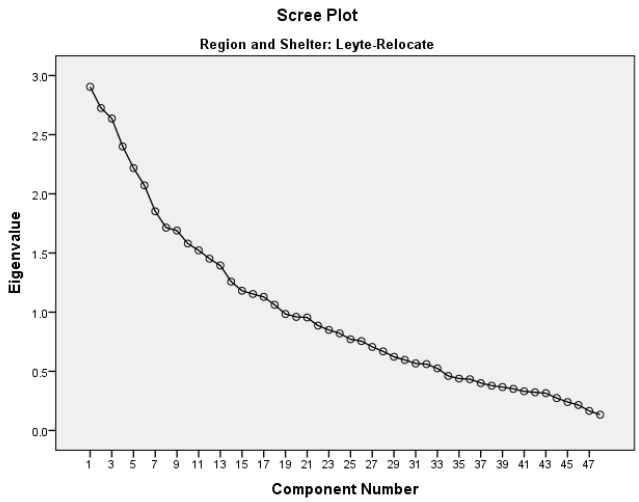


Figure 36. Scree plot for Variables in Manila-Rebuilding Case

Table 16. Eigenvalue and Total Variance Explained by the Components in Leyte-Relocation Case

Component/ Value	Eigenvalue, %	Total Variance	Cumulative Eigenvalue	Cumulative Variance
1	6.1	5.8	6.1	5.8
2	5.7	5.5	11.8	11.3
3	5.5	5.3	17.3	16.6
4	5.0	4.7	22.3	21.3
5	4.6	4.7	26.9	26
6	4.3	4.7	31.2	30.7
7	3.9	4.4	35.1	35.1

The interpretation of the seven components was consistent with previous research on housing recovery determinants, with Financial Assistance items loading strongly on Component 1, Community Initiatives on Component 2, Risk Perception items in Component 3, Rebuilding Assistances in Component 4, Indirect Impacts items in Component 5, Place Attachment in Component 6 and Relocation Assistance items contributing on Component 7. The results of this analysis support the use of post-disaster recovery determinant categories as separate scales, as suggested by past literature.

Table 17. Rotated Component Matrix for Leyte-Relocation Case

Independent Variables	Component						
	1 *Financial Assistance*	2 *Community Initiatives*	3 *Risk Perception*	4 *Rebuilding Assistance*	5 *Indirect Impacts*	6 *Place Attachment*	7 *Relocation Assistance*
Total Financial Aid Amount	.793						
Number of Family Members	.724						
Financial Source: 4P Program	.719						
Electricity Service Disruption	.446		-.379				
Fishing-related Occupation	.342				.329		
Influenced by Leaders or Neighbors		.639					
Consultation with Community		.548					-.320
Frequency of Attending Meetings		.530			.334		
Community Involvement in Decision-making		.465			.329		
Community Consensus		.437					
Hazard Frequency		-.429			.409		
Assistance: Land		-.360	.544				
Trust in Government After Disaster		.372	.433				

Level of Participative Leadership			.513				
Trust in Government Before Disaster		.406	.424				
Water Service Disruption	.341		-.514		-.354		
Frequency of Community Meetings			-.450		.356		
Ownership of House			-.374				
Assistance: Standard Housing Plan				.575			
Assistance: Construction Training				.372			
Financial Source: Calamity Loans				.447			
Financial Source: NGO				-.344	.313		
Monthly Income				.497			
Financial Source: Personal Savings				.497			
Financial Source: Relatives				.478			
Assistance: Livelihood			-.317	.395	.393		
Post-disaster Livelihood Self-sufficiency					.552		
Post-disaster Risk Acceptance Attitude					.483		
Water Level Height					-.467		
Occupational Change					.362		
Residency Period in Area						.687	
Age						.631	
Number of Years Past Since House was Built						.499	
Financial Source: Private Loans						.462	
Land Size		.318				.442	
Pre-disaster Livelihood Self-sufficiency						.335	

Assistance: Relocation House							-.497
Assistance: Construction Materials							.654
Native or Migrant							-.470
Financial Usage: Housing Repair							.352
Duration of First Receipt of Aid	.338						.349

4.9 Data Pre-processing: Multivariate Analysis of Independent and Dependent Variables Assisted by Stepwise Multiple Regression

The purpose of performing the stepwise regression using backward elimination was to determine which latent variable group based on the identified principal components significantly affect the reconstruction rate and should be retained in the final model. The group of the remaining variables after regression will be further used as a guide to the formation of the structural equation model.

4.9.1 Starting Time in Leyte-Rebuilding Case

A stepwise multiple linear regression using backward elimination was calculated to predict time to start rebuilding (higher value, longer duration) based on the 50 variables collected. In the final model after 34th iteration, a significant regression equation was found ($F(15, 153) = 5.815$, $p < .0001$), with an Adjusted R-square of .301. The unstandardized coefficients used in the equation and the corresponding standardized values were shown in the table. Based on the coefficient signs, time to start (Y) increased with higher damage level, longer time since the house was built, higher number of relocation assistance, higher financial aid amount, higher perceived level of safety, community consensus and community consultation. On the other hand, it increased with the decrease in number of households inside no-build-zone, no usage of housing reconstruction countermeasures, less cases of 4P program beneficiaries, less usage of financial assistance for housing repair, higher pre-disaster livelihood self-sufficiency, less influenced by community, less number of family members and lower age. All were significant predictors of starting time duration.

Based on the remaining variables after regression and the 6 components found in PCA, determinants were mostly found in <u>all of the 6 components</u> including Component 1: risk perception, Component 2: place attachment, Component 3: relocation assistances, Component 4: community initiatives, Component 5: rebuilding assistances and Component 6: financial assistances. This will be further examined as main latent variables in structural equation modeling.

Table 18. Stepwise Regression Model for Starting Time in Leyte Rebuilding Case

Region and Shelter (Y=Time to Start Rebuilding)		Unstandardized Coefficients	Standardized Coefficients
		B (S.E.)	Beta
Leyte-Rebuild	(Constant)	8.559 (6.193)	
	X_{1A}= Inside No Build Zone	-5.648 (2.366)	-.197**
	X_{2A}= Estimated Housing Damage Level	3.798 (1.028)	.289***
	X_{3A}= Number of Years Past Since House was Built	.147 (.072)	.154**
	X_{4A}= Countermeasure	-2.125 (1.010)	-.162**
	X_{5A}= Assistance: Relocation House	6.011 (2.640)	.158**
	X_{6A}= Financial Source: 4P Program	-5.707 (2.238)	-.209**
	X_{7A}= Total Financial Aid Amount	$1.85x10^{-4}$ (.0001)	.277***
	X_{8A}= Financial Usage: Housing Repair	-5.462 (2.067)	-.200***
	X_{9A}= Perceived Safety of Original Housing	1.503 (.803)	.142*
	X_{10A}= Pre-disaster Livelihood Self-sufficiency	-1.900 (.946)	-.137**
	X_{11A}= Community Consensus	2.581 (1.461)	.135*
	X_{12A}= Consultation with Community	5.465 (2.083)	.208***
	X_{13A}= Influenced by Leaders or Neighbors	-5.634 (1.958)	-.220***
	X_{14A}= Number of Family Members	-1.041 (.389)	-.198***
	X_{15A}= Age	-.102 (.056)	-.130*

Note: ***p(0.01), **p(0.05), *p(0.1)

4.9.2 Completion Duration in Leyte-Rebuilding Case

Next, another stepwise multiple linear regression using backward elimination was performed to predict time to finish or complete rebuilding (higher value, longer duration) based on the 50 variables collected. In the final model after 39^{th} iterations, a significant regression equation was found ($F(10, 158) = 7.104$, $p < .0001$), with an Adjusted R-square of .267. The unstandardized coefficients used in the equation and the corresponding standardized values were shown in the table. Based on the coefficient signs, time to finish (Y) increased with higher housing damage level, higher number of years past since house was built, more case of construction materials assistances, higher perceived safety of original housing, community consensus, higher frequency of attending community meetings and occupational change. On the other hand, it increased with the decrease in less standardized housing plan, less usage of financial assistance for housing repair and less frequency of community meetings. All were significant predictors of completion time duration.

Based on the remaining variables after regression and the 6 components found in PCA, determinants were mostly found in all of the 6 components including Component 1: risk perception, Component 2: place attachment, Component 3: relocation assistances, Component 4: community initiatives, Component 5: rebuilding assistances and Component 6: financial assistances. This will be further examined as main latent variables in structural equation modeling.

Table 19. Stepwise Regression Model for Completion Duration in Leyte Rebuilding Case

Region and Shelter (Y= Finish/ Completion Duration)		Unstandardized Coefficients	Standardized Coefficients
		B (S.E.)	Beta
Leyte-Rebuild	(Constant)	-14.497 (4.805)	
	X_{1B}= Estimated Housing Damage Level	3.919 (.944)	.326***
	X_{2B}= Number of Years Past Since House was Built	.119 (.065)	.137*
	X_{3B}= Assistance: Construction Materials	7.971 (1.764)	.332***
	X_{4B}= Assistance: Standard Housing Plan	-4.299 (1.939)	-.174**
	X_{5B}= Financial Usage: Housing Repair	-5.532 (1.872)	-.221***
	X_{6B}= Perceived Safety of Original Housing	1.464 (.700)	.151**
	X_{7B}= Community Consensus	3.204 (1.219)	.183***
	X_{8B}= Frequency of Community Meetings	-1.795 (.746)	-.172**
	X_{9B}= Frequency of Attending Meetings	1.237 (.604)	.144**
	X_{10B}= Occupational Change	7.288 (1.947)	.252***

Note: ***p(0.01), **p(0.05), *p(0.1)

4.9.3 Starting Time in Manila-Rebuilding Case

For the Manila case, a stepwise multiple linear regression using backward elimination was calculated to predict time to start rebuilding (higher value, longer duration) based on the 50 variables collected. In the final model after 31st iteration, a significant regression equation was found ($F(4,135) = 7.236$, $p < .0001$), with an Adjusted R-square of .122. The unstandardized coefficients used in the equation and the corresponding standardized values were shown in the table. Based on the coefficient signs, time to start (Y) increased with increase in number of cases using financial assistance for housing repair, usage of housing countermeasures against hazard and with construction materials assistances. On the other hand, the dependent variable increased with less cases of 4P program beneficiaries. All were significant predictors of starting time duration.

Based on the remaining variables after regression and the 5 components found in PCA, determinants were mostly found in only 2 components including Component 1: place attachment and Component 2: financial assistances. This will be further examined as main latent variables in structural equation modeling.

Table 20. Stepwise Regression Model for Starting Time in Manila Rebuilding Case

Region and Shelter (Y=Time to Start Rebuilding)		Unstandardized Coefficients	Standardized Coefficients
		B (S.E.)	Beta
Manila-Rebuild	(Constant)	.815 (.656)	
	X_{1C}= Financial Usage: Housing Repair	1.717 (.778)	.159**
	X_{2C}= Countermeasure	1.441 (.555)	.188***
	X_{3C}= Financial Source: 4P Program	-2.835 (1.472)	-.139*
	X_{4C}= Assistance: Construction Materials	5.404 (1.616)	.244***

Note: ***p(0.01), **p(0.05), *p(0.1)

4.9.4 Completion Duration in Manila-Rebuilding Case

A stepwise multiple linear regression using backward elimination was calculated to predict time to finish or complete rebuilding (higher value, longer duration) based on the 50 variables collected. In the final model after 30th iterations, a significant regression equation was found ($F(5, 174) = 5.026$, $p < .0001$), with an Adjusted R-square of .101. The unstandardized coefficients used in the equation and the corresponding standardized values were shown in the table. Based on the coefficient signs, time to finish (Y) increased with usage of countermeasures against future hazard, more case of calamity loans assistances and higher water level height. On the other hand, it increased with the decrease in housing damage level and lower pre-disaster livelihood self-sufficiency. All were significant predictors of completion time duration.

Based on the remaining variables after regression and the 6 components found in PCA, determinants were mostly found in only 4 components including Component 1: place attachment, Component 2: financial assistances, Component 3: community initiatives and Component 4: indirect impacts. This will be further examined as main latent variables in structural equation modeling.

Table 21. Stepwise Regression Model for Completion Duration in Manila Rebuilding Case

Region and Shelter (Y=Time to Finish/ Completion Duration)		Unstandardized Coefficients	Standardized Coefficients
		B (S.E.)	Beta
Manila-Rebuild	(Constant)	-2.532 (4.478)	
	X_{1D}= Estimated Housing Damage Level	-1.831 (.993)	-.136*
	X_{2D}= Countermeasure	3.403 (1.128)	.219***
	X_{3D}= Financial Source: Calamity Loans	3.853 (1.848)	.148**
	X_{4D}= Water Level Height	2.548 (1.243)	.147**
	X_{5D}= Pre-disaster Livelihood Self-sufficiency	-1.816 (.711)	-.185**

Note: ***p(0.01), **p(0.05), *p(0.1)

4.9.5 Transfer Time in Leyte-Relocation Case

A stepwise multiple linear regression using backward elimination was calculated to predict time to transfer or relocate (higher value, longer duration to transfer) based on the 50 variables collected. In the final model after 34th iteration, a significant regression equation was found ($F(12, 213) = 12.387$, $p < .000$), with an Adjusted R-square of .378. The unstandardized coefficients used in the equation and the corresponding standardized values were shown in the table. Based on the coefficient signs, Time to transfer (Y) increased with increase of hazard frequency, trust in government after the disaster, consensus in the community, influence of community members and frequency in attending community meetings and with decrease in number of construction material assistances, land assistance, shorter electricity service disruption duration, less consultation with community, lower participation in community decision-making, lower risk acceptance and less family members. All were significant predictors of transfer duration.

Based on the remaining variables and the 7 components found in PCA, determinants were mostly found in 5 components involving Component 1: financial assistances, Component 2: community initiatives, Component 3:

risk perception, Component 5: indirect impacts, and Component 7: relocation assistances. This will be further examined as main latent variables in structural equation modeling.

Table 22. Stepwise Regression Model for Transfer Time in Leyte Relocation Case

Region and Shelter (Y= Transfer Duration)		Unstandardized Coefficients	Standardized Coefficients
		B (S.E.)	Beta, β
Leyte-Relocate	(Constant)	36.141 (5.008)	
	X_{1E}= Hazard Frequency	4.445 (1.636)	.158***
	X_{2E}= Assistance: Construction Materials	-7.143 (2.911)	-.139**
	X_{3E}= Assistance: Land	-3.433 (1.706)	-.120**
	X_{4E}= Electricity Service Disruption	-.072 (.035)	-.120**
	X_{5E}= Trust in Government After Disaster	2.118 (.865)	.140**
	X_{6E}= Community Consensus	2.574 (1.283)	.114**
	X_{7E}= Consultation with Community	-4.683 (1.601)	-.188***
	X_{8E}= Influenced by Leaders or Neighbors	2.898 (1.603)	.115*
	X_{9E}=Frequency of Attending Meetings	1.851 (.558)	.190***
	X_{10E}= Level of Participative Leadership	-2.128 (.899)	-.133**
	X_{11E}= Post-disaster Risk Acceptance Attitude	-1.009 (.183)	-.316***
	X_{12E}= Number of Family Members	-1.568 (.312)	-.291***

Note: ***p(0.01), **p(0.05), *p(0.1)

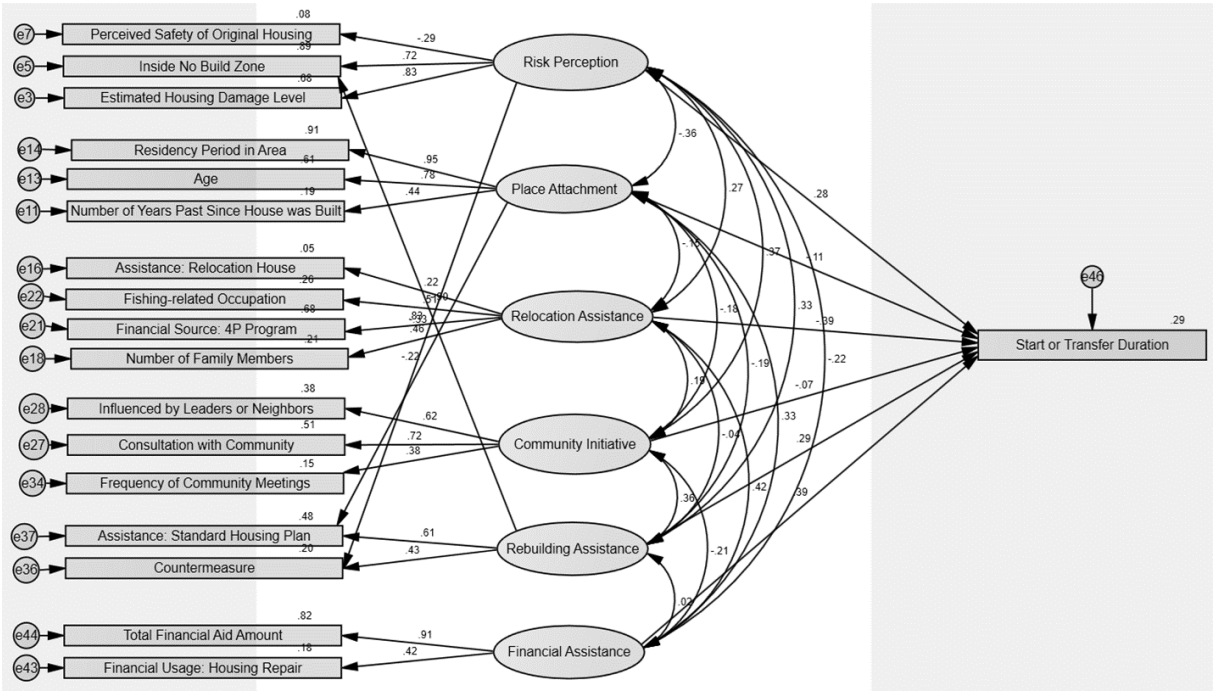
4.10 Result: Exploring Latent Constructs of Independent Variables Affecting Reconstruction Duration by Structural Equation Modeling (SEM)

4.10.1 SEM Result for Leyte-Rebuilding Case (Start and Finish)

For the rebuilding case in Leyte, the latent variables selected based on the components from PCA and remaining variables from stepwise regression analysis stepwise regression analysis were subjected to structural equation modeling. The final SEM model output from SPSS AMOS was shown in the figure with the parameters of standardized regression coefficients, measured variable coefficients, covariances and model fit indices.

For the **Starting Time Duration**, the final model was found to have acceptable fit based on the cut-off criteria. Results of the structural model part (R^2=0.29) in the table also showed that two latent variables were found to highly significantly ($p<0.05$) predicting the starting time including Risk perception and Rebuilding Assistances. To a lesser degree, relocation assistances and financial assistances constructs were also found to be significant ($p<0.10$). Considering the signs of the coefficients in the measurement model indicators of the latent constructs and the standardized regression coefficients, the model presented that from the group of indicators under Risk Perception latent variable, higher housing damage level, being inside the high risk zone or NDZ and lower perceived safety of original housing prolonged the time for households to decide to rebuild. The measured variables explained how households view their level of security living in their original residence with the consideration of the disaster impact and government policy guidelines. Moreover, for the rebuilding assistance group, the combination of the factors of having a standardized housing rebuilding plan with application of countermeasures against hazards to strengthen the housing unit and being outside the NDZ also increased the time

to decide to start rebuilding. This showed the inclination of households to follow standardized housing plan before they finally commit to rebuilding. Lastly, checking for the covariances of the latent constructs, risk perception latent group was found to be significantly correlated to place attachment and financial assistances (inverse relationships) and community initiatives (direct relationship). Rebuilding assistances group had significant direct relationship to the community initiatives latent variable. The negative relationship of risk perception and place attachment signified that they have contrasting effect in the time to decide.



Note: χ^2 (112) = 237.427, p≤0.05; RMSEA= 0.08 or SRMR= 0.09; GFI=0.90

Figure 37. SEM Diagram of Time to Start Dependent Variable for Leyte-Rebuilding Case

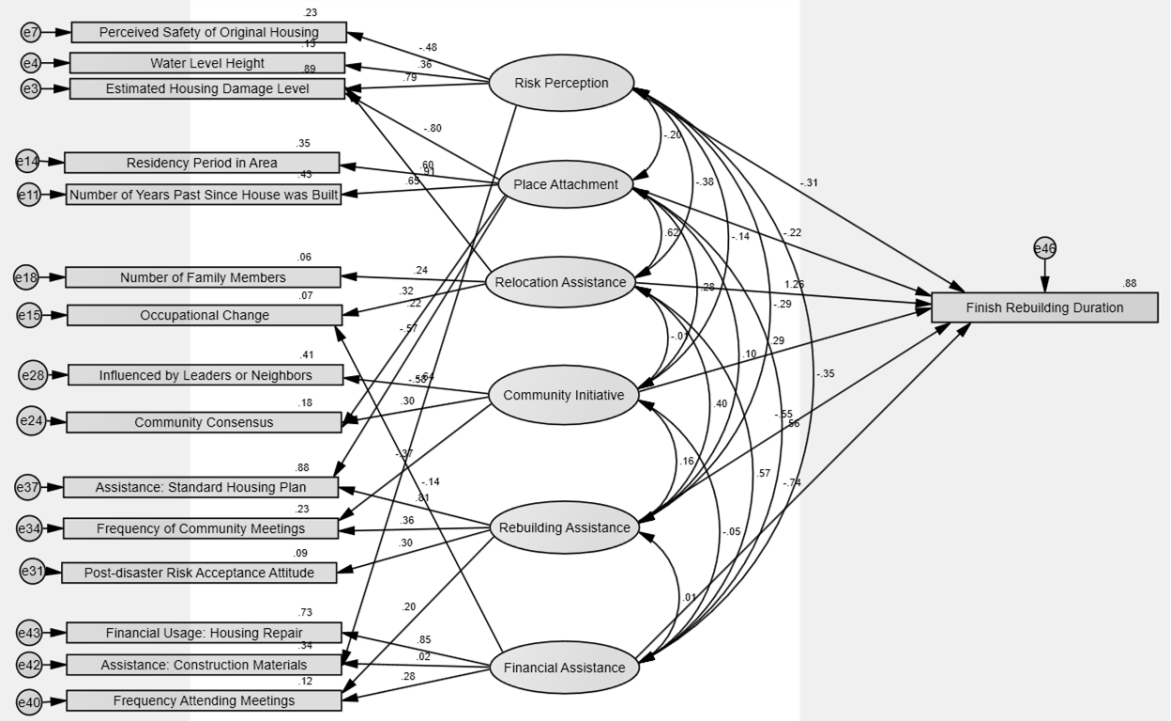
Table 23. Standardized Regression Coefficients of Time to Start Dependent Variable for Leyte-Rebuilding Case

Y	←	X	Estimate
Time to Start	←	Risk Perception	0.295**
Time to Start	←	Place Attachment	-0.115
Time to Start	←	Relocation Assistance	-0.343*
Time to Start	←	Community Initiative	-0.059
Time to Start	←	Rebuilding Assistance	0.34**
Time to Start	←	Financial Assistance	0.293*

Note: **p(0.05), *p(0.1)

Meanwhile, for the **Completion Time Duration**, the final model was also found to have acceptable fit based on the cut-off criteria. Results of the structural model part (R^2=0.88) in the table also showed that only one latent variable (relocation assistance) was found to significantly (p<0.10) predicting the completion duration to a lesser extent. Considering the signs of the coefficients in the measurement model indicators of the latent constructs and the standardized regression coefficients, the structural equation model presented that from the group of indicators under relocation assistances latent variable, higher number of respondents required to change their pre-disaster

occupation or livelihood, higher number of family members and higher housing damage level increased the time for households to finish rebuilding. The number of family members was part of the relocation assistances because of the beneficiary prioritization of larger family size as what was found in other relocation sites such as the GMA Kapuso. Moreover, although this case is under the rebuilding case, key informant interviews (i.e. Chairman Noel Martinez, LGU and Gloria Quintero, Homeowner's Association Secretary) revealed that households were pledged or promised to be given relocation assistance by donor agencies as the homeowners were approached when they were in temporary shelters. Lastly, checking for the covariances of the latent constructs, relocation assistances latent group was found to be significantly correlated to place attachment and financial assistances (direct relationships).



Note: χ^2 (76) = 104.810, p≤0.05; RMSEA= 0.048 or SRMR= 0.059; GFI=0.93
Figure 38. SEM Diagram of Completion Duration Dependent Variable for Leyte-Rebuilding Case

Table 24. Standardized Regression Coefficients of Completion Duration Dependent Variable for Leyte-Rebuilding Case

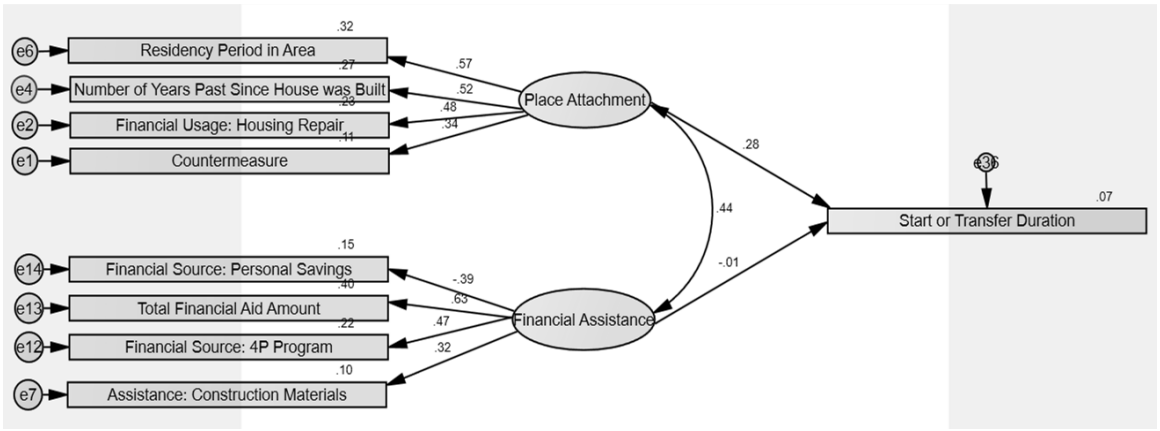
Y	←	X	Estimate
Completion Duration	←	Risk Perception	-0.306
Completion Duration	←	Place Attachment	-0.222
Completion Duration	←	Relocation Assistance	1.263*
Completion Duration	←	Community Initiative	0.287
Completion Duration	←	Rebuilding Assistance	-0.546
Completion Duration	←	Financial Assistance	-0.736

Note: **p(0.05), *p(0.1)

4.10.2 SEM Result for Manila-Rebuilding Case (Start and Finish)

For the rebuilding case in Manila, the latent variables selected based on the components from PCA and remaining variables from stepwise regression analysis were subjected to structural equation modeling. Standardized coefficients are shown in the figure with the model fit indices shown.

For the **Starting Time Duration**, the final model was found to have acceptable fit based on the cut-off criteria. Results of the structural model part (R^2=0.07) in the table also showed that only the place attachment latent variable was found to significantly ($p<0.05$) predicting the starting time. Considering the signs of the coefficients in the measurement model indicators of the latent constructs and the standardized regression coefficients, the model presented that longer residency period and longer number of years the house was built, and higher usage of resource for housing repair and planned usage for applying housing countermeasures against hazards prolonged the time to decide to start rebuilding. This delay in starting time can be due to reconsideration of emotional attachment and familiarity to the place even though they have options to temporarily move. Lastly, checking for the covariances of the latent constructs, place attachment latent group was found to be significantly correlated to financial assistances (direct relationship). This can be interpreted that people who placed high significance to place attachment had also more access to financial assistances most probably because of the sources.



Note: χ^2 (25) = 58.830, $p \leq 0.05$; RMSEA= 0.087 or SRMR= 0.072; GFI=0.94

Figure 39. SEM Diagram of Time to Start Dependent Variable for Manila-Rebuilding Case

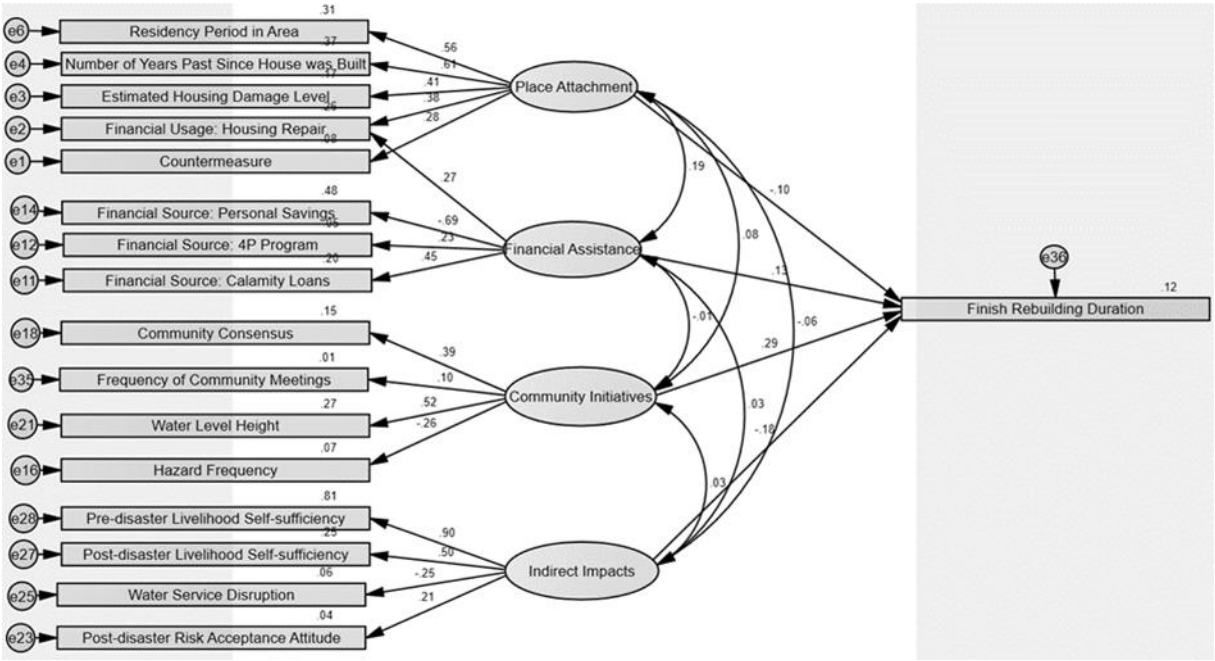
Table 25. Standardized Regression Coefficients of Time to Start Dependent Variable for Manila-Rebuilding Case

Y	<---	X	Estimate
Time to Start	<---	Place Attachment	0.277**
Time to Start	<---	Financial Assistance	-0.012

Note: **p(0.05), *p(0.1)

On another hand, for the **Completion Time Duration**, the final model was found to have acceptable fit based on the cut-off criteria. Results of the structural model part (R^2=0.12) showed that the indirect impact latent variable was found to highly significantly predict ($p<0.05$) the completion time and to a lesser degree, the community initiatives latent variable at $p<0.10$. Considering the signs of the coefficients in the measurement model indicators of the latent constructs and the standardized regression coefficients, the structural equation model presented that

from the group of indicators under Indirect Impacts, the time to finish rebuilding was shortened with higher livelihood self-sufficiency, shorter water service disruption and higher risk acceptance attitude of the households. This showed that impact to other aspects such as occupation and utility service also had an effect to the housing recovery rate. On another hand, under the community initiatives latent variable, higher community consensus, and more frequent community meetings and with higher water level height of lower frequency of hazard prolonged the time for households to finish rebuilding. As presented, the community initiatives effect is in extending the time which can be because of the added weight of forming consensus (bonds or trust) in the community before they were able to decide. Additionally, due to the negative sign of the coefficient, the time to finish rebuilding was shortened with higher livelihood self-sufficiency, shorter water service disruption and higher risk acceptance attitude of the households. Lastly, checking for the covariances of the latent constructs revealed that no latent constructs were correlated significantly to each other.



Note: χ^2 (142) = 214.823, p≤0.05; RMSEA= 0.054 or SRMR= 0.075; GFI=0.90
Figure 40. SEM Diagram of Completion Duration Dependent Variable for Manila-Rebuilding Case

Table 26. Standardized Regression Coefficients of Completion Duration Dependent Variable for Manila-Rebuilding Case

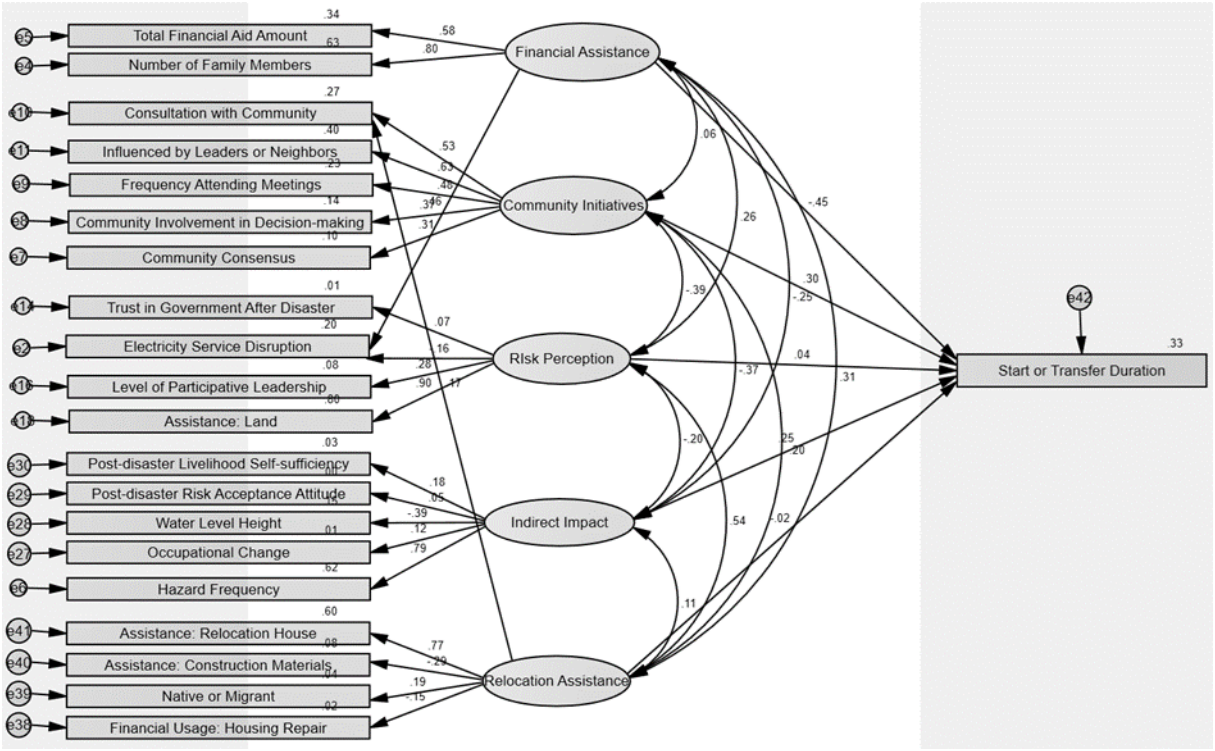
Y	←	X	Estimate
Completion Duration	←	Place Attachment	-0.099
Completion Duration	←	Financial Assistance	0.131
Completion Duration	←	Community Initiatives	0.286*
Completion Duration	←	Indirect Impacts	-0.181**

Note: **p(0.05), *p(0.1)

4.10.3 SEM Result for Leyte-Relocation Case (Transfer)

For the relocation case in Leyte, the latent variables selected based on the components from PCA and remaining variables from stepwise regression analysis were subjected to structural equation modeling. Standardized coefficients are shown in the figure with the model fit indices shown.

For the **Transfer Time Duration**, the final model was found to have acceptable fit based on the cut-off criteria. Results of the structural model part (R^2=0.33) in the table also showed that only two latent variables were found to significantly ($p<0.05$) predict the starting time. It was positively affected by community initiatives and inversely by financial assistance latent group of variables. Considering the signs of the coefficients in the measurement model indicators of the latent constructs and the standardized regression coefficients, the model presented that with higher number of households who consulted and were influenced by the community members, more frequent attendance to the meetings and with higher consensus prolonged the decision time to transfer or move as it could take more time to discuss the topic of relocation among the internally displaced families. As also found in the Manila-rebuilding-finish case, the community initiatives measured indicators delayed their time to transfer as forming consensus by involving the community members will usually take more time for discussion of the tradeoffs of the shelter options before the households finally decide. On another hand, the transfer time was shortened when the family received higher financial aid amount and if the family had higher number of family members. This indicated that the households who finally decided to transfer were committed to moving because they were able to receive sufficient financial assistances to start their lives in another location. Lastly, checking for the covariances of the latent constructs, the financial assistance latent group was found to have direct relationship to relocation assistances and risk perception. Moreover, community initiatives had significant inverse relationship with risk perception.



Note: χ^2 (173) = 389.700, p≤0.05; RMSEA= 0.075 or SRMR= 0.078; GFI=0.90

Figure 41. SEM Diagram of Time to Transfer Dependent Variable for Leyte-Relocation Case

Table 27. Standardized Regression Coefficients of Time to Transfer Dependent Variable for Leyte-Relocation Case

Y	←	X	Estimate
Time to Transfer	←	Financial Assistance	-0.452**
Time to Transfer	←	Community Initiatives	0.296**
Time to Transfer	←	Risk Perception	0.038
Time to Transfer	←	Indirect Impact	0.254
Time to Transfer	←	Relocation Assistance	-0.019

Note: **p(0.05), *p(0.1)

4.11 Cross-Checking or Internal Validity-checking of Causal Linkages

One of the research issues encountered by determining relationships of variables was on proving the causal linkage (which caused what) instead of presenting correlations only (triangulation). To address this, the questionnaire was designed to include direct inquiries asking for the following supplementary items:

a. Comparison of Factors in Rebuilding or Relocation Decisions in Leyte based on Binary Logistic Regression

b. Degree of importance (measured by Likert scale from 0 to 5) based on 5 potential key factors affecting their decision to rebuild or reconstruct (safety, financial resource, utility service, community initiatives and livelihood opportunities) and

c. Key reasons to decide to rebuild or relocate

This was employed to cross-check if the respondents' answers to the more detailed and quantified questions were consistent to these embedded items by direct response.

4.11.1 Comparison of Leyte-Rebuild and Leyte-Relocate through Binary Logistics Regression

To compare what factors affected the residency decision in Leyte case, logistic regression was performed with the dependent variable – to rebuild (0) or relocate (1). The model contained 12 independent variables. The full model containing all predictors was statistically significant, χ^2 (12, N = 201) = 272.768, p < .001, indicating that the model was able to distinguish between respondents who expressed their intention to relocate or not. The model as a whole explained between 49.9% (Cox and Snell R square) and 67.0% (Nagelkerke R squared) of the variance, and correctly classified 87.1% of cases. As shown in the table, all of the independent variables made a unique statistically significant contribution to the model. The strongest predictors were estimated housing damage and community consensus, recording odds ratios greater than 3. This indicated that respondents who had higher estimated housing damage and higher community consensus were over 3 times more likely to relocate, controlling for all other factors in the model. On another hand, the odds ratios of less than 1 were found for financial usage for housing repair, perceived safety level of original housing location, post-disaster livelihood self-sufficiency, risk acceptance attitude and age, indicating that for every additional increase in unit of the variables, respondents were less likely to relocate. Based on the remaining variables, the measured factors can be mainly attributed to risk perception determinants (X_1, X_2, X_4, and X_{10}) and community initiatives (X_7, X_8 and X_9) which supported the conclusion that both latent constructs were not only significantly affecting their actual instantaneous decision, but also the temporal decision-making in Leyte. The other latent construct of financial assistances was not directly found (except for X_3 and X_5), which represented that both generally experienced the same level of assistances.

Table 28. Logistic Regression for Rebuilding (0) or Relocation (1) Decision in Leyte Case

$$\ln\left(\frac{p}{1-p}\right) = B_0 + B_1X_1 + \cdots + B_{12}X_{12}$$

Y=Rebuild (0) or Relocate (1)	Coefficient B (S.E.)	Odds Ratios Exp(B)
X_1= Hazard Frequency	.741 (.417)	2.098*
X_2= Estimated Housing Damage Level	1.247 (.415)	3.480***
X_3= Financial Usage: Housing Repair	-3.259 (.382)	.038***
X_4= Perceived Safety of Original Housing	-.293 (.145)	.746**
X_5= Post-disaster Livelihood Self-sufficiency	-.384 (.148)	.681***
X_6= Water Service Disruption Duration	-.045 (.010)	.956***
X_7= Community Consensus	1.130 (.281)	3.095***
X_8= Frequency of Community Meetings	.281 (.120)	1.324**
X_9= Frequency of Attending Community Meetings	.279 (.120)	1.322**
X_{10}= Post-disaster Risk Acceptance Attitude	-.082 (.044)	.921*
X_{11}= Number of Family Members	.183 (.067)	1.201***
X_{12}= Age	-.021 (.011)	.979*
Constant	-6.340 (1.983)	.002

4.11.2 Degree of Importance of 5 Key Factors Affecting Reconstruction Decisions

The figure showed the spider plot of the mean scores of the Leyte-rebuilding case (169 samples), Manila-rebuilding case (180 samples) and the Leyte-relocation case (226 samples) based on the 5 factors. One-way ANOVA was performed to determine if the factors between the case groups had statistical difference. As presented in in the table, among the five variables, the degree of importance of safety, community initiatives and livelihood opportunities were found to have significant statistical difference between the case groups.

For the importance of safety, there was a statistically significant difference at the $p < .05$ level between the rebuilding case (Leyte and Manila) and relocation case (Leyte): F (2, 572) = 8.877, p = .0001. With statistical significance, the actual mean difference in mean scores is shown in the table. The effect size, calculated using eta squared, was .03 (small effect). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Leyte-Rebuild (M = 3.83, SD = .986) was significantly different from Leyte-Relocate (M = 4.18, SD = 1.006). Leyte-Relocate also differ significantly from Manila-Rebuild (M=3.62, SD=1.915). Signs of the mean differences showed that the relocation case placed a higher significance to safety than the ones in the rebuilding cases. Although magnitude-wise, the effects were considered small, the direction of difference must be emphasized that the relocation cases generally placed higher importance to the factors than the rebuilding cases. Hence, they feel safer in the new resettlement units, there were more opportunities to interact with the social group and livelihood. For the importance of community initiatives, there was a statistically significant difference at the $p < .05$ level between the Leyte case (rebuild and relocate) and Manila case (rebuild): F (2, 572) = 8.025, p = .0001. With statistical significance, the actual mean difference in mean scores is shown in the table. The effect size, calculated using eta squared, was .03 (small effect). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Leyte-Rebuild (M = 4.02, SD = 1.215) was significantly different from Manila-Rebuild (M = 3.69, SD

= 1.754). Manila-Rebuild also differ significantly from Leyte-Relocate (M=4.20, SD=.795). Signs of the mean differences showed that the Manila rebuilding case placed a lower importance to community initiatives than the ones in the Leyte cases.

Lastly, for the importance of Livelihood opportunities, there was a statistically significant difference at the $p < .05$ level only between the Manila rebuilding case and the Leyte-relocate case: F (2, 572) = 4.275, p = .014. With statistical significance, the actual mean difference in mean scores is shown in the table. The effect size, calculated using eta squared, was .04 (small effect). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Manila-Rebuild (M = 4.44, SD = 1.282) was significantly different from Leyte-Relocate (M = 4.70, SD = .617). Signs of the mean differences showed that the Manila rebuilding case placed a lower importance to livelihood opportunities than the Leyte-relocate case. This result can be explained by the programs available in the relocation sites (ex. sweat equity) that were non-existent in the areas for rebuilding.

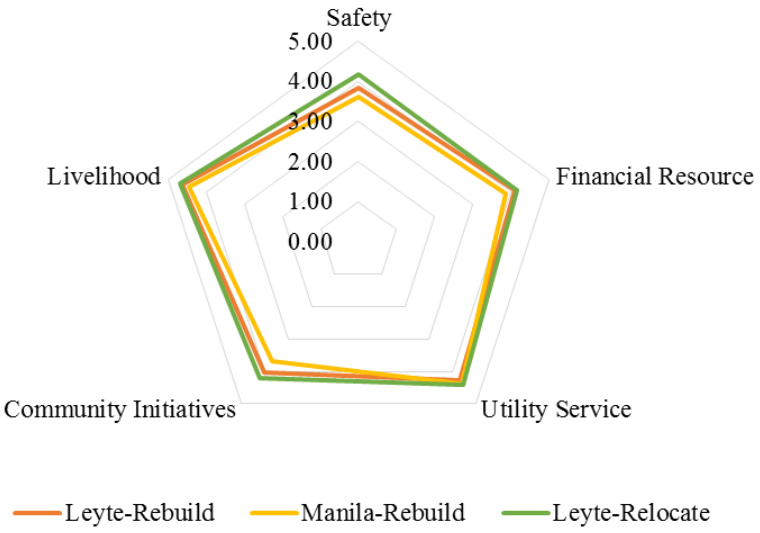


Figure 42. Mean Degree of Importance of 5 Key Factors among Reconstruction Approach

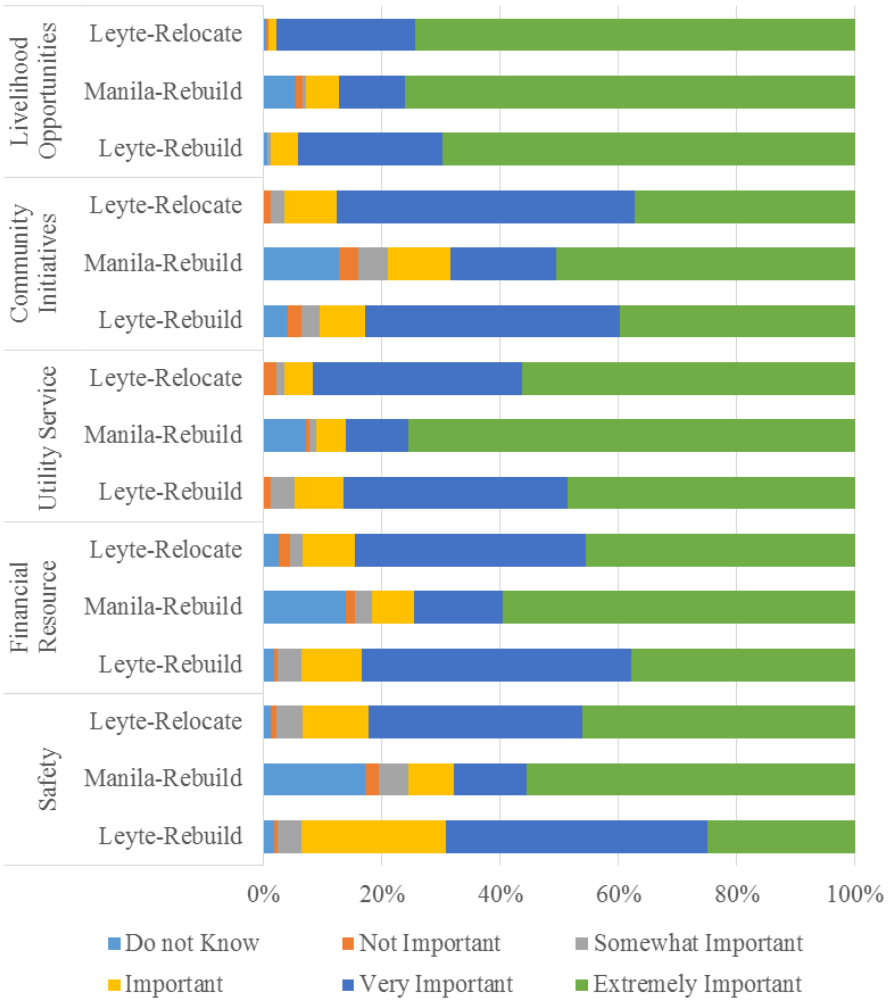


Figure 43. Distribution of Degree of Importance of 5 Key Reasons to Reconstruction by Approaches

Table 29. Mean Differences of Degree of Importance among Reconstruction Approaches based on One-way ANOVA

Dependent Variable Note: **p(0.05)			Mean Difference (I-J)
1. Importance: Safety	Leyte-Rebuild (I)	Manila-Rebuild (J)	.212
		Leyte-Relocate (J)	-.347**
	Manila-Rebuild (I)	Leyte-Relocate (J)	-.559**
2. Importance: Financial Resources	Leyte-Rebuild (I)	Manila-Rebuild (J)	.245
		Leyte-Relocate (J)	-.057
	Manila-Rebuild (I)	Leyte-Relocate (J)	-.303
3. Importance: Utility Service	Leyte-Rebuild (I)	Manila-Rebuild (J)	-.094
		Leyte-Relocate (J)	-.136
	Manila-Rebuild (I)	Leyte-Relocate (J)	-.043
4. Importance: Community Initiatives	Leyte-Rebuild (I)	Manila-Rebuild (J)	.335**
		Leyte-Relocate (J)	-.175
	Manila-Rebuild (I)	Leyte-Relocate (J)	-.510**
5. Importance: Livelihood Opportunities	Leyte-Rebuild (I)	Manila-Rebuild (J)	.176
		Leyte-Relocate (J)	-.084
	Manila-Rebuild (I)	Leyte-Relocate (J)	-.260**

4.11.3 Key Reasons to Rebuild or Relocate (Open-ended Type)

Meanwhile, the figure summarized the other factors which influenced their decisions in the long run – forced as there were no other options available or unaware of other shelter options; need to protect the original house and lot from unfortunate events like burglary and land-grabbing; proximity to facilities such as schools, hospitals, churches, etc.; emotional attachment or sense of place; comparing housing conditions and required additional or incremental expenses in accordance to the decisions. These were outlined by performing content analysis based on the responses to open-ended question style in the questionnaire. These factors served as additional parameters to supplement the quantitative sections of this research.

Chi-square tests of independence were performed to examine the relation between the reconstruction approaches and responses related to reasons to decide residency as forced or no option, safety reasons and emotional attachment. For the forced or no option, $X^2(2, N = 575) = 57.368$, $p<0.01$, the Manila-rebuilding case had the highest frequency followed by the Leyte-rebuilding and lastly, the Leyte-relocate. Moreover, for the safety reasons, the relation between these variables was significant, $X^2(2, N = 575) = 227.128$, $p<0.01$. The Leyte-relocation case had the highest percentage compared to the rebuilding cases. Moreover, for the emotional attachment, $X^2(2, N = 575) = 120.534$, $p<0.01$, the Manila-rebuilding case had higher percentage compared to both the Leyte cases.

Other observations include that higher number of households expressed that they had no option or forced but to rebuild than relocate in Leyte. Also, more people rebuilt in Leyte due to livelihood opportunities and access to basic facilities (schools, church, hospitals, etc.) in their original area compared to those who relocated. Meanwhile, more respondents were feel more secure and had better housing conditions in their new resettlement units than

those who rebuilt. The Manila rebuilding case also selected the reason of having no additional expenses required if they decided to just return to their community and rebuild.

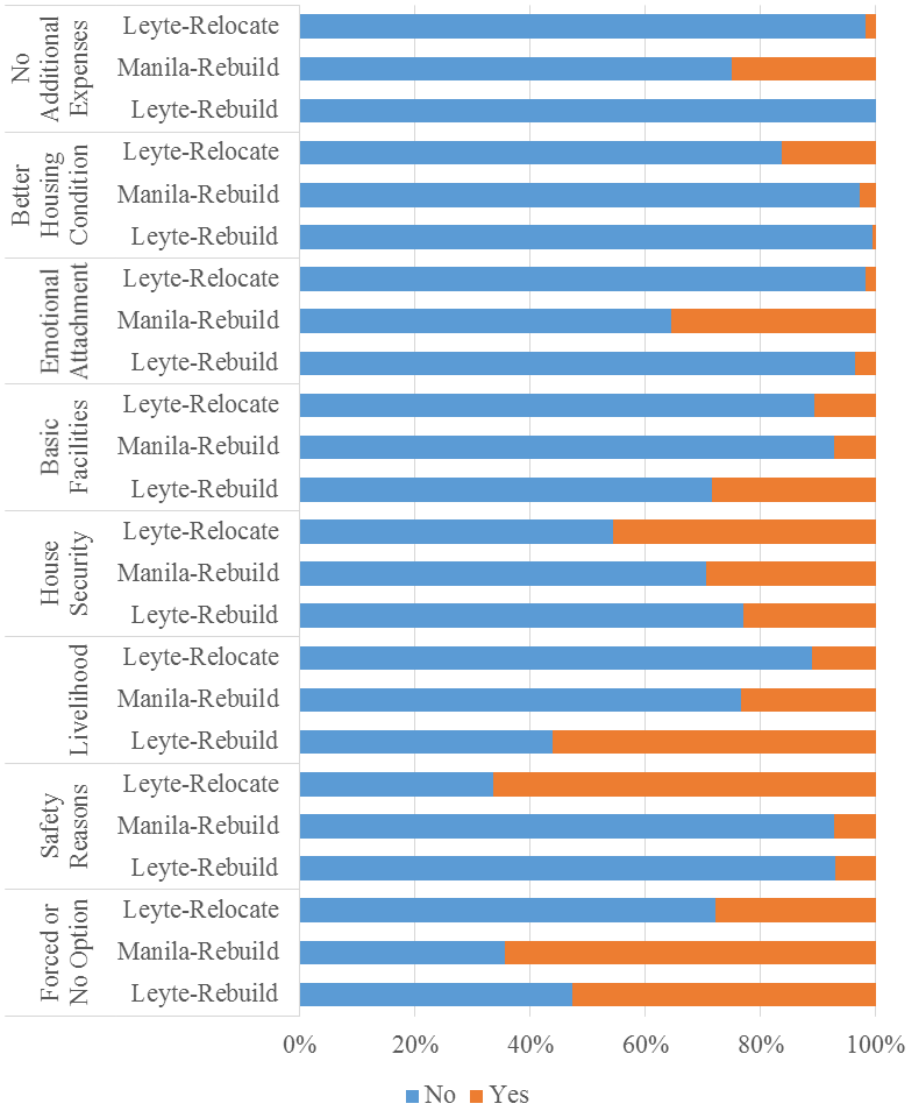


Figure 44. Reasons for Decision to Relocate and Reconstruct (Open-ended Question)

4.12 Discussion: Interpretation of Integrated Significant Determinants to Reconstruction Decisions

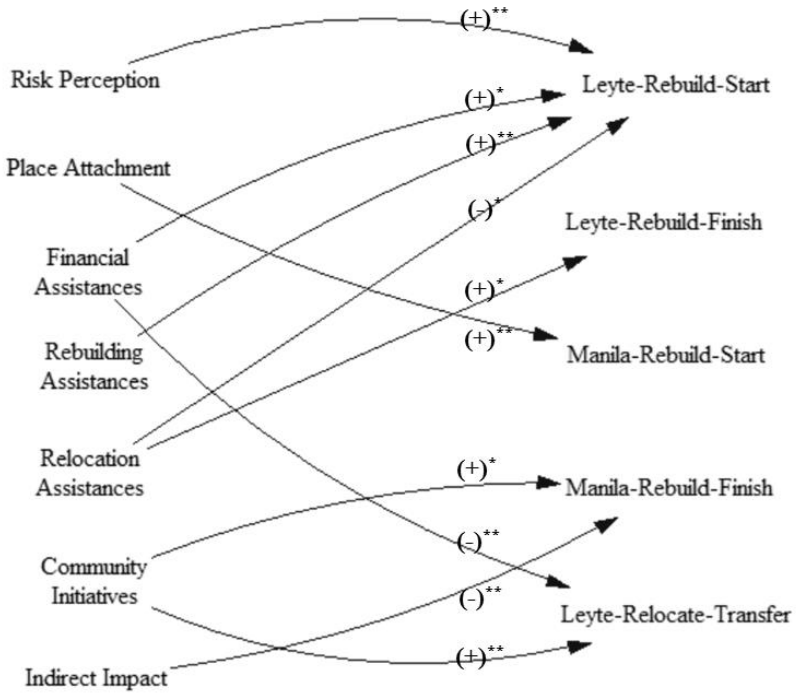


Figure 45. Integrated Systems Diagram of Significant Latent Variables Affecting Reconstruction Duration

Note: **p(0.05), *p(0.10)

Although some of the structural equation models exhibited low predictive power (R-squared values: 7% to 88%), this meant that there can be additional factors which can better predict the rebuilding and relocation behaviors. By empirically testing the group of variables in the case studies of Leyte and Manila, the figure summarized the latent variables significantly affecting the reconstruction duration (start, transfer and finish). The results of the present study were further supported or triangulated and discussed by checking also the internal validity or consistency of the claims (Section 4.12 and key informant interviews) and by showing external source validity (past researches). The interpretation of the results included the following:

4.12.1 Assistances (Behavioral Control) Influencing Outcome Expectancy and Reinforcing Behavior

In the Leyte case, assistances including financial and non-monetary assistances were able to trigger and assisted or discouraged the duration to rebuild. Observing the 3 types of assistances latent variables affecting the starting time duration, receiving various assistances in the Leyte case either prompted or discouraged them to implement the behavior of rebuilding. Positively affecting the time to start were the financial and rebuilding assistances and inversely, the relocation assistances which can be explained that the presence of a factor may facilitate or impede the behavior performance based on the households' expectancies (influencing control beliefs). For the completion (finish) duration, an interpretation can be that there was an indication of waiting or delaying behavior for future additional reinforcements as relocation assistance was also found to inversely affect the reconstruction rate

(prolonging the length of time) in the Leyte rebuilding case. Based on the key informant interview with Ms. Gloria Quintero (fisher folk homeowners association secretary in Magallanes) and Chairman Noel Martinez (local government officer), several families were offered or "promised" with relocation assistances so most households decided to rebuild "temporary or makeshift" houses. On the contrary, assistances were not able to affect rebuilding in Manila indicating a limited assistance level in the area.

In behavioral concepts, rebuilding behavior in Leyte case was (1) triggered, which related to an increase in motivation due to the desirability of the expected outcome, and (2) reinforced (positive or negative) due to incentives or rewards given over time in the form of the assistances. Expectancy theory related that the individual will behave because they are motivated to select a specific behavior over other behaviors due to the desirability of its outcome. Moreover, reinforcement (positive or negative) is defined as the consequence that strengthens future behavior whenever that behavior is initially triggered by a specific antecedent stimulus.

Moreover, considering the financial assistance latent group, it could be observed that it differentiated the Leyte case with time to start against the time to transfer with a sign difference. This further supported the claim that the financial assistance had significantly driven relocation behavior by shortening the time to transfer (negative sign) wherein households can use the monetary assistance to move while other people who did not receive the financial aid decided to rebuild temporarily and wait.

These findings are supported by past researches in the Philippines (Hudner and Kurtz, 2014) examining how financial services determine recovery in Typhoon Haiyan and another study with a more global perspective about financial aid highlighting the importance of sufficient lump sum access through formal or informal levels of financial strategies (Jacobsen, Marshak and Griffith, 2009).

4.12.2 Risk Perception vs. Place Attachment (Attitude) as Triggering Factors

In line with the integrated behavior model, the experiential attitude construct, which explains the individual's emotional response to the idea of performing the behavior, can be established through the place attachment latent variable while instrumental type of attitude is determined by cognitive beliefs about outcomes of behavior through the risk perception. It must be pointed out that the attitude constructs only played a role in the time to start to rebuild. This observation is important in strategizing housing recovery programs as these were the main triggering agents or behavioral catalysts in reconstruction decisions.

The Leyte case start rebuilding duration showed a relationship with risk perception which showed a more cognitive belief while place attachment affected the Manila case which placed more emphasis on the emotional or affective part. This could be further explained by the difference in the disaster characteristics of the low-frequency severe impact storm surge hazard experience in the communities of Leyte compared to more frequent flooding events in the past with less severe damage in the Manila case. This indicated the higher risk accepting behavior in Manila compared to the Leyte case due to sense of place.

The result is further supported by the results of the open-ended "narrative" questions in section 4.12.2 asking the respondents directly the reasons why they decided to rebuild. One-way ANOVA results showed that the Manila

rebuilding case had significantly higher mean difference than the Leyte rebuilding case. In the Manila case, 36% expressed that emotional attachment (keywords were sentiments on childhood, more familiar environment, stayed in the area for so long) was part of the reason for them to stay and rebuild compared to only 6% in the Leyte rebuilding case.

Moreover, by examining also the factor of emotional attachment from the cross-checking of causation linkage section, the most respondents from the Manila rebuilding case selected the factor as a reason to rebuild compared to the Leyte case. Their responses related to this emotion-related factor tackled about the sentiments they had for their house and the area (childhood memories) and familiarity with the current setting. Hence, the attitude-related latent variables must be incorporated in the disaster risk reduction and management programs aside from the socio-environmental variables in understanding the behavior of residents in rebuilding in disaster-prone regions.

External validity of the claim was done through reviewing past case studies. Attitude as personal traits (such as being a risk-taking person) combined with the opportunity structure within the household and within the community can discourage the person from migrating and decide to stay in the original housing location (Week, 2008). In a similar supporting study, Bonaiuto et al., (1996) used social identity theory to examine attitudes towards polluted beaches compared to place attachment. The stronger attachment people had to a place, the less they thought about the negative aspects of the place. Furthermore, past research by Peng et al. (2016), claimed that in their study in China, dimensions of risk perception (possibility and unknown) had direct, negative impacts on the dimensions of sense of place (society bond and place identity). Rural residents also overestimate disaster risks due to fatalism and reduces their place dependence. Lastly, based on the study of Anacio et al. (2016) in Laguna, Philippines, sense of place is the functional mechanism which allow residents to adapt and stay in their houses in spite of repeated experiences of flooding events in the community.

4.12.3 Community Initiatives (Subjective Norm) as Migration Driver

Community initiatives significantly influenced the transfer or relocation rate of the households in Leyte (migration driver) and also the completion duration in Manila. Societal and cultural norms about migration shape the values and benefits they hope to gain by moving. These benefits represented clusters of motivations to move, including affiliation (joining family or friends as they migrate). This could also be explained as the transfer behavior of the household both influences and is influenced by the social environment (reciprocal determinism) with measured variables involving consensus, consultation and community meeting frequency.

In support to this claim, by looking at the importance of community initiatives described in the section 4.12.1, the relocation case placed higher significance to this aspect than the rebuilding case. Moreover, according to De Jong et al. (1986) in their study in Ilocos Norte, a province in northern Philippines, perceived norms and family pressure and availability of money to finance a move were also found to determine migration behavior.

4.12.4 Indirect Impact as Environmental Factor

The indirect impact latent variable group was found to be significant only in the time to finish of the Manila rebuilding case. This external determinant (taking the outside the boundary of household capacity system), which included livelihood self-sufficiency and utility service disruption, showed inverse relationship with the completion duration. These were found to be consistent with the hypothesis mentioned in the early section of this chapter. Serving as environmental factors, the indirect impact can make it easy or difficult to perform a behavior due to the constraints.

5. RESULTS AND DISCUSSION 2: CHALLENGES TO HOUSING RECOVERY

Overview

After modeling the behavioral mechanism of the duration of housing recovery decisions in the case study areas, the research investigated the challenges to housing recovery by analyzing the gaps between beneficiary needs and the recovery program assistances. The level of beneficiary satisfaction was introduced as the parameter to evaluate the project performance in the household-level.

Using one-way ANOVA, the rebuilding case in Manila was observed to have significantly lower level of satisfaction compared to the rebuilding and relocation case in Leyte. Hence, the underlying factors which contributed to the low satisfaction level were further explored. Based on the stepwise regression using backward elimination approach, the dissatisfaction in Manila case was attributed to low personal savings, and lower financial aid amount received. Hence, the insufficiency of financial assistance was found to be one of the critical factors affecting dissatisfaction level in Manila case in terms of the assistances offered.

In addition, in Leyte case, based on the key informant interviews, other issues in project management included the weak enforcement of the no-dwelling-zone policy in the rebuilding case and delay in relocation transfer plan by prolonged land acquisition and issues in subcontracting. Lastly, the study also found that there was lack of livelihood opportunities, basic services and educational facilities in the relocation sites.

5.1 Rationale

After describing the behavioral mechanism of the housing recovery decisions in the case study areas, this chapter aimed to identify the problems or issues that were experienced by determining the gaps between the available recovery program assistances with the beneficiary needs. This section was anchored on the learning process framework focusing on analyzing the fitness between the program and the beneficiary. The learning process framework was originally developed by Korten (1980) to evaluate the performance of development assistance projects. The framework was subsequently adapted by Berke, Kartez and Wenger (1993) for disaster recovery planning. The learning process framework emphasizes the need to match the assistance provided to the actual needs of the beneficiaries in order to achieve greater recovery outcomes. This match may be improved by ensuring that 1) the organization implementing the program has sufficient capacity, and that 2) the beneficiary community is able to participate in the decision-making process of the organization. In this framework, only the matching between the beneficiaries and program will be the focus in understanding if the housing recovery assistances met the needs of the beneficiaries. Considering the logic in the structure of the dissertation, this chapter served to connect the previous chapter by finding the problem in the current behavioral mechanism to the next chapter about

proposing a solution to address the issues raised. In line with this, both social challenges and project management issues will be discussed.

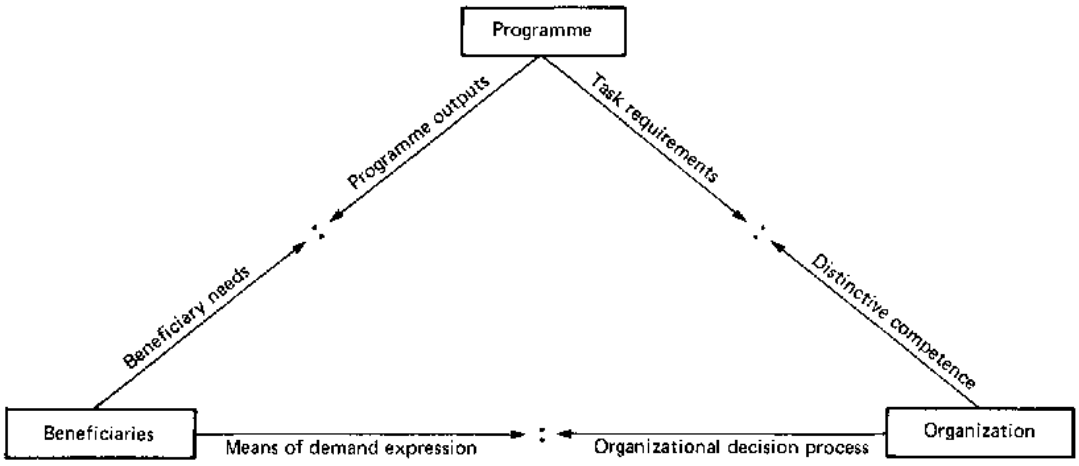


Figure 46. Fitness Requirement of Beneficiary Needs with Program Outputs for Development Projects (Korten, 1980)

5.2 Hypothesis: Fitness of Program Assistances to Beneficiary Needs

The main variable used for analysis was the level of beneficiary satisfaction, which was introduced as a social indicator of evaluating the project performance of the recovery program. This parameter had already been used in past literature to measure project performance (Lizarralde, 2009; Karunasena and Rameezdeen, 2010) and user and community participation (Barenstein, 2008; Bouraoui and Lizarralde, 2013; ESSC, 2014). Moreover, this quantitative measure will then be backed up by the narratives from key informant interviews of local government officers, village leaders and civic society groups. The main hypothesis was that the assistance mechanism especially the financial aspect is related to the dissatisfaction of the respondents. This meant that there is a mismatch between the offered programs for recovery and the requirements of the beneficiary. The author also expected other critical issues as outlined in the past reconstruction case studies in other countries mentioned in the previous chapter.

5.3 Data Analysis Method

The new paradigm for post-disaster reconstruction recognized that disaster can be an opportunity to "build back better" rather than merely satisfying the demand of communities to return to their original state immediately (Kates et al., 2006; Thiruppugazh, 2007; World Bank, 2014). Hence, decision-makers have a choice of whether to restore the status quo or to enhance development in disaster-stricken regions. The analysis evaluates the need for this holistic approach by checking the level of satisfaction of households with the housing reconstruction programs (i.e. whether or not the assistance received was related to their actual needs). It also identifies the types of assistances that would lead to greater satisfaction for each case of housing reconstruction project.

One-way ANOVA was first done to check which reconstruction approach had the lower satisfaction level which could be improved. Furthermore, stepwise multiple regression by backward elimination was performed next between the satisfaction level (dependent variable) and the monetary and non-monetary assistances-related variables (independent variables). Moreover, qualitative information from key informant interviews will be used to support the conclusion and to identify the other challenges encountered in the recovery phase (that will be difficult to evaluate quantitatively).

5.4 Result: Fitness Level of Beneficiary Satisfaction and Housing Project Performance

The level of beneficiary satisfaction was included to gauge how effective were the assistances in addressing the reconstruction needs. In terms of satisfaction level, generally the relocation cases were more satisfied than the rebuilding cases. It must be also noted that among the three stratified groups, the Manila case had the lowest mean scores in terms of satisfaction. This will be further explored as to which aspect of the assistances affected this level of dissatisfaction.

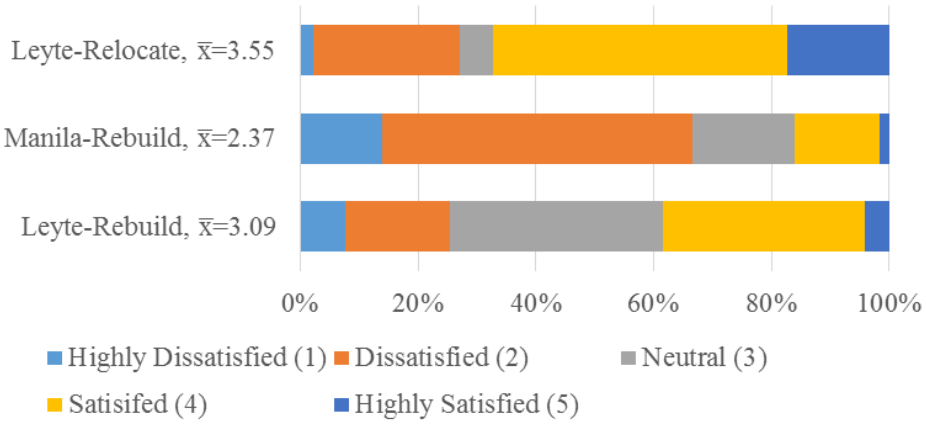


Figure 47. Level of Beneficiary Satisfaction between Rebuilding and Relocation Cases

As a pre-processing analysis, comparing the three groups by one-way ANOVA, there was a statistically significant difference at the $p < .05$ level in for the three groups: F (2, 572) = 66.35, p = .0001. With statistical significance, the actual mean difference in mean scores is shown in the table. The effect size, calculated using eta squared, was .19 (large effect). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for Leyte-Rebuild (M = 3.09, SD = 0.99) was significantly different from Manila-Rebuild (M = 2.37, SD = 0.95). Manila-Rebuild case also differ significantly from both Leyte-Rebuild and Leyte-Relocate (M=3.55, SD=1.11). Signs of the mean differences showed that the level of satisfaction was significantly higher in Leyte than in Manila. Moreover, relocation transfer respondents were more satisfied than the households who rebuild in Leyte. Hence, there was a need to focus on what potentially caused the low satisfaction in Manila case.

Table 30. Result of One-way ANOVA for Level of Beneficiary Satisfaction among Reconstruction Approaches

Level of Satisfaction	Sum of Squares	df	Mean Square	F
Between Groups	140.227	2	70.114	66.354***
Within Groups	604.409	572	1.057	
Total	744.637	574		

Note: **p(0.05), ***p(0.01), Welch Statistic: 67.97**, Eta-squared: 0.20 (large effect)

Dependent Variable (Level of Satisfaction) **p(0.05)		Mean Difference, I-J (S.E.)
Leyte-Rebuild (I)	Manila-Rebuild (J)	.722** (.11)
	Leyte-Relocate (J)	-.458** (.11)
Manila-Rebuild (I)	Leyte-Relocate (J)	-1.181** (.10)

Moreover, stepwise multiple linear regression using backward elimination was calculated to predict the level of beneficiary satisfaction (higher value, higher satisfaction) based on the 18 variables received (items from financial, rebuilding and relocation assistances latent groups). For the rebuilding case in Manila, significant regression equation of the final model after 11th iterations was found ($F(2,177) = 4.632$, $p < .05$), with an Adjusted R-square of .04. The unstandardized coefficients used in the equation and the corresponding standardized values were shown in the table.

Highlighting the Manila rebuilding case, based on the coefficient signs, level of satisfaction (Y) increased with higher personal savings and higher total financial aid amount. Both independent variables were significant predictors of level of satisfaction ($p<0.05$). Due to the low value in satisfaction level in the Manila case, this can be expressed that the respondents had low personal savings and fewer financial aid received. Hence, the financial assistance was found to be one of the critical factors affecting the satisfaction level in Manila case where low-level of satisfaction was observed compared to the Leyte case.

Table 31. Stepwise Regression Model of the Level of Beneficiary Satisfaction Variable as Dependent Variable

$$y = \alpha_0 + B_1X_1 + B_2X_2$$

$$y = 2.133 + 0.283X_1 + 2.048(10^{-5})X_2$$

Region and Shelter (Dependent Variable, Y: Level of Satisfaction)		Unstandardized Coefficients B (S.E.)	Standardized Coefficients Beta, β
Manila-Rebuild	(Constant)	2.133 (.111)	
	X_1 = Financial Source: Personal Savings	.283 (.143)	.149**
	X_2 = Total Financial Aid Amount	2.048E-05 (.0001)	.205***

As an added value, due to the dissatisfaction level, the respondents were also asked how much they were willing to pay per month for a risk sharing insurance scheme to improve their financial resilience as a preliminary exercise before moving on to the next full-blown discrete choice experiment. The distribution of responses (by range) were presented in the following figure. Monthly contribution of PhP0-100 to the premium was preferred by half of the sampled population. The rebuilding case had higher mean WTP compared to the relocation case ($\bar{x}_{reb}$ = 2.29 for rebuilding in Leyte and 2.74 for Manila > $\bar{x}_{rel}$=1.7 for relocation in Leyte) aware of the existing risks in their areas (concept of moral hazard and adverse selection must be considered). This construct of improving their financial

resilience by changing their choice from ex post to ex ante risk sharing type will be further explored in the next chapter.

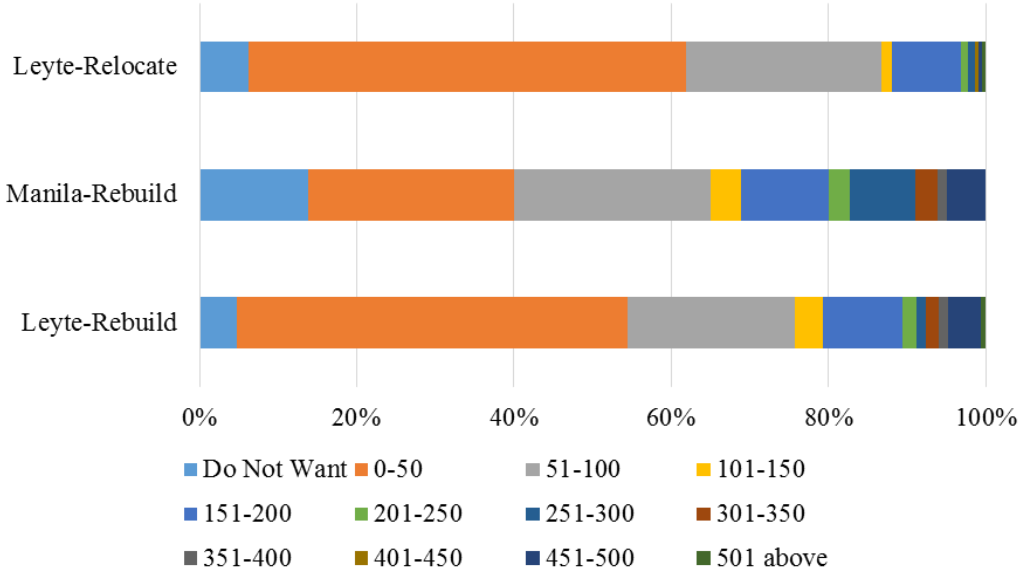


Figure 48. Willingness-to-Pay for a Risk Sharing Disaster Insurance from Preliminary Survey, in Philippine Pesos (PhP) per month

5.5 Other Rebuilding and Relocation Challenges

5.5.1 Rebuilding inside the No Dwelling Zone

The housing projects in Tacloban, including both on-site reconstruction and off-site relocation programs, are encountering problems in the different stages (i.e. preparation, design and construction stages) of project planning and implementation. These interconnected challenges are highlighted in this section.

Households located in areas highly affected by storm surge were provided with various schemes (City Government of Tacloban, 2014) such as:

1) assistance for self-recovery offered by government and non-governmental organizations in the form of shelter repair kits,
2) socialized housing program or permanent relocation to sites in the North Coast of Tacloban, and
3) Community Mortgage Programs (CMP), where an organized group of beneficiaries can purchase lots through long-term loans at socialized rates.

The first option was made available to residents living outside the NDZ. In addition, the government prescribed guidelines on how to build safer houses in safe zones (Philippines Shelter Cluster, 2014b). However, some rebuilt houses were observed to have not followed this accordingly.

On the other hand, only the second and third options were made available to residents living inside the NDZ as the revised coastal land use policy of the city government requires them to relocate to areas with lower risk to storm surge instead. However, several residents still rebuilt inside the NDZ, which indicated poor implementation of the policy. This situation also points to problems regarding the availability of assistance to all households that need to be relocated, delay in the construction of the resettlement houses, and lack of information dissemination on assistance options to target beneficiaries. According to the Tacloban City Housing Office (local government agency), the 14,433 target number of units only initially accommodates 36 barangays located within NDZ and is inadequate to serve all the families needed to be displaced to a safer zone.

5.5.2 Delay in Off-site Relocation Construction

The main challenge to project implementation for off-site permanent relocation is the delay in housing construction. On the one hand, land acquisition proved to be challenging and time-consuming as reaching an agreement with land owners needed thorough negotiation. On the other hand, especially for contractor-driven off-site relocation, subcontracting has become a serious issue as many contractors have been distributing part of their obligation to subcontractors, compromising construction quality and materials. Interview with Tacloban City Housing Office revealed that a number of materials were returned to suppliers due to poor quality, and an NGO-funded housing reconstruction project has already been stopped due to the use of sub-standard materials. Such poor construction management may only inadvertently increase risks to future disasters.

5.5.3 Social Challenges to Sustainable Development in Relocation Sites

In the relocation projects in Leyte, a number of critical social challenges had emerged, raising concerns about the long-term viability of the projects. The following sections will discuss several other essential and challenging aspects that are critical for a successful relocation, based on information from key-informants and discussions with respondents after they had completed the questionnaires.

Livelihood Opportunities

The issue of livelihood is one of the most pressing for households in resettlement units. One of the main requirements for proper relocation is for adequate livelihood opportunities to be available (Cernea, 1997). As the sites are located far from downtown Tacloban, access to jobs and other income-generating activities have become difficult for residents. This was especially the case for women who used to work as market vendors and domestic service providers, as there are no markets or business establishments near the relocation sites. On the other hand, especially for community-driven off-site relocation, some men are able to work in the construction of the permanent relocation site for PhP250/day (US$5.65/day) for laborers, and PhP350-PhP400/day (US$7-9/day) for skilled workers. Site observation by the authors also indicated that construction workers in the relocation site were mostly men. Thus, while women were able to participate in the training, they were unlikely to proceed to actual

construction work, leaving them with lesser livelihood opportunities compared to men. Still, as construction will eventually be completed, longer-term livelihood opportunities need to be made available to both sexes in general.

Accessibility and Basic Services

Permanent relocation sites are located more than 20 km north of downtown Tacloban city center, and takes about an hour ride from the city center. As the sites are currently poorly served by public transport, residents are faced with various related issues such as the cost of transportation, availability of livelihood and accessibility of schools.

Moreover, each permanent relocation house is to be provided with individual water and electricity connections. However, utility service connections were not fully prepared at the time of transfer. To address this gap, each household was provided with solar lamps by UNHCR in partnership with IOM. In terms of water, relocated residents have to buy water from an outside source for PhP30/day or US$0.68/day (at least 10% of the daily incomes of those who have work) or fetch it from a deep well around the site. It is important to note that many of the resettlement beneficiaries previously lived as informal settlers in coastal barangays and are beneficiaries of DSWD's 4P conditional cash transfer program which is mainly for families living below the country's poverty threshold.

Educational Institutions

Although learning facilities like day care centers and even elementary schools are included in the plans for relocation sites, construction of such vertical infrastructure was delayed. In this sense, it appears that the priority is to complete the row houses and move in all beneficiary families first, before commencing the construction of other facilities. Participants of focus group discussion revealed that their children have stopped going to school due to the inability to pay for commuting fares and school allowance. At the same time, because their children do not go to school anymore they have stopped receiving assistance from DSWD's 4P program. Based on Administrative Order No. 16 of DSWD (2008), the 4P program grants households PhP300 or US$7 (for elementary students) or PhP500 or US$11 (for high school students) each month on the condition that the children regularly attend classes.

Following all these challenges, many target beneficiaries who are still awaiting relocation might be dissuaded from moving into their new houses after they have finally been completed. Similarly, they might also accept the new houses but, at the same time, keep another house in informal settlements close to the city center (which might eventually result in a partial failure of the relocation program, especially if informal settlements are allowed to be used by descendants of current inhabitants).

6. RESULTS AND DISCUSSION 3: FEASIBILITY OF PROPERTY DISASTER INSURANCE

Overview

Due to the dependency of the households who rebuilt in Manila case to reactive options of disaster risk financing which affected the low satisfaction of the vulnerable population, the future tendency of the households to participate in a proactive ex-ante risk sharing insurance scheme was gauged through discrete choice experiment. Logistic regression and conditional logit modeling were performed to understand how household characteristics and proposed insurance attributes affected their choice behavior.

The barriers to insurance acceptance in the Manila case included lack of budget, lack of trust in insurance system, low risk perception of future flooding events and dependence to external government assistance. Moreover, the decision to purchase the property insurance was significantly affected by 5 household characteristics– past flood frequency, estimated property value, monthly income, monthly savings capacity in percentage and educational attainment. Among these, the strongest predictor was the educational attainment signifying that more literate households will 3 times more likely to purchase. Interestingly, respondents who experienced higher flood frequency are less likely to buy insurance, controlling for other factors in the model. Contrary to results of some past researches where high risk people are more likely to purchase insurance, the Manila case provided contrasting evidence. After checking for associations with other variables, the households were revealed to underestimate the potential housing asset loss or damage due to their lower perceived future flooding frequency as manifested also in the barriers to insurance acceptance as low risk perception. Furthermore, based on the insurance attributes, the discrete choice experiment revealed that the average respondent was (1) more willing to pay from the base values of the private insurance if the assessment type was changed to the index type with faster settlement of claims, but (2) less willing to pay from the base values to change the service provider from private to risk sharing type. For the proposed risk sharing property insurance between the public and private sectors, an uptake rate of 30-39% can be expected if this insurance type will be offered in the market.

6.1 Rationale

Based on the problem-analysis in the last chapter, there was a high dependency of the households to ex-post type of disaster risk financing (donation, loans) and less on the proactive ex ante types (insurance). Moreover, it has been established in the previous chapter that in Manila case, there was relatively low satisfaction level which was significantly influenced by the financial resource set of variables. In order to provide more information on how to gauge the future tendency of the people in the same community as in the first survey to participate in an insurance scheme, the pilot choice experiment was implemented last September 2015 in the same population as the first survey in the Manila case.

In the current risk sharing mechanism in the both Leyte and Manila study sites, the components in terms of amount, usage, distribution and delivery were inferred to have an influence to the decision-making of rebuilding-relocation choices. A failure to consider one component can lead to housing recovery delays, unresponsiveness to assistances and failure of policy implementation. To ensure a successful risk financing program geared towards housing recovery, a systematic decision tree from donors integrated with communication among all agencies involved in the transfer of financial risk (source, assessment and distribution) remains to be the challenge in the context of extreme disaster events especially in reactive types of disaster risk financing.

6.2 Past Case Studies on Willingness to Pay for Insurance

In the purchase of insurance, prospect theory is the most widely used descriptive model of choice and can explain why people choose to be uninsured as they do not want to suffer the certain loss of paying money for insurance premiums. An alternative theory contends that individuals purchase insurance to satisfy a set of goals that include financial considerations, emotional needs such as peace of mind, and satisfying social norms. Other factors that need to be considered in characterizing insurance purchase decisions are the status quo bias, availability bias, and budget constraints in affording premiums and good relationship with a trusted agent or adviser. In addition, some individuals do not know which type of insurance to buy, and unprotected consumers are not concerned that they might experience severe financial losses. (Kunreuther, Pauly and McMorrow, 2013). Moreover, insurability conditions were also outlined in the study of Mills (2007) which included assessable risk, randomness, mutuality, adverse selection, controllable moral hazard, manageable risks, affordability, solvency and enforceability.

There are variety of reasons why there is failure in the penetration of the insurance market. Moral hazard and adverse selection can partially explain for imperfections in the market for natural hazard insurance. Kunreuther (2000) defined the disaster syndrome where individuals tend to underinsure because of underestimation of the risk of low-probability-high-loss events and dependence to financial relief by the government or private charity. Additionally, the theoretical model by Raschky and Weck-Hannemann (2007) shows that a higher degree of institutionalization of governmental relief further decreases individual demand for insurance and increases the reliance on aid in a disaster situation. The phenomenon of charity hazard (Browne and Hoyt 2000) could also apply to international disaster assistance.

In the individual-level, when making decisions, individuals collect and use all of the available information in order to obtain maximum utility, well-being, and/or profit; and second, that individuals have an unlimited capacity for processing information viewing individuals as highly rational thinkers. However, Mattos and Garcia (2011) concluded that there are various important psychological aspects that determine individuals' behavior regarding the use and acquisition of information including overconfidence and limited cognitive capabilities.

Table 32. Past Case Studies on Willingness to Pay for Insurance

Source	Country (insurance type)	Factors
Seifert et al. 2012	Germany and Netherlands (property)	This study investigates how characteristics of flood risk influence household flood insurance demand based on household surveys. The willingness to pay (WTP) for insurance against medium-probability medium impact flood risk in Germany is higher than WTP for insurance against low-probability high-impact flood risk in the Netherlands. These differences in WTP can be related to differences in **flood experience, individual risk perceptions, and the charity hazard**.
Botzen and Bergh, 2008	Netherlands (property)	A stated preference survey using choice modeling with mixed logit estimation methods was performed to examine the effects of climate change and availability of government compensation on the demand for flood insurance by Dutch homeowners. The dependence of WTP on prior **risk perceptions, actual measures of risk, risk aversion, and socio-economic characteristics** was estimated. Results indicate that opportunities for partially private flood insurance market exist.
Ren, Li and Wang, 2014	China (property)	The authors investigated whether residents in rural China are willing to insure their property against flood damage and what kind of factors influence their willingness to seek insurance protection through a national survey. The results showed that there exists a strong need for flood insurance in rural China, and factors including **flood experience in past 30 years, the elapsed time since the latest serious flood, income, and insurance experience** influence rural residents' willingness to participate in flood insurance.
Arshad et al. 2016	Pakistan (crop)	This paper attempted to determine whether crop insurance is an acceptable tool against flood and drought events in rural Pakistan. Findings suggested that the **frequency and severity of the previous weather-related extremes, socio-economic settings, farm typology and the farming communities' ability to pay** need to be taken into consideration when introducing crop insurance program against flood or drought in Pakistan. Furthermore, disseminating awareness among farming communities about the future climatic changes and the associated risks of the occurrence of extreme weather events is necessary. The government's willingness to share/subsidize insurance premiums may increase the demand for crop insurance among smallholders in Pakistan and protect them from the negative repercussions of these extreme weather.

6.3 Survey Design or Structure (Manila-Rebuild Case Only)

The questionnaire contained inquiries on hazard experience, risk perception, insurance experience, actual choice experiment, socio-demographic details and was administered to 201 samples. There were 5 main policies to choose from with the attributes explained in the table. The designation of levels to attributes were facilitated by review of existing policies of commercially-available property insurance against acts of god or disasters/ crisis such as on fire, earthquake and floods as base values. Reduction in the premium rates were proposed to test if it can accommodate the low income group. The risk sharing hypothetical insurance is a tripartite agreement between the government, private insurers/ reinsurers and homeowners which will distribute the disaster consequences to a larger group aiming to lower the premium rates.

Table 33. Choices and Attributes for the Insurance System for Flooding

Summary of Choices		
Policy 1: Private Insurance	Policy 2: Community Insurance	Policy 3: Hypothetical Government Public
Policy 4: Hypothetical Risk Sharing (Public-Private) – Regular Assessment	Policy 5: Hypothetical Risk Sharing (Public-Private) Special	I will not choose any.

Attributes	**Levels**	***Explanation***
A. Service Provider	• Private Insurance Company • Insurance Company + Community Group Participation • Government • Insurance Company + Government	*Organization who manages the transactions promising to give assistance in case of a calamity*
B. Premium	• Base Values (100%): ***Low-risk Location***: PhP 250/ year for every PhP10,000 coverage and ***High-risk Location***: PhP 500/ year for every PhP10,000 coverage • 70%, 80%, 85%, 90% of Base Values	*Contribution or payment per year from the owner of the house dependent on the risk zone*
C. Assessment System	• Regular Type (Appraisal System) • Special Type (Index Based Parametric System)	*Processing system for the estimation of payout for the damaged house* *Note: Index – faster estimation by scientific parameters (ex. rainfall amount in certain boundaries)*

6.4 Data Analysis Method

There are two-stages of analysis to be performed in the collected data in Manila case. From the choice experiment executed last September 2015 in the households in Putatan, there are two ways on how to understand what affects the choice behavior or willingness to participate in the risk sharing disaster insurance – including the effects of characteristics of the households sampled and the attributes of the alternatives. The first part will be investigated using the logistic regression considering how household characteristics (ex. socio-demographic-economic variables and hazard experiences) affected their decision to agree or not with the participation. Then, the conditional logit model will present how the attributes (in this study, the varying of insurance portfolio such as service provider, premium and assessment system) will influence their choices.

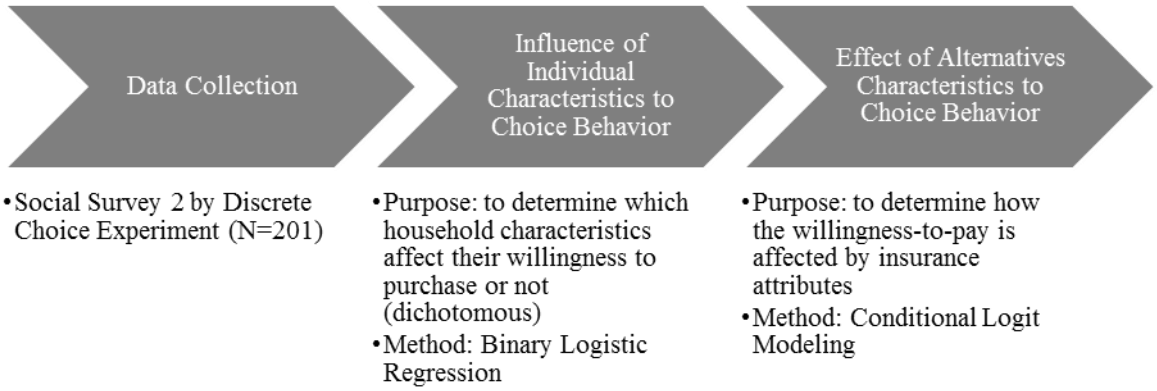


Figure 49. Methodology for Discrete Choice Experiment

6.4.1 Binary Logistics Regression

Binary logistic regression is a regression type where the independent variable is used to predict the dependent variable which is nominal or categorical data type and for which there are two categories. To obtain the maximum likelihood estimation, the dependent variable is transformed in the logit function. Logit is a natural log of the dependent variable and tells whether or not the event will occur. Wald statistics tests the significance of the individual independent variable. (Pallant, 2011). For a binary response taking the values 0 and 1, the expected value is the probability, p, that the variable takes the value one. Due to the limitation of the multiple regression for binary response, more suitable approach is to model p indirectly through logit transformation of p. (Landau and Everitt, 2004)

This leads to the logistic regression model presented as:

$$ln\frac{p}{1-p} = \beta_0 + \beta_1 x_1 + \cdots + \beta_q x_q \quad (3)$$

6.4.2 Discrete Choice Experiment (DCE)

Discrete choice experiments are quantitative method for valuing different factors that influence choices and provides quantitative information on the relative importance of various attributes that influence the choices, as well as the trade-offs between these factors and the probability of uptake of defined proposals. This method goes beyond the traditional qualitative assessments (ranking and rating) and provides quantifiable data that can better guide the selection of the most appropriate strategies in underserved areas. Unlike studies of revealed preference which relates to actual choices, DCEs can also be used to estimate the effect of policies yet to be implemented. (World Health Organization (WHO), 2012)

In a DCE, respondents are presented with a number of hypothetical choices that vary with respect to attributes and levels. DCEs are an attribute-based measure of benefit. The DCE has 5 key stages: 1. identification of

attributes and assignment of levels; 2. experimental design: deciding what choices to present to individuals; 3. development and administration of the survey; 4. data input; and 5. analysis and interpretation.

Conditional Logit Model

Conditional logit model is an extension of the multinomial logit model that is particularly appropriate in models of choice behavior, where the explanatory variables may include attributes of the choice alternatives rather than the characteristics of the individual. This applies to a setting where an agent (individual, household, firm, decision maker) chooses from an unordered set of alternatives. The conditional logit model requires variables that vary across alternatives and possibly across the individuals as well and takes into consideration the utility differences across alternatives. Factors that influence the level of utility for all alternatives in the same way can therefore not explain the individual's decision. (Rodriguez, 2016; McFadden, 1973)

Willingness-to-Pay and Uptake Rate

The willingness-to-pay is the monetary contribution that an average respondent is willing to sacrifice for a change in the alternative attributes. This is calculated by:

$$WTP = -\frac{\beta_2}{\beta_1} \tag{4}$$

Where β_1 is the coefficient of the monetary attribute and β_2 is the coefficient of other attributes changed.

Furthermore, another useful output when using to present DCEs in policymaking is how the probability of choosing a given alternative changes as levels of attributes are changed or the uptake rate. One option is to consider the change in the probability of taking the baseline (the reference category) due to a change of the one attribute level. (WHO, 2012)

The logit probability of choosing alternative i rather than alternative j is given by the formula:

$$P_i = \frac{e^{\beta' x_i}}{\sum e^{\beta' x_j}} \tag{5}$$

where x is a vector of attribute coefficients.

6.5 General Observations and Trends

6.5.1 Flooding History, Risk Perception and Insurance Experience

The years of residence in the house had a mean value of 30 years. 39% of the samples were experiencing flooding once in 2 years or less (defined as low flood risk for this study). Moreover, in the next 10 years, 12.4% of the

samples expected there will be more frequent flooding in the area (pessimistic view), 40% expected no change in frequency while the remaining samples suggested that there will be less frequent inundation events (48%). Furthermore, it was observed that there was a low penetration of insurance (only 2% for property insurance and 71% with no insurance experience).

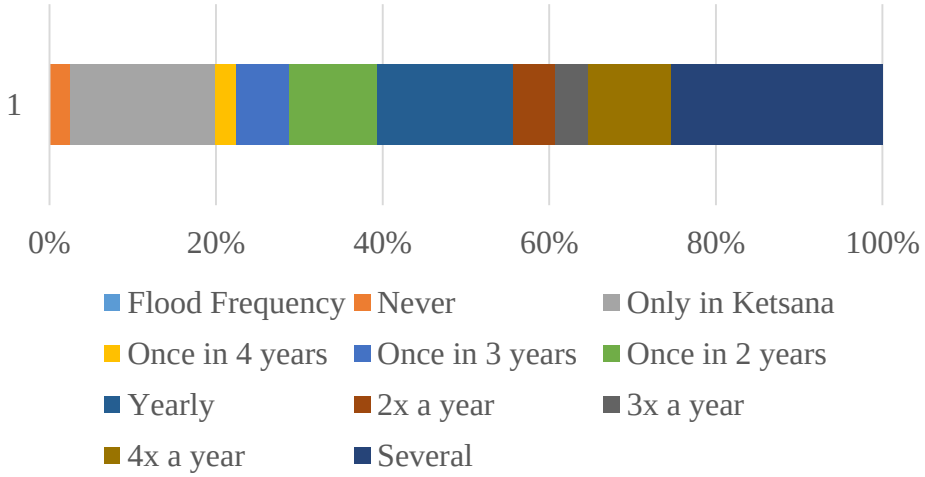


Figure 50. Past Flood Frequency in Putatan Community of the Manila case

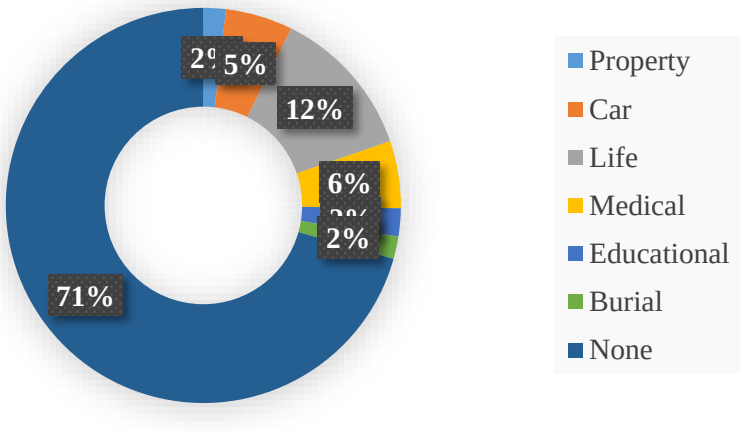


Figure 51. Types of Insurance which Respondents Participated

6.5.2 Socio-demographic Variables

In terms of the socio-economic class based on the MORES classification, the distribution was composed of lower income class C1 (33%) and D (30%) and the higher income group AB (16%) and C2 (21%). Moreover, in terms of monthly savings capacity, the mean percentage was approximately 9.8% of their monthly income. With regards

to age and sex, the range of age distribution was from 20-79 years old, and 62% were female respondents. Lastly, in terms of highest educational attainment, around 53% had college degrees and 43% in high school.

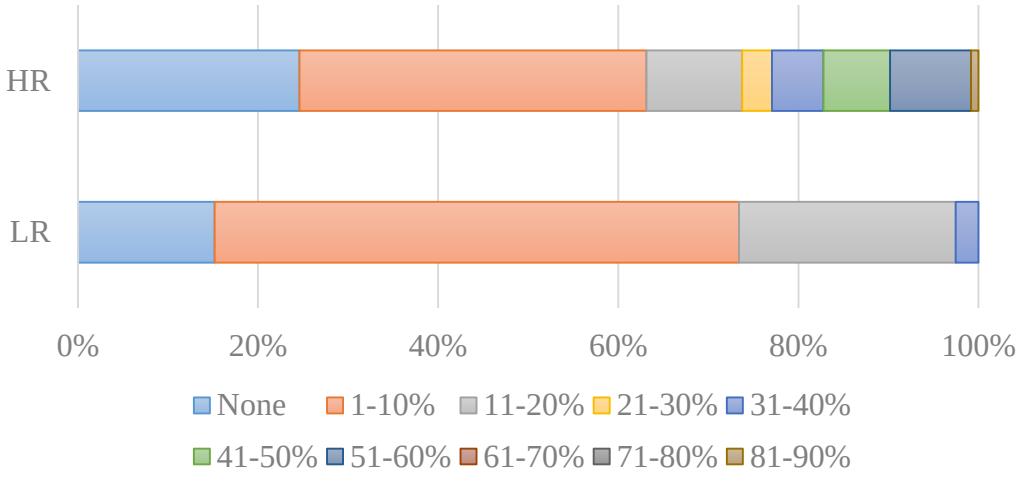


Figure 52. Savings Capacity Percentage based on Monthly Income by Risk Level

6.5.3 Direct Ranking of Insurance Attributes

However, 86% of the households were willing to participate in the insurance scheme with the following ranked attributes in terms of highest importance: (1) Settlement of Claims (32%), (2) Service Provider (26%), (3) Premium Rate (15%) and with other miscellaneous attributes such as inclusivity of housing structure and contents (10%), multi-hazard coverage (7%), longer contract period (5.5%) and flexible payment periods (4%). Interestingly, after case stratification in terms of income and hazard frequency (Low Risk-Low Income: 19%, LR-HI: 20%, HR-LI: 43% and HR-HI: 18%), the most important attribute to the low income group was the fast settlement of claims or assessment system and for the high income group, the highest ranked was the trustworthiness of service provider.

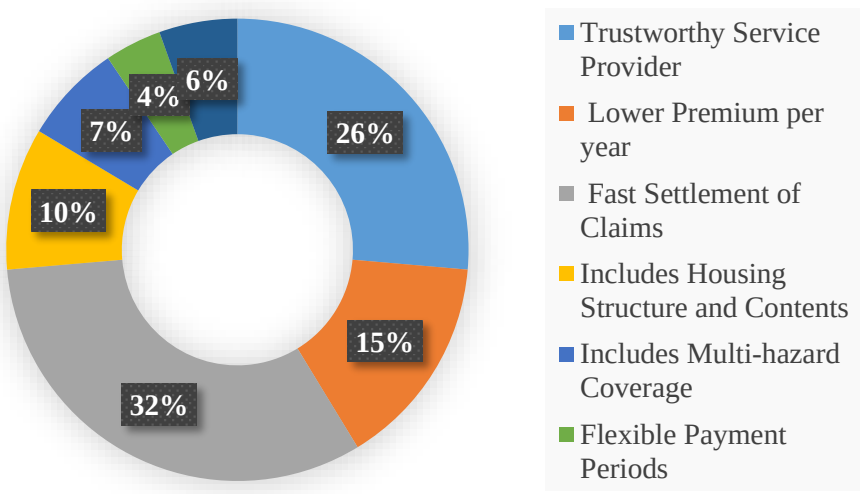


Figure 53. Importance of Insurance Attributes by Direct Ranking

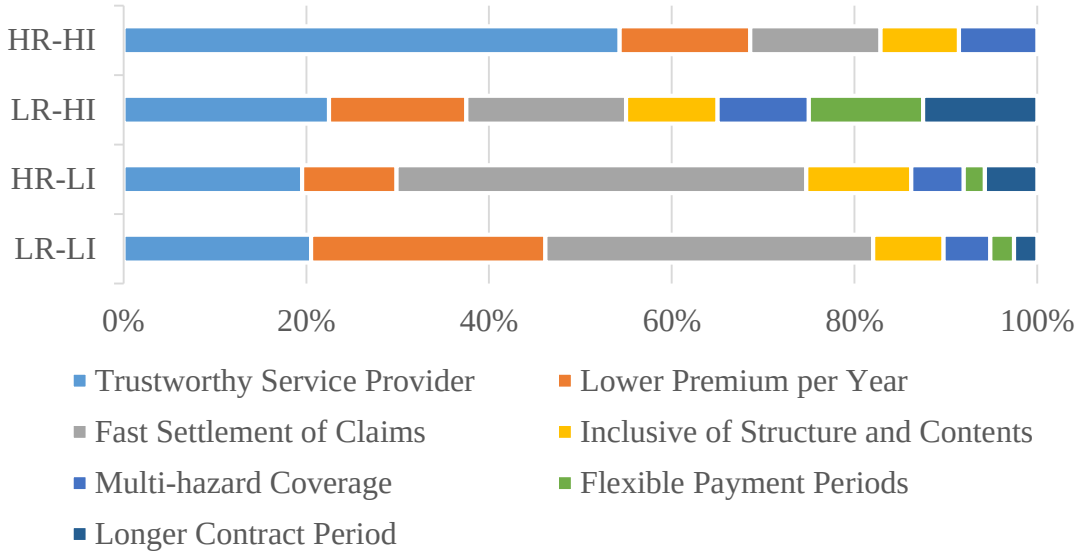


Figure 54. Distribution of Most Important Attributes by Stratified Income and Flood Risk Level

6.5.4 Barriers to Acceptance of Insurance

For those who answered a negative response with regards to participation, the reasons for not joining the insurance scheme (barriers to acceptance of insurance systems) included the following:

1. LOW RISK PERCEPTION (18%): I do not think my house will be damaged by a typhoon.
2. LACK OF BUDGET (56%): Our budget is not enough. I cannot afford.

3. LACK OF TRUST (22%): I do not believe or trust in insurance at all.
4. DEPENDENCE TO EXTERNAL ASSISTANCES (4%): Government will provide financial assistance following a disaster anyway.

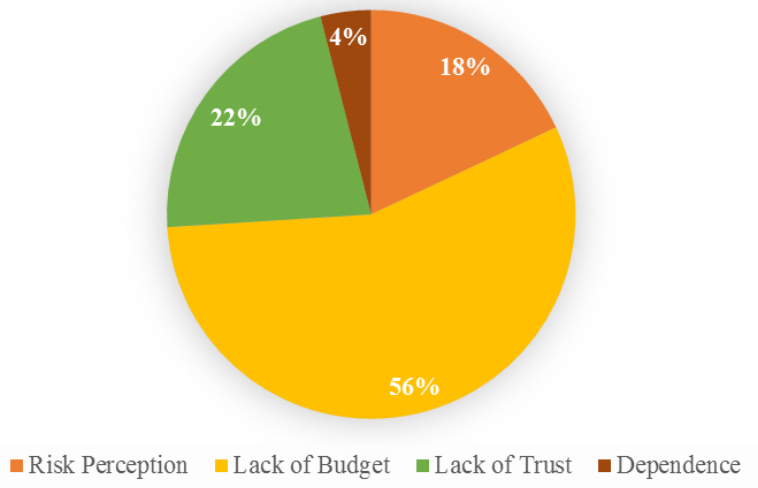


Figure 55. Barriers to Insurance Acceptance

6.6 Influence of Individual Characteristics to Willingness to Purchase Property Insurance

To check for any effect of socio-demographic variables, logistic regression was performed with the dependent variable – to purchase or not any property insurance scheme. The model contained five independent variables (past flood frequency, estimated property value, monthly income, monthly savings capacity in percentage and educational attainment). The full model containing all predictors was statistically significant, $\chi 2$ (5, N = 201) = 39.007, $p < .001$, indicating that the model was able to distinguish between respondents who expressed their intention to purchase or not. The model as a whole explained between 17.6% (Cox and Snell R square) and 31.8% (Nagelkerke R squared) of the variance, and correctly classified 87.1% of cases. As shown in the table, all of the independent variables made a unique statistically significant contribution to the model. The strongest predictor was educational attainment, recording an odds ratio of 3.11. This indicated that respondents who had higher educational attainment were over 3 times more likely to buy insurance than those who had lower educational attainment, controlling for all other factors in the model.

On another hand, the odds ratio of .78 and .67 (less than 1) for past flood frequency and estimated property value were less than 1, indicating that for every additional increase in unit of the variables, respondents were .78 and .67 times less likely to buy insurance, respectively, controlling for other factors in the model. Comparing to results of some past researches where high risk people are more likely to purchase insurance, this finding about the effect of hazard frequency provided empirical evidence that the Manila case underestimated the potential housing asset loss or damage due to future flooding events as manifested in the barriers to insurance acceptance as low risk perception. To support this claim statistically, paired samples t-test was performed to the past and perceived future flooding frequency of the same sample households. Based on the paired samples t-test, there was a statistically

significant decrease in perceived frequency of flood from past flood frequency (M=6.31, SD=3.018) to future flood frequency (M=5.28, SD=2.971, t=6.209, p<0.005) with an eta-squared statistic of 0.2 indicating large effect. Similar findings were found in a study in New York, US after Hurricane Sandy (Wharton University of Pennsylvania, 2014).

Moreover, a higher savings capacity was 1.1 more likely to participate. Meanwhile, an increase in monthly income (not highly correlated with savings capacity) will 1.6 more likely to purchase. On the other hand, other variables such as age, sex, insurance experience and usage of hazard countermeasures for houses were also tested but were not found to reach the significance level of p(0.05).

Table 34. Logistic Regression for Willingness to Purchase (1) or Not (0) a Property Insurance

$$\ln\left(\frac{p}{1-p}\right) = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5$$

Dependent Variable: Willingness to Purchase (Yes/No)	B (S.E.)	Odds Ratios (95% C.I.)
X_1= Past Flood Frequency	-.246** (.097)	.782 (.646-.946)
X_2= Estimated Property Value	-.401*** (.152)	.670 (.497-.902)
X_3= Monthly Income	.450** (.190)	1.568 (1.079-2.278)
X_4= Savings Capacity %	.061** (.028)	1.062 (1.006-1.122)
X_5= Educational Attainment	1.135** (.533)	3.112 (1.094-8.852)
Constant, B_0	-.164 (1.347)	.849

6.7 Effect of Attributes of Proposed Alternative to Willingness to Participate in Proposed Risk Sharing Insurance Scheme

Furthermore, conditional logit modeling was applied to the discrete choice data (log likelihood=-1450.3226 at 4th iteration, Prob>chi-square). All attributes (premium, service provider and assessment type) were all significant predictor of their insurance choice.

For the willingness to pay, the average respondent was willing to pay 4.7% more of the base values if the assessment type was the index type. Moreover, the respondent was willing to pay 5.8% less of the base values for every point change in service provider from private to community, government and risk sharing public-private type.

Table 35. Conditional Logit Model and Odds Ratios for Willingness to Participate in Insurance Scheme (Total Samples=201)

Y	Coefficient, β (S.E.)
Premium	0.041*** (0.002)
Service Provider	0.232*** (0.032)
Assessment Type	-0.190** (0.093)

Log likelihood= -1450.3226***
LR chi-square (3) = 1515.78
Note: **p(0.05); ***p(0.01)

Attribute	Service Provider	Assessment Type
WTP (95% C.I.)	**- 5.71** (-7.09, -4.33)	**+ 4.67** (0.43, 8.91)

To understand the social implication of the experiment, uptake rates for the whole sample set were presented in the figure. The increasing trend with respect to premium rate was expected as more people will more likely choose the cheaper option. In this case, the government type has to reduce by 30% of the base value premium of private insurance. However, due to the lack of financial resource of the Philippine national government to offer full insurance coverage to housing properties, this policy is deemed to be less feasible (OECD-APEC, 2013; Climate Change Commission, 2016). As a next best alternative, for the proposed type of risk sharing property insurance for flooding, there was a probability of an uptake rate of 30% for the index parametric type of appraisal to 39% for the regular appraisal type.

6.8 Discussion: Feasibility of Insurance Penetration in Relation to Behavioral Change

This experiment served as an initial community-level examination of the feasibility to implement a metropolitan-wide risk pooling property insurance which will foster resilience-thinking among the decision-makers. The discussion will be anchored on the constructs presented in the health belief model (behavioral change model) to recognize how their choices were affected in a more systematic approach.

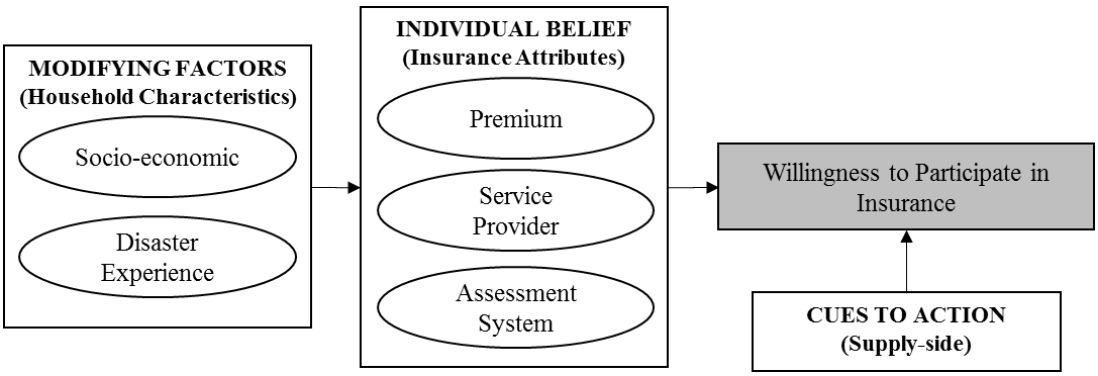


Figure 56. Model of Choice Behavior for Willingness to Participate in Disaster Insurance

6.8.1 Effect of Modifying Factors to Behavioral Change

The decision to purchase the property insurance was significantly affected by 5 control variables - past flood frequency, estimated property value, monthly income, monthly savings capacity in percentage and educational attainment. These variables can account for the modifying factors as mentioned in the health belief model which includes the individual characteristics such as the socio-economic-demographic variables. Among 5 household characteristics significantly affecting willingness to purchase, educational attainment was the highest predictor. A practical strategy to consider is risk communication targeting the lower literacy regions in Manila.

6.8.2 Understanding Individual Belief through Choice among Hypothetical Insurance Types

The discrete choice experiment revealed that the service provider had to relatively lower down the premium based on the currently available baseline amount of private companies for a higher uptake rate of property insurance. This can be interpreted as households estimating the trade-offs (benefits – barriers). It was mentioned in the previous section that the barriers included lack of budget and to a lesser extent, lack of trust and dependence to government assistance. With the lack of budget, the tendency of the decision-maker is to accept the lower premium. Moreover, government assistance is more likely to be chosen due to the issue on dependence to external donors. With similar benefits, the last factor about trust cannot be truly be assessed due to the effect of the other barriers.

6.8.3 Cues to Action as Recommendation to Supply-side of Insurance Industry

In the point of view of the organizational units offering insurance (private insurers and government), disseminating awareness (through media or social dialogues) among communities about how insurance works (especially in lower literacy regions) is imperative. The partnership between the government and private companies sharing insurance premiums with households may increase the demand for insurance and protect them from the negative impacts of these extreme weather events. These recommended cues to action is more strategically required in the supply-side of the insurance market.

7. SUMMARY AND CONCLUSION

The research design integrated the results of the past behavior and future tendency of updating the individual belief by improving their behavioral control. The key constructs used in the study were based on the integrated behavioral model for retrospective causation analysis and health belief model for the prospective behavioral assessment.

7.1 Research Output: Empirically-supported Behavioral Mechanism Framework

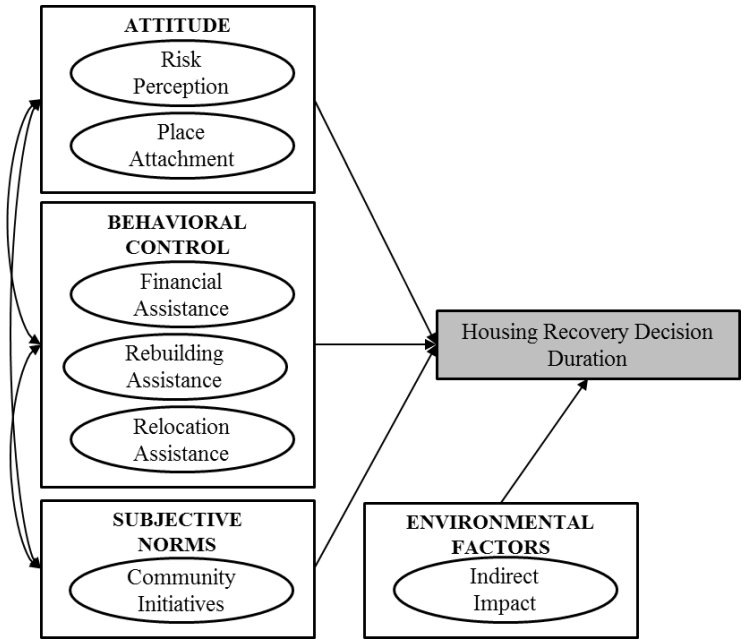


Figure 57. Post-disaster Housing Recovery Behavioral Temporal Decision-making Framework

The main output of the research was the empirically-supported determinants or variables in the framework, which significantly affected the reconstruction decisions over time. The latent constructs of risk perception, place attachment, financial resources, non-monetary assistances (rebuilding and relocation assistances), community initiatives and indirect impacts were found to have significant influence to the duration to decide. It must be noted also that the socio-demographic variables were embedded in these constructs as mediating effect. Moreover, location- based reconstruction approaches of rebuilding and relocation had unique interactions with the respondents' decisions.

To discuss the linkage to behavioral constructs, the analysis was anchored using the integrated behavioral model. The assistances including financial and non-monetary assistances affected the household expectancies on the outcome and self-efficacy which triggered their choice to rebuild and also acted as behavioral reinforcements which assisted or discouraged the behavior (Leyte Case). Meanwhile, under the main construct of attitude, risk perception which is the cognitive response to disaster (instrumental attitude) was found to affect the Leyte case recovery as triggering factor, while place attachment as emotional or affective response, affected the Manila case. This can indicate the risk accepting behaviors of the Manila case and can be further explained through the population characteristics and the cultural theory of risk. Lastly, both community initiatives (social norm) and financial assistances represented as significant migration drivers.

In terms of framework applicability, it must be considered that the current models serve as preliminary indicators for similar urban households to Manila and Leyte to be subjected to micro-scale household-level analysis of recovery rate. The type of dwellings found is only inclusive of attached or detached single family housing structures. Moreover, these communities experienced extreme typhoon events with high return periods but different hazard regimes involving storm surge and flooding with differential level of devastation. Lastly, the target timeframe is recovery phase of the disaster management cycle with the assumptions that households are deciding more rationally compared to the relief phase.

7.2 Academic Contribution

The main academic significance of the research in the theoretical aspect was on linking the research gaps by providing multivariate quantitative analysis of post-disaster housing recovery which (1) focused on psycho-social cognitive aspect of resilience assessment in disaster events; (2) integrated rebuilding and relocation cases in analyzing recovery rate measured through temporal scale and (3) empirically-tested the behavioral decision-making framework through communities in the Philippines as a developing nation after extreme events. More importantly, the analysis provided the initial set of latent constructs (which researchers can further explore with additional predictors) in better understanding not only how decisions were formed based on their motivations, but also how decisions are maintained through time until the desired outcome is achieved.

Moreover, with regards to the empirical aspect, the study focused on micro-scale analysis of housing recovery in a developing country affected by extreme disasters. This provided recent and additional literature to the observed lack of research in understanding behavioral decisions at local-level especially in the developing nations. Lastly, as a recommendation for future research works, the inclusion of spatial considerations, application of longer longitudinal study that can widely capture the progress of reconstruction, consideration of the impact of actual policy to individual decision-making and path analysis of the different latent constructs are further suggested.

7.3 Practical or Social Implications

The practical implications of the research rested on the understanding of the current and future behavioral mechanism of the households in the Philippines specifically. These consequences of the research findings were mainly focused on how the research can be used to form better strategies in the designing future housing recovery programs and policies. The behavioral mechanism highlighted the combination of attitude, behavioral control, subjective norms and environmental factors which served as triggering or reinforcing factors. The suggested coping responses are highlighted in the following:

Main Triggering Components	Suggested Coping Response	Behavioral Decision
Place Attachment/ Risk Perception	+ Property Insurance	= Rebuild
Community Initiatives	+ Financial Assistances	= Migrate

For a successful housing recovery, considering the concept of risk perception and place attachment of the vulnerable population can be incorporated in the design of the programs. For groups that placed high significance on place attachment indicators as portrayed in the Manila case, the households will more likely trigger rebuilding on-site even with insignificant level of external assistances. These rebuilding cases in safer zones can be offered with property insurances to increase their capacity to cope up in the next disaster.

In line with this, based on the result of the feasibility study for proposed property insurance scheme, the risk sharing between the public government and private companies lowering insurance premiums was expected to increase the demand for insurance and financially protect these households from the negative impacts of these future extreme weather events. However, this proposed scheme entails reaching agreement of interests between the organizational units who will offer lower premium insurance for shared goal (private insurers and government) and disseminating awareness campaigns (through media or social dialogues) among communities about how insurance works (especially in lower literacy regions). These are imperative steps to increase the acceptance of insurance and can be strategically planned in the supply-side of the insurance market.

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9. APPENDICES

9.1 Questionnaires

9.1.1 Social Survey 1: Leyte-Rebuild or Manila-Rebuild (March 2015 and 2016)

Survey Questionnaire about Housing Reconstruction after Typhoon Yolanda, 2013 • Target Respondents: **HOMEOWNERS who REBUILD DAMAGED HOUSES** in Tacloban • Research Objective: To investigate the reasons for household decisions in choosing among housing options (to rebuild on-site or relocate off-site) after the disaster • Estimated Time for Interview: **20 minutes** with **53 Questions**	Questionnaire Label:

I. Interview Details

1. Date of interview	
2. Time Started	
3. Name of Interviewee	
4. Address or GPS Coordinates of Current Housing	Address: _____ Latitude: _____ Longitude: _____

II. Housing Damage Assessment and Hazard Characteristics

5. How frequent is your original house inundated by storm surge in a year?	☐ Only in Yolanda ☐ Once a year ☐ Twice ☐ 3x ☐ Others: _____
6. How high is the storm surge level in Yolanda that reached the house?	☐ _____ meter ☐ Ankle-level ☐ Knee-level ☐ Waist-level ☐Human-height level ☐ More than 1st floor
7. Which housing material is used for the Main Structure and Roof at the time of Typhoon Yolanda?	Structure: ☐ Concrete ☐ Wood ☐ Others: _____ Roof: ☐ Iron Sheets ☐ Roof Tiles ☐ Others: _____
8. Estimated House Lot Size or Land Area (use number of paces if not known)	_____ squared meter (m^2) _____(#forward steps) and _____(#side steps)
9. How many storey/s is your house?	☐ 1 ☐ 2 ☐ 3 ☐ others: _____
10. What year was your original house built?	☐ Do not Know ☐ Year: _____
11. How severe is the estimated damage in your original house? Please select the most severe damage mentioned.	
☐ 0- No Damage ☐ 1- Floors with mud, Punctured Roof ☐ 2- Walls with Crack, Broken Windows or Detached Roof ☐ 3- Walls Collapsed and Posts Fell Down ☐ 4- Structure Flushed by Surge, Totally Destroyed	

III. Post-disaster Housing Reconstruction Experience

12. Where did you stay from the time of the disaster to before rebuilding your house?	

13. How long did you stay in temporary shelters (bunkhouses or tents) and evacuation centers?	☐ Did not Stay ☐ 1-2 weeks ☐ 3 weeks - 1 month ☐ others: _____
14. Where did you receive guideline or information on the safety of rebuilding houses in original location?	☐ Personal Decision ☐ Local Government ☐ National Government ☐ Village Association Leader ☐ Neighbor ☐ Relative ☐ NGO representative ☐ Others: _____
15. Is your house located within 40 m. from shoreline?	☐ Yes ☐ No ☐ Do Not Know
16. How long did it take to **START** rebuilding your house again from the time of Typhoon Yolanda?	☐ Did not Reconstruct ☐ After 1-2 weeks ☐ 3 weeks - 1 month ☐ Others: _____
17. How long did it take to reconstruct from the time you STARTED rebuilding the damaged house?	☐ Did not Reconstruct ☐ 1-2 weeks ☐ 3 weeks - 1 month ☐ Others: _____
18. What countermeasure/s did you apply to strengthen the house against future flood or strong typhoon wind?	☐ Did not Apply ☐ Elevate Ground ☐ Change to More Durable Materials ☐ Others: _____

19. Which of the following did you receive or was provided after the disaster? Check all that apply.

☐ Money ☐ House Repair Kit	☐ Relief Goods ☐ Livelihood Training
☐ Construction Materials: _____	☐ Medical Help ☐ Toilet or Sanitary Facilities
☐ Construction Skills Training for Rebuilding House	☐ Others: _____
☐ Standard Design for Flood-proof House	

20. How satisfied are you in terms of the assistance you received? If Dissatisfied, what are the problems you encountered?	☐ Highly satisfied ☐ Satisfied ☐ Neutral ☐ Dissatisfied ☐ Highly Dissatisfied Problems: _____

A. Financial or Monetary Assistance

21. Who provided information to you about any External Financial Aid for rebuilding house at original location? Check all that apply.	☐ Personal Knowledge ☐ Village Association Leader ☐ Neighbor ☐ Relative ☐ Local Government Official ☐ National Government ☐ NGO representative ☐ Others: _____

22. Which of the following are the sources of Financial or Monetary Aid after the disaster? Check all that apply.

☐ Personal Savings or Owned Assets	☐ Government: Calamity Loan
☐ Money from Relatives	☐ Loan from Private Institutions (Lending/ Banks/ Work Loan)
☐ Money from Neighbors	

☐ Government: DSWD Pantawid Pamilyang Pilipino Program (4Ps)	☐ Compensation from Property Insurance ☐ Donation from NGO: _____ ☐ Others: _____
23. Describe the process of application on how to be a beneficiary of the monetary aid.	☐ Did not Apply ☐ Process: _____
24. If no financial aid received, what are the reasons why you did not apply for any financial aid from government or private institutions?	☐ Expensive Repayments ☐ Not informed about Application ☐ Difficulty in Access ☐ Takes Long Time to Receive Aid ☐ Others : _____
25. If you RECEIVED Financial Monetary Assistance or BORROWED Money from Another Party, answer (a) to (e):	
(a) How much was the total financial aid?	₱_____
(b) When did you start receiving the aid or compensation from the date of typhoon?	☐ After 1-2 weeks ☐ 3 weeks - 1 month ☐ Others: _____
(c) How many months did you receive money?	☐ Received only Once ☐ Number of Months: _____
(d) Where did you use this money for?	☐ House Repair ☐ Livelihood Capital ☐ Food ☐ Others: _____
(e) If borrowed, what are the problems you encountered in repaying the debt/ loan?	☐ No Problem/ I do not have to repay ☐ High Interest Rate ☐ Frequent Repayment ☐ Others: _____

B. Government Assistance

26. Which government assistance programs (monetary and non-monetary) are you benefitting from after the disaster? Check all that apply.	☐ None ☐ Calamity Loan ☐ 4Ps ☐ Government Land ☐ Government-funded Housing ☐ Others: _____
27. How satisfied are you in the support given by the government? If Dissatisfied, what kind of assistance was lacking or problems you encountered?	☐ Highly satisfied ☐ Satisfied ☐ Neutral ☐ Dissatisfied ☐ Highly Dissatisfied Assistance Lacking/ Problems: _____ _____

C. Reasons for On-site Reconstruction Decision

28. What are your **Reasons or Motivations** why you decided to reconstruct at your original location or to not be relocated?	☐ No Other Choice ☐ Location is Still Safe ☐ Location of Original Livelihood ☐ Need to Protect Property ☐ Others: _____
29. What do you think are the **Advantages** of staying at your original housing location than relocation? List all mentioned.	
30. What do you think are the **Disadvantages** of staying at your original housing location than relocation? List all mentioned.	

31. How important are the following factors that might have affected your decision to **reconstruct/ to rebuild**? Use **X** mark.

Reasons for Decision:	**Do not Know**	**Not Important**	**Slightly Important**	**Moderately Important**	**Very Important**	**Extremely Important**
A. Safety of Original Housing Location						
B. Financial Aid for Reconstruction of Damaged House						
C. Water and Electricity Utility Services						
D. Community Assistance and Collective Action to Reconstruct						
E. Access to Livelihoods						

32. How **safe or secure** in terms of future disaster, crime or disease is the location of your original house? Scale: 0-4.

☐ 0- Unsafe ☐ 1-Slightly Safe ☐ 2-Moderately Safe ☐ 3-Very Safe ☐ 4-Extremely Safe

33. How **self-sufficient or able to provide daily needs** are you in terms of the current livelihood you have compared to before the typhoon? Scale: 0-4.	Before Disaster: ☐ 0- Not Sufficient ☐ 1-Slightly Self-sufficient ☐ 2-Moderately Self-sufficient ☐ 3-Very Self-sufficient ☐ 4-Extremely Self-sufficient After Disaster: ☐ 0- Not Sufficient ☐ 1-Slightly Self-sufficient ☐ 2-Moderately Self-sufficient ☐ 3-Very Self-sufficient ☐ 4-Extremely Self-sufficient

34. If water and electricity services were disrupted, how long was the restoration period from the time of

disaster?	
(a) Water	☐ No Disruption ☐ 1-2 weeks ☐ 3 weeks - 1 month ☐ others _____
(b) Electricity	☐ No Disruption ☐ 1-2 weeks ☐ 3 weeks - 1 month ☐ others _____

D. Community Decision-making

35. Who are the people you consulted with for advices if you should rebuild the damaged house? List down the first 3 mentioned.

☐ No One ☐ Village Association Leader ☐ Neighbor ☐ Relative ☐ Government Official ☐ NGO representative

☐ Specific Person Name: _____Relationship: _____ Address: _____

36. How was your decision to rebuild your damaged house affected by your neighbors or village association leader?

☐ Not Affected ☐ By Meetings with Village Association ☐ By Advice from Close Friends/ Relatives ☐ By Following Other Households who Started Rebuilding ☐ By Sharing Information about House-Rebuilding with Neighbors

☐ Others: _____

37. How frequent are the village meetings for village development held in your original community?	☐ Once a week ☐Once in 2 weeks ☐ Once in 3 weeks ☐ Once a month ☐ Never ☐ Others: _____
38. How frequent do you participate in meetings?	☐ Never ☐Seldom ☐Sometimes ☐Often ☐ Always

39. Did you discuss about the reconstruction of damaged houses? What are the topics discussed in these meetings?

☐ Did not Discuss/ Do not Know ☐ Labor and Skills Needed
☐ Information about Financial Assistance ☐ Materials to be used in Houses
☐ Design of Housing Unit ☐ Others: _____

40. How do the village association, local government and community leaders usually make collective decisions?

☐ The leader decides and informs the other group members. ☐ The leader asks households what they think and then decides.

☐ The households hold a discussion and decide together. ☐ Others: _____

41. If there was a problem (ex. disaster, violence, disease) that affected the entire village/neighborhood, who do you think would work together to deal with the situation?

☐ Households deal individually ☐ Neighbors among themselves ☐ Local government/municipal political leaders. ☐ All community leaders acting together ☐ The entire village/neighborhood ☐ Others: _____

E. Risk Attitude

42. How will you rate your tendency for accepting **financial risks on investing** or gambling? Scale: 0-10.	☐ 0 (Risk Avoiding) ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 (Risk Accepting)
43. If you will be asked to apply for **property insurance against typhoon damage** so that you can get financial aid at the time of disaster with more ease, how much are you willing to pay in a month for this insurance scheme?	☐ Do not Want ☐ ₱0-50 ☐ 51-100 ☐ 101-150 ☐ 151-200 ☐ 201-250 ☐ 251-300 ☐ 301-350 ☐ 351-400 ☐401-450 ☐451-500 ☐Others: _____

IV. Personal Information

44. Current Primary Occupation of Head of Family	
45. Pre-disaster Primary Occupation of Head of Family	☐ Same ☐ Other Occupation: _____
46. Estimated Current Total Monthly Income of Household	☐ ₱0-10,000 ☐ ₱10,001-20,000 ☐ ₱20,001-30,000 ☐ ₱30,001-75,000 ☐ more than ₱75,001
47. Total Number of Family Members Living in the House	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ others: _____
48. Type of Legal Form of Original Residence	☐ Owned ☐ Rented ☐ Informal ☐ Others _____
49. How long have you resided in Tacloban? Did you migrate to Tacloban from another area?	Number of Years: _____ ☐ Since Birth ☐ Migrated from Outside Tacloban

50. Age	51. Sex	52. Highest Educational Attainment
	☐ Male ☐ Female	☐ Elementary ☐ High School ☐ College ☐ Higher Degree

53. Time Ended	

Thank you very much for your time.

9.1.2 Social Survey 1: Leyte-Relocate (March 2015)

Survey Questionnaire about Housing Reconstruction after Typhoon Yolanda, 2013 • Target Respondents: **PERMANENTLY RELOCATED HOMEOWNERS** in Tacloban • Research Objective: To investigate the reasons for household decisions in choosing among housing options (to rebuild on-site or relocate off-site) after the disaster • Estimated Time for Interview: **25 minutes** with **54 Questions**	Questionnaire Label:

I. Interview Details

1. Date of interview	
2. Time Started	
3. Name of Interviewee	
4. Address or GPS Coordinates of Current Housing	Address: _____ Latitude: _____ Longitude: _____
5. Address of Original Housing Location (if relocated)	House No. _____ Barangay:_____
6. Is your original house located within 40 m. from shoreline?	☐ Yes ☐ No ☐ Do Not Know

II. Housing Damage Assessment and Hazard Characteristics

7. How frequent is your original house inundated by storm surge in a year?	☐ Only in Yolanda ☐ Once a Year ☐ Twice ☐ 3x ☐ Others: _____
8. How high is the storm surge level in Yolanda that reached the house?	☐ _____ meter ☐ Ankle-level ☐ Knee-level ☐ Waist-level ☐Human-height level ☐ More than 1st floor
9. What housing material is used for the Main Structure and Roof at the time of Yolanda?	Structure: ☐ Concrete ☐ Wood ☐ Others: _____ Roof: ☐Iron Sheets ☐ Roof Tiles ☐ Others: _____
10. Estimated House Lot Size or Land Area (use number of paces if not known)	_____ squared meter (m^2) _____(#forward steps) and _____(#side steps)
11. How many storey/s is your house?	☐ 1 ☐ 2 ☐ 3 ☐ others: _____
12. What year is your original house built?	☐ Do not Know ☐ Year: _____
13. How severe is the estimated damage in your original house? Please select the most severe damage mentioned.	
☐ 0- No Damage ☐ 1- Floors with mud, Punctured Roof ☐ 2- Walls with Crack, Broken Windows or Detached Roof ☐ 3- Walls Collapsed and Posts Fell Down ☐ 4- Structure Flushed by Surge, Totally Destroyed	

III. Post-disaster Housing Reconstruction or Relocation Experience

14. Where did you stay from the time of disaster to relocation?	
15. How long did you stay in temporary shelters (bunkhouses or tents) or evacuation centers?	☐ Did not Stay ☐ 1-2 weeks ☐ 3 weeks - 1 month ☐ others: _____
16. Which of the following did you receive from neighbors, government or other parties after disaster? Check all that apply.	
☐ Money ☐ House ☐ Lot/ Land ☐ Construction Materials: _____ ☐ Construction Skills Training for Rebuilding House ☐ Standard Design for Typhoon-resistant House	☐ Relief Goods ☐ Livelihood Training ☐ Medical Help for Trauma ☐ Toilet or Sanitary Facilities ☐ Others: _____
17. When did you transfer to resettlement units?	Month: _____ Year: _____
18. Who funded (mostly) the relocation houses? Please	☐ Local Government ☐ NGO: _____

specify.	☐ National Government: DPWH, NHA or _____ ☐ Others: _____
19. Who provided you information about this relocation program? Check all that apply.	
☐ Personal Knowledge ☐ Village Association Leader ☐ Neighbor ☐ Relative ☐ Local Government Official ☐ National Government ☐ NGO representative ☐ Others: _____	
20. Describe the process of application on how to be a beneficiary of this relocation program.	
21. What is your contribution to the relocation program?	☐ Provide Labor ☐ Provide Construction Material ☐ Pay Money: ₱_____ ☐ Others: _____
22. What are the topics discussed in the PLANNING of the permanent housing project?	
☐ Did not Participate in Planning ☐ Needs in terms of housing ☐ Design of Housing Unit ☐ Location of Housing ☐ Materials to be used in Houses	☐ Budget for Housing ☐ Schedule of Housing Construction ☐ Order of Households who will Receive Entitlements ☐ Responsibility of Constructing the House ☐ Others: _____
23. How satisfied are you in terms of the permanent housing project? If Dissatisfied, what are the problems you encountered?	☐ Highly satisfied ☐ Satisfied ☐ Neutral ☐ Dissatisfied ☐ Highly Dissatisfied Problems: _____

A. Financial or Monetary Assistance

24. Who provided information to you about any External Financial Aid for relocation? Check all that apply.	☐ Personal Knowledge ☐ Village Association Leader ☐ Neighbor ☐ Relative ☐ Local Government Official ☐ National Government ☐ NGO representative ☐ Others: _____
25. Which of the following are the Sources of Financial Aid after the disaster? Check all that apply.	
☐ Personal Savings or Owned Assets ☐ Money from Relatives ☐ Money from Neighbors ☐ Government: DSWD Pantawid Pamilyang Pilipino Program (4Ps)	☐ Government: Calamity Loan ☐ Loan from Private Institutions (Lending/ Banks/ Work Loan) ☐ Compensation from Property Insurance ☐ Donation from NGO: _____ ☐ Others: _____
26. If no financial aid received, what are the reasons why you did not apply for any programs from government or private institutions?	☐ Expensive Repayments ☐ Not informed about Application ☐ Difficulty in Access ☐ Takes Long Time to Receive Aid ☐ Others : _____
27. If you RECEIVED Financial Monetary Assistance or BORROWED Money from Another Party, answer (a) to (e):	
(a) How much was the total financial aid?	₱_____
(b) When did you start receiving the aid or compensation from the date of typhoon?	☐ After 1-2 weeks ☐ 3 weeks - 1 month ☐ Others: _____
(c) How many months did you receive?	☐ Received only Once ☐ Number of Months: _____
(d) Where did you use this money for?	☐ House Repair ☐ Livelihood Capital ☐ Food ☐ Others: _____
(e) If borrowed, what are the problems you encountered	☐ No Problem/ I do not have to repay ☐ High Interest Rate

in repaying the debt/ loan?	☐ Frequent Repayment ☐ Others: _____

B. Government Assistance

28. Which government assistance programs (monetary and non-monetary) are you benefitting from after the disaster?	☐ None ☐ Calamity Loan ☐ 4Ps ☐ Government Land ☐ Government-funded Housing ☐ Others: _____
29. How satisfied are you in the support given by the government? If Dissatisfied, what kind of assistance was lacking or problems you encountered?	☐ Highly satisfied ☐ Satisfied ☐ Neutral ☐ Dissatisfied ☐ Highly Dissatisfied Assistance Lacking/ Problems: _____ _____

C. Reasons for Relocation Decisions

30. What are the **Reasons or Motivations** why you chose to move or be relocated? Check all that applies.	☐ Forced to Move/ No Choice ☐ Safety Reasons ☐ New Livelihood Opportunities ☐ Better Housing Condition ☐ Others: _____ _____
31. What do you think are the **Advantages** of being relocated? List all mentioned.	
32. What do you think are the **Disadvantages** of being relocated? List all mentioned.	

33. **How important** are the following factors that might have affected your decision **to relocate/ not rebuild**? Use **X** mark.

Reasons for Decision:	**Do not Know**	**Not Important**	**Slightly Important**	**Moderately Important**	**Very Important**	**Extremely Important**
A. Safety of Original Housing Location						
B. Financial Aid for Reconstruction of Damaged House						
C. Water and Electricity Utility Services						
D. Community Assistance and Collective Action to Relocate						
E. Access to Livelihoods						

34. How **safe or secure** in terms of future disaster, crime or disease is the location of your original house compared to new relocation site? Scale: 0-4.

Original House: ☐ 0- Unsafe ☐ 1-Slightly Safe ☐ 2-Moderately Safe ☐ 3-Very Safe ☐ 4-Extremely Safe

Relocation Site: ☐ 0- Unsafe ☐ 1-Slightly Safe ☐ 2-Moderately Safe ☐ 3-Very Safe ☐ 4-Extremely Safe

35. How **self-sufficient or being able to provide daily needs** are you in terms of the current livelihood you have compared to before the typhoon? Scale: 0-4.	Before Disaster: ☐ 0- Not Sufficient ☐ 1-Slightly Self-sufficient ☐ 2-Moderately Self-sufficient ☐ 3-Very Self-sufficient ☐ 4-Extremely Self-sufficient After Disaster: ☐ 0- Not Sufficient ☐ 1-Slightly Self-sufficient ☐ 2-Moderately Self-sufficient ☐ 3-Very Self-sufficient ☐ 4-Extremely Self-sufficient

36. How long was the restoration period of water and electricity services in area from the time of disaster?

(a) Water	☐ No Disruption ☐ 1-2 weeks ☐ 3 weeks - 1 month ☐ Others _____

(b) Electricity	☐ No Disruption ☐ 1-2 weeks ☐ 3 weeks - 1 month ☐ Others _____

D. Community Decision-making

37. Who are the people you consulted for advices if you should relocate? List down the first 3 mentioned.
☐ No One ☐ Village Association Leader ☐ Neighbor ☐ Relative ☐ Government Official ☐ NGO representative ☐ Specific Person Name: _____Relationship: _____ Address: _____
38. How was your decision to relocate affected by your neighbors or village association leader?
☐ Not Affected ☐ By Meetings with Village Association ☐ By Advice from Close Friends/ Relatives ☐ By Following Other Households who Relocated ☐ By Sharing Information about Relocation with Neighbors ☐ Others: _____

39. How frequent are the village meetings for village development held in your original community?	☐ Once a week ☐Once in 2 weeks ☐ Once in 3 weeks ☐ Once a month ☐ Never ☐ Others: _____
40. How frequent do you participate in meetings?	☐ Never ☐Seldom ☐Sometimes ☐Often ☐ Always

41. How do the village association, local government and community leaders usually make collective decisions?
☐ The leader decides and informs the other group members. ☐ The leader asks households what they think and then decides. ☐ The group members hold a discussion and decide together. ☐ Others: _____
42. If there was a problem (ex. disaster, violence, disease) that affected the entire village/neighborhood, who do you think would work together to deal with the situation?
☐ Households deal individually ☐ Neighbors among themselves ☐ Local government/municipal political leaders. ☐ All community leaders acting together ☐ The entire village/neighborhood ☐ Others: _____

E. Risk Attitude or Behavior

43. How will you rate your tendency for accepting **financial risks on investing or gambling**? Scale: 0-10.	☐ 0 (Risk Avoiding) ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 (Risk Accepting)
44. If you will be asked to apply for **property insurance against typhoon damage** so that you can get financial aid at the time of disaster with more ease, how much are you willing to pay in a month for this insurance scheme?	☐ Do not Want ☐ ₱0-50 ☐ 51-100 ☐ 101-150 ☐ 151-200 ☐ 201-250 ☐ 251-300 ☐ 301-350 ☐ 351-400 ☐401-450 ☐451-500 ☐Others: _____

IV. Personal Information

45. Current Primary Occupation of Head of Family	
46. Pre-disaster Primary Occupation of Head of Family	☐ Same ☐ Other Occupation: _____
47. Estimated Current Total Monthly Income of Household	☐ ₱0-10,000 ☐ ₱10,001-20,000 ☐ ₱20,001-30,000 ☐ ₱30,001-75,000 ☐ more than ₱75,001
48. Total Number of Family Members Living in House	☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ others: _____
49. Type of Legal Form of Original Residence	☐ Owned ☐ Rented ☐ Informal ☐ Others _____
50. How long have you resided in Tacloban? Did you migrate to Tacloban from another area?	Number of Years: _____ ☐ Since Birth ☐ Migrated from Outside Tacloban

51. Age	52. Sex	53. Highest Educational Attainment
	☐ Male ☐ Female	☐ Elementary ☐ High School ☐ College ☐ Higher Degree
54. Time Ended		

Thank you very much for your time.

9.1.3 Social Survey 2: Manila Case (September 2015)

	Questionnaire for Homeowners in Barangay Putatan, Muntinlupa	Interviewer Code
東京大学 THE UNIVERSITY OF TOKYO	**Research Objective**: to determine **willingness-to-participate** in a **national calamity housing recovery assistance program** against typhoon flood and wind *Layunin ng Pag-aaral: Masukat ang lebel ng kagustuhang makilahok para sa programa ng pagtulong sa pagtatayo muli ng bahay na mapipinsala ng kalamidad (katulad ng baha at bagyo)* **Estimated Time**: 25-30 minutes	

Note: We are conducting a research on **how to improve community's capacity to recover from typhoons** which often result in significant damages to personal property and disrupt people's life. Your name will remain confidential.

I. Interview Details	
1. Interview Date and Time Started	
2. Name of Respondent	
3. Contact Number (Cellphone #)	
4. Address(with Village/ Subdivision)	
5. Number of Years of Residence in Current House *Ilang taon na naninirahan sa bahay ngayon*	
6. Year the House was Built *Taon kung kelan ginawa ang bahay*	□ a. Year: ____ □ b. Do not Know
7. Type of Housing Materials Used *Uri ng mga materyal na ginamit sa bahay*	□ a. Heavy concrete (permanent) □ b. Heavy wood (permanent) □ c. Mixed Heavy and Light (semi-permanent) □ d. Light Material (semi-permanent) □ e. Barong-barong/ Wood (temporary) □ f. Others: ____
8. Types of Disaster Hazards that Caused Damage while Living in the Current House *Uri ng mga kalamidad na naranasan na maaaring nakasira sa bahay*	□ a. Flood □ b. Typhoon Wind □ c. Fire □ d. Earthquake □ e. Others: ____

II. Risk Perception					
9. In the **Past**, how frequently in a year did the typhoons cause flooding in your community? Choose only one answer. *Noong nakalipas, gaano kadalas sa isang taon bumabaha sa inyong komunidad o bahay? Piliin ang pinakamalapit na sagot.*					
Low-Risk:	□ a. Never	□ b. Only in Ondoy	□ c. Once every 4 years	□ d. Once in every 3 years	□ e. Once in 2 years
High-Risk:	□ f. Once a year	□ g. 2x in a year	□ h. 3x in a year	□ i. 4x in a year	□ j. Several
□ j. Others: ____					
10. In the **Next ten years**, how frequently do you think typhoons will hit your community? Choose only one answer. *Sa darating na sampung taon, gaano kadalas sa iyong palagay babaha sa inyong komunidad o bahay kada taon? Piliin ang pinakamalapit na sagot.*					
□ a. Never □ b. Once in 5 years □ c. Once every 4 years □ d. Once in every 3 years □ e. Once in 2 years □ f. Once a year □ g. 2x in a year □ h. 3x in a year □ i. 4x in a year □ j. Others: ____					
11. If severe flooding occurs **in the future**, which decision are you planning to take? *Kung magkakaroon ng matinding pagbaha sa inyong lugar sa hinaharap, alin ang desisyong inyong planong gawin?*	□ a. Stay in the House □ b. Evacuate and Return to Community after Weeks or Months □ c. Move and Live in Another House Completely □ d. Relocate Completely with Assistance from Government or Other Organizations □ e. Others: ____				

III. Choice Experiment	
12. What types of insurance have you purchased in the past? Check all types that apply. *Anong klaseng insurance ang inyong nalahukan o sinubukan na sa nakalipas?*	□ a. Residential Property Insurance **(answer Q12b also)** □ b. Auto/ Car insurance □ c. Life insurance □ d. Medical insurance □ e. None **(move to Q13)** □ f. Educational □ g. Burial □ h. Others: ____
• 12a. When is the first year you purchased any of the insurance policies you mentioned in Q12? *Kailan ang unang taong bumili ng insurance?*	□ a. Specify the Year: ____ □ b.Don't know □ c. Refused
• 12b. How much is the coverage and monthly premium for your residential **property insurance**? *Magkano ang coverage (perang makukuha dahil sa sira) at binabayaran kada taon o buwan para sa insurance para sa bahay?*	☐ a. Coverage: ____ Premium: ____ ☐ b. Don't know ☐ c. Refused
• 12c. How satisfied are you in terms of the property insurance policy you have chosen? *Gaano ka kakuntento sa insurance na iyong napili?*	☐ a. Highly Satisfied *Lubos ang Kasapatan* ☐ b. Satisfied *Sapat* ☐c. Cannot Say *Hindi Masabi* ☐ d. Dissatisfied *Hindi Sapat/ Kulang* ☐ e. Highly Dissatisfied *Lubos ang Kakulangan*
• 12d. What are the provisions that you dislike? *Anong mga probisyon ng polisiya ang hindi mo gusto?*	

13. How much is the estimated market value for your house/apartments? (Range) *Magkano ang estima na halaga ng inyong bahay?*	□ a. PhP 0-50,000 □ b. PhP 50,001-100,000 □ c. PhP 100,001-500,000 □ d. PhP 500,001-1M □ e. PhP 1M-1.5M □ f. PhP 1.5M-2M □ g. PhP 2M and above □ h. Don't know □ i. Refused

Explanation: *Pagpapaliwanag ng Idea ng "Property Insurance" o Polisiyang Panseguridad na Pambahay*

If you purchased insurance policyagainst typhoon, insurance companies will **cover your property loss**after a typhoon strikes. Here is a brief description of how insurance works. The following terms are important for assessing an insurance policy.

*Kung makikilahok sa programa para may **tulong pinansyal na makuha sakaling may kalamidad** na dumating, may mga kumpanya o organisasyon ng insurance na **maaaring sagutin ang magiging sira sa iyong bahay** pagkatapos ng matinding pagbaha dahil sa bagyo. Ang mga sumusunod ay mga importanteng katangian ng mga available na polisiya.Ang layunin ay alamin kung alin ang inyong magugustuhan**depende sa 3 katangian at iyong kakayahang sumali**.*

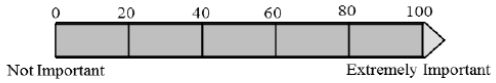
Note: Ipaliwanag nang maigi ang 3 Katangian - A, B at C sa respondent.

Attributes ***Katangian***	**Levels** ***Lebel o Halimbawa***	***Explanation*** ***Eksplanasyon***
A. Service Provider ***Nagbibigay-serbisyo***	• Private Insurance Company • Insurance Company + Community Group Participation • Government • Insurance Company + Government	*Organisasyong namamahala ng transaksyon* ***(nangangangako na magbibigay tulong pinansyal sakaling may kalamidad)***
B. Premium ***Kontribusyon***	• ***Low-risk Location***: PhP 250/ year for every PhP10,000 coverage • ***High-risk Location***: PhP 500/ year for every PhP10,000 coverage	*Babayaran kada taon para sa kontribusyon ngmay-ari ng bahay* ***Nakadepende sa lokasyon ng Bahay (Answer from Q9)***
C. Assessment System ***Sistema ng Pag-eestima ng Pinsala***	• Regular Type (Appraisal System) • Special Type (Index Based System)	*Sistema ng pagproseso kung magkano ang estima ng nasirang bahay* ***Note: Special type - mas mabilis ang pagproseso ng dokumento at pagkuha ng tulong pinansyal***
Others: D. Terms of Contract - *Haba ng taon na nakainsure (kadalasan ay 1 year lamang)* E. Type of Hazards Covered - *Klase ng Kalamidad (baha, sunog, lindol, hangin mula sa bagyo)* F. Included Assets Insured – *Kung iinsure ang istraktura pati ang kagamitan sa loob ng bahay*		

14. Based on this introduction of insurance and your knowledge/experience with insurance, would you consider purchasing typhoon insurance to protect you from property losses resulting from typhoons? *Base sa inyong nalaman at experience sa isang insurance program, gusto nyo bang sakaling lumahok sa isang programa sa flood insurance para sa bahay?*	□ a. No **(proceed to Q15)** □ b. Yes **(proceed to Q16)** □ c.Maybe **(proceed to Q16)**

15. What is your main reason for not participating in the insurance program?
Ano ang iyong rason sa hindi pagpayag sa paglahok sa isang programa sa pagiinsure ng bahay nyo?

□ a. I do not think my house will be damaged by a typhoon.
□ b. Our budget is not enough. I cannot afford.
□ c. I do not believe or trust in insurance at all.
□ d. Government will provide financial assistance following a disaster anyway.
□ e. I have other ways to cover losses or damage to my house.
□ f. Others (Please Specify) _____

16. From 0 to 100% scale, how will you rate the importance of the following in terms of your preference of housing recovery calamity assistance program? *Mula sa 0 hanggang 100%, gaano kaimportante ang mga sumusunod na katangian sa iyong desisyong lumahok sa programa ng pagbibigay tulong sa masasalanta ng bagyo?*	
a. Trustworthy Service Provider *Mapagkakatiwalaang organisasyon*	
b. Lower Premium per year *Mababang bayarin sa isang taon*	
c. Fast Settlement of Claims *Mabilis na nakukuha ang tulong pinansyal*	
d. IncludesHousing Structure and Contents *Kasama Hindi lang Istraktura pati ang Kagamitan*	
e. Includes Multi-hazard Coverage *Kasama hindi lamang ang baha pati sunog at lindol*	
f. Flexible Payment Periods *May opsyon na monthly o yearly ang bayad*	
g. Longer Year of Contract Period *Mas mahabang taon na nakakontrata*	

17. Which among the 7 factors are the most and least important? Write the letter (a to g). *Alin sa pitong katangian sa Q16 ang pinakaimportante at pinakahindi importante? Isulat ang letra.*	Most: ☐ Least: ☐
18. Aside from the 7 factors, what other factors will you consider before choosing a property insurance policy? *Maliban sa mga nabanggit, alin pa ang iyong kinokonsidera bago lumahok sa programa ng insurance?*	

Explanation: *Pagpapaliwanag ng Pagkukumpara ng Choice Sets*

19. You will be presented with ten (10) choice sets, each of which is composed of two hypothetical insurance policies and the option of *"do not purchase"*. Among the 3, choose your preference. The two listed insurance policies are different on the following dimensions – Service Provider, Yearly Premium and Assessment System.
Note for Interviewer: Before starting, respondents have to realize about the cost for the insurance in their yearly budget or savings. The experience from previous similar surveys is that people often respond with higher willingness to pay than in real life. Also, please treat each of these ten sets independently.

Kayo po ay bibigyan ng 10 sets ng polisiyang pagpipilian, na sa bawat isa ay may 2 polisiyang pinagkukumpara at ang opsyon na hindi bumili. Piliin ang iyong pinakagustong lahukan. Nagkakaiba ang mga polisiya base sa ***(1) Service Provider- namamahala na ahensya, (2) Premium- Binabayaran sa isang Taon at (3) Assessment System- Sistema ng pageestima ng nasira sa bahay.***

Note: Bago magsimula, ipaliwanag sa iniinterbyu na isipin nila na ang paglahok ay may kalakip na bayarin mula sa kanilang savings o budget sa isang taon. Tandaan din na ang sagot nila sa bawat set ay walang kinalaman sa maaaring isagot nila sa susunod na set.

Summary of Choices		
Policy 1: Private Insurance	Policy 2: Community Insurance	Policy 3: Government Public
Policy 4: Public-Private – Regular Assessment	Policy 5: Public Partnership-Special	I will not Choose any.

CHOICE SET 1			
Attribute	**Policy 1 (Base Value)**	**Policy 2**	**Choice 3**
Service Provider ***Nagbibigay-serbisyo***	Private Insurance Company	Private Insurance Company + Community Social Group *(buong komunidad ang magkokontribusyon)*	I will not choose any.
Yearly Premium ***Kontribusyon***	100% ***Low Risk****: PhP 250/yr for PhP 10,000 coverage* ***High Risk****: PhP 500/yr for PhP 10,000 coverage*	Less -10% off	
Assessment System ***Sistema ng Pag-eestima ng Pinsala***	Regular	Regular	
19a. Which of the following will you choose?	☐ 1	☐ 2	☐ 3

CHOICE SET 2			
Attribute	**Policy 1**	**Policy 3**	**Choice 3**
Service Provider	Private Insurance Company	Government	I will not choose any.
Yearly Premium	100% ***Low Risk****: PhP 250/yr for PhP 10,000 coverage* ***High Risk****: PhP 500/yr for PhP 10,000 coverage*	Less -30% off	
Assessment System	Regular	Regular	
19b. Which of the following will you choose?	☐ 1	☐ 2	☐ 3

CHOICE SET 3			
Attribute	**Policy 1**	**Policy 4**	**Choice 3**
Service Provider	Private Insurance Company	Private Insurance Company + Government	I will not choose any.
Yearly Premium	100% ***Low Risk****: PhP 250/yr for PhP 10,000 coverage* ***High Risk****: PhP 500/yr for PhP 10,000 coverage*	Less -20% off	
Assessment System	Regular	Regular	
19c. Which of the following will you choose?	☐ 1	☐ 2	☐ 3

CHOICE SET 4			
Attribute	**Policy 1**	**Policy 5**	**Choice 3**
Service Provider	Private Insurance Company	Private Insurance Company + Government	I will not choose any.
Yearly Premium	100% ***Low Risk**: PhP 250/yr for PhP 10,000 coverage* ***High Risk**: PhP 500/yr for PhP 10,000 coverage*	Less -15% off	
Assessment System	Regular	Special *(mas mabilis makuha ang tulong)*	
19d. Which of the following will you choose?	□ 1	□ 2	□ 3

CHOICE SET 5			
Attribute	**Policy 2**	**Policy 3**	**Choice 3**
Service Provider	Private Insurance Company + Community Social Group	Government	I will not choose any.
Assessment System	Less -10% off	Less -30% off	
Assessment System	Regular	Regular	
19e. Which of the following will you choose?	□ 1	□ 2	□ 3

CHOICE SET 6			
Attribute	**Policy 2**	**Policy 4**	**Choice 3**
Service Provider	Private Insurance Company + Community Social Group	Private Insurance Company + Government	I will not choose any.
Yearly Premium	Less -10% off	Less -20% off	
Assessment System	Regular	Regular	
19f. Which of the following will you choose?	□ 1	□ 2	□ 3

CHOICE SET 7			
Attribute	**Policy 2**	**Policy 5**	**Choice 3**
Service Provider	Private Insurance Company + Community Social Group	Private Insurance Company + Government	I will not choose any.
Yearly Premium	Less -10% off	Less -15% off	
Assessment System	Regular	Special *(mas mabilis makuha ang tulong)*	
19g. Which of the following will you choose?	□ 1	□ 2	□ 3

CHOICE SET 8			
Attribute	**Policy 3**	**Policy 4**	**Choice 3**
Service Provider	Government	Private Insurance Company + Government	I will not choose any.
Yearly Premium	Less -30% off	Less -20% off	
Assessment System	Regular	Regular	
19h. Which of the following will you choose?	□ 1	□ 2	□ 3

CHOICE SET 9			
Attribute	**Policy 3**	**Policy 5**	**Choice 3**
Service Provider	Government	Private Insurance Company + Government	I will not choose any.
Yearly Premium	Less -30% off	Less -15% off	
Assessment System	Regular	Special *(mas mabilis makuha ang tulong)*	
19i. Which of the following will you choose?	□ 1	□ 2	□ 3

CHOICE SET 10			
Attribute	**Policy 4**	**Policy 5**	**Choice 3**
Service Provider	Private Insurance Company + Government	Private Insurance Company + Government	I will not choose any.
Yearly Premium	Less -20% off	Less -15% off	
Assessment System	Regular	Special *(mas mabilis makuha ang tulong)*	
19j. Which of the following will you choose?	□ 1	□ 2	□ 3

20. From 0% to 10% , how much are you willing to add to gain the following attributes or additional services: *Mula 0 hanggang 10%, magkano ang maaari mo pang idagdag para makakuha ang mga sumusunod na serbisyo?*											
a. Multi-hazard Protection *Protektado di lang sa baha kundipati sunog, lindol*	0%	1	2	3	4	5	6	7	8	9	10%
b. Insuring also the Contents of the House *Nakainsure ang kagamitan at istraktura*	0%	1	2	3	4	5	6	7	8	9	10%
c. Longer Years of Contract *Mas mahabang taon ng kontrata*	0%	1	2	3	4	5	6	7	8	9	10%

21. What are the countermeasures you generally apply or initiate to strengthen or floodproof your house? *Anong mga pamamaraan ang iyong ginamit para mas tumibay ang ipinatayong bahay laban sa baha o malakas na hangin ng bagyo?*	☐ a. Did not Use Any *Hindi Gumamit* ☐ b. Elevate the Ground *Itinaas ang Lupa/ Tinambakan* ☐ c. Change to Strong Materials *Pinalitan ng Matibay na Materyal* ☐ d. Others: _____
22. Has your house ever been destroyed or seriously damaged in a typhoon in the last ten years? *Napinsala ba ang iyong bahay dahil sa bagyo sa nakalipas na 10 taon?*	□ 1) Yes **(proceed to Q22a and Q22b)** □ 2) No**(proceed to Q23)**
22a. Where did you get the money to rebuild or repair your house? Multiple Answers OK *Saan kayo kumuha ng pera upang maitayo o maipagawa ang bahay na nasira?*	□ a. Personal savings □ b.Money from relatives and friends □ c. Bank loan □ d. Government subsidy □ e. Others (please specify) _____
22b. What is the amount of government assistance? *Magkano ang inyong estima sa tulong pinansyal na natanggap mula sa gobyerno?*	□ a. PhP _____ □ b. Do Not Remember
23. In the last few years, did government provide life necessities such as food and clothes to you after atyphoon? *Sa nakalipas na taon, ang gobyerno ba ay nagbigay ng pangangailangan nyo (pagkain o damit) pagkatapos ng bagyo?*	□ a. Beyond Basic Needs □ b. Satisfy Basic Needs □ c. Some but Not Enough □ d. Did not Provide
24. Based on local government's performance in the last disaster response after a typhoon, how has yourtrust/confidence in local government changed? *Base sa huling kalamidad, paano nagbago ang iyong tiwala sa gobyerno?*	□ a. Significantly Improved □ b. Improved □ c. No Change □ d. Reduced □ e. Significantly Reduced
25. In your opinion, which of the following describes what generally affects your decision-making especially in times of disaster? Kung ikaw ay papipiliin, alin sa mga sumusunod ang madalas nakakaapekto sa iyong desisyon lalo na pag may kalamidad?	□ a. Own Decision *Madalas sariling desisyon at di naaapektuhan ng iba* □ b. Government *Sumusunod madalas sa gobyerno* □ c. Community *Sumusunod madalas sa komunidad (lider o kapitbahay)* □ d. Government and Community *Sumusunod madalas sa gobyerno at komunidad* □ e. Others: _____

IV. Demographic Details		
26. Occupation of Head of Household		
27. Total Estimated Monthly Income *Kabuuang Kinikita kada Buwan (Total Combined)*		☐ ₱0-3,000 ☐ ₱3,001-5,000 ☐ ₱5,001-10,000 ☐ ₱10,001-20,000 ☐ ₱20,001-30,000 ☐ ₱30,001-40,000 ☐ ₱40,001-50,000 ☐ ₱50,001-60,000 ☐ ₱50,001-60,000 ☐ ₱60,001-70,000 ☐ more than ₱70,001
28. From 0 to 100%, how many percent do you allot for monthly savings? *Mula 0 hanggang 100%, magkano ang inyong natatabi para ipon?*		
29. MORES Socio-economic Class		□ AB □ C1 □ C2 □ D □ E
30. Age *Edad*	31. Sex *Kasarian*	32. Highest Educational Attainment *Pinakamataas na Lebel na Napag-aralan*
	☐ Lalaki ☐ Babae	☐ Elementary ☐ High School ☐ Kolehiyo ☐ Nag-espesyalisasyon
33. Time Ended		