

# Assessing the use of places of worship through a social resilience framework: an empirical study of managing disaster risks in Barangay San Andres, Cainta, Philippines

Doctor of Philosophy in Architecture and the Built Environment

**School of the Built environment**

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## Keywords

Social resilience, social infrastructure, resilience, places of worship, disaster management, disaster risk reduction and management, urban resilience, resilience framework

## Abstract

Understanding the influence of places of worship in managing disasters is an important discourse in urban environment research. With the considerable presence of informal settlements in cities, this study analyses the resilience and social capacities of vulnerable communities in the informal built environment. This study aids academicians, professional practitioners, and government officials in determining the significance of places of worship in enhancing their contribution to social resilience.

The focus of the study is situated in the informal settlements at Barangay San Andres in Cainta, Rizal, Philippines: a community along the riverbank of the Manggahan floodway that is prone to extreme weather events and disaster risks. This study examines how places of worship are used as a social infrastructure through the social resilience framework. Through a sequential exploratory research design, the qualitative data from 16 key informant interviews highlighted six (6) emerging themes of social resilience. A survey from 409 respondents revealed the significance and positive effects of resilience in most social dimensions except for social equity. Moreover, the structural equation modelling equation has determined that the relationships between the dimensions of social resilience to be non-linear. The framework also found social capital to have the highest influence or impact on the other components among all the social resilience dimensions.

The study thus presented a unique integrated social resilience framework as a method of assessing places of worship through a social resilience context. The study also provided additional insights to three religious/spiritual aspects of places of worship, namely (1) the spiritual space, (2) the spiritual capital, and (3) the spiritual beliefs. Hence, this study has introduced an integrated and transdisciplinary analysis across the social infrastructure, the social resilience, and the religious dimensions of places of worship.

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## List of Abbreviations

ADRC	Asian Disaster Reduction Centre
ANOVA	Analysis of Variance
BHERT	Barangay Health Emergency Response Team
BRGY	Barangay
CBDRRM	Community Based Disaster Risk Reduction and Management
CFI	Comparative Fit Index
CHED	Commission on Higher Education
COVID	Coronavirus Disease
CRED	Centre for Research on the Epidemiology of Disasters
DPWH	Department of Public Works and Highways
DRR	Disaster Risk Reduction
DRRM	Disaster Risk Reduction and Management
ECQ	Enhanced Community quarantine
EFA	Explorative Factor Analysis

ENAI	East-side Neighbourhood Association Incorporation
EOC	Emergency Operation Centre
EPSRC	Engineering and Physical Sciences Research Council
ESCR	Economic and Social Research Council
FB	Facebook
FBO	Faith Based Organizations
GCQ	General Community Quarantine
GFI	Goodness of Fit Index
HHI	Herfindahl-Hirschman Index
HOA	Homeowners Association
ISF	Informal Settlement Families
JAPS	Jeffreys's Amazing Statistics Program
JICA	Japan International Cooperation Agency
KII	Key Informant Interviews
LGU	Local Government Unit
LIDAR	Light Detection and Ranging
MECQ	Modified Enhanced Community Quarantine
NGO	Non-Governmental Organization
OECD	Organization for Economic Cooperation and Development
PFCI	Progressive Filipino Community Incorporation
POW	Places of Worship
PPS	Probability Proportional to Size
RMSEA	Root Mean Square Error of Approximation
RO	Research Objective
RRL	Review of Related Literature
SD	Standard deviation
SEM	Structural Equation Modelling

SES	Socio Economic Survey
SPSS	Statistical Package for the Social Sciences
SR	Social Resilience
UNDRR	United Nations Office for Disaster Risk Reduction
UNESCA	United Nations Economic and Social Commission for Asia and the Pacific
UNFPA	United Nations Population Fund
UNISDR	United Nations International Strategy for Disaster Reduction
UPNOAH	University of the Philippines Nationwide Operational Assessment of Hazards
USAID	United States Agency for International Development
UST	University of Santo Tomas
VAWC	Violence Against Women and their Children
WB	World Bank
WHO	World Health Organization

## Declaration of Original Authorship

Declaration: I confirm that this is my own work and the use of all material from other sources has been properly and fully acknowledged.

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## Research Outline

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- 1.1. Background in Disaster Risk Management
- 1.2. Social infrastructure and social resilience
- 1.3. Places of worship in the built environment
- 1.4. Research problem, aims, and objectives
- 1.5. Rationale and significance of the research
- 1.6. Scope and limitations of the research
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## Research Outline

1. **Introduction and Aims**
  - 1.8. Background in Disaster Risk Management
  - 1.9. Social infrastructure and social resilience
  - 1.10. Places of worship in the built environment
  - 1.11. Research problem, aims, and objectives
  - 1.12. Rationale and significance of the research
  - 1.13. Scope and limitations of the research
  - 1.14. Structure of thesis
2. **Review of Related Literature**
3. **Theoretical Framework**
4. **Research Methods**
5. **Interview Results/Analysis**
6. **Survey Results/Analysis**
7. **Synthesis of Key Findings**
8. **Discussion/Recommendations for Future Research**

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## Chapter 1: Introduction

Chapter One starts the discussion on the background of the importance of resilience in Disaster Risk Reduction and Management (DRRM) studies (Section 1.1) and potential use of places of worship through the lens of social resilience in the built environment (Section 1.2). Section 1.4 then discusses the research questions, aim, objectives and outputs of the study. Section 1.5 details the significance of the research to different industries in the academe and professional practice and Section 1.6 discusses the scope and limitations of the research. Finally, Section 1.7 discusses the structure of the thesis.

## **1.1. Concerns and Issues of Disasters and Urbanization**

The occurrence of natural disasters has continued to increase in frequency and intensity during the past few decades. Natural disasters have increased from 2,508 incidents in 1980-1999 to 7,348 incidents in 2000-2019 (Loenhout, Below and McClean, 2020). In 2020, 389 natural disasters have caused 15,080 deaths, and an economic loss of US\$171.3 billion globally (Scheuren, 2021). The Centre for Research on the Epidemiology of Disasters (CRED) has found that flood and extreme weather events are the most common types of disaster to occur globally. These events have initiated government institutions, non-government organizations and academic institutions in spearheading research works on different aspects of managing disasters. Hence, many Western-based research on disasters has put much emphasis on the economics of how countries that are highly exposed to hazards and risks cope with the adverse effects of disaster risks.

Urbanization and negative effects for climate change has causes more problems for the people or groups that are unable to respond well when a disaster has occurred in the urban environment. In addition, the frequency and intensity of urbanization and disasters and have caused many studies to formulate and explore ways on how man, society, and the environment to become resilient. Thus, Disaster Risk Reduction and Management (DRRM) has been a dominant theme in many institutional studies and academic literature.

## **1.2. Managing Disaster Risks in Cities**

In disaster studies, critical infrastructure is often included in studies on how cities cope, mitigate, prepare, and recover from disasters. Such critical infrastructure includes roads, bridges, electrical systems, and water infrastructure to name a few. Studies in measuring critical infrastructure include quantifying their robustness, strength, connectivity, redundancy, and reliability. There are also discussions on the integration of physical infrastructure and social systems in engineering and disaster studies (Petit *et al.*, 2013); (Guidotti, Gardoni and Rosenheim, 2019). Hence, (Popova, 2017) subdivides infrastructure into two main categories: (1) social infrastructure and (2) economic or production infrastructure. The economic infrastructure consists of the transportation systems, telecommunications, electrical grid, and water supply and water systems. Social infrastructure on the hand is comprised of systems such as healthcare, education, culture, and tourism (Grum and Kobal Grum, 2020). From the standpoint of economic infrastructure, UNDRR mentions the need for a \$ 1.7 trillion annual budget in 2018 for building new disaster resilient infrastructure in Asia (UNDRR, 2018). However, Aldrich (2012) highlights the critical role of social infrastructure in communities when facing disasters and calamities, such as

analysed in the 1923 Tokyo earthquake. Thus, it is of interest to explore how emerging studies in social infrastructure could contribute more to studies in disaster resilience.

### **1.2.1. The Significance of Social Infrastructure in DRRM**

Discussions in social infrastructure often pertain to the 'interactive aspect of organizations or institutions' that provide resources such as leadership, entrepreneurship, medical services, and the linking of physical resources in the community (Flora and Flora, 1993; (Chandra *et al.*, 2014). However, studies have recently started to associate social infrastructure to planning systems and more tangible elements such as schools, fire stations, and hospitals (Bigotte and Antunes, 2007); (Klinenberg, 2018). So how does this study define social infrastructure? Sociologist Eric Klinenberg (2018) defined social infrastructure as the "people, places, and institutions that foster cohesion and support". Layton and Latham (2021). further clarify the categories of social infrastructure to include schools, civic centres, museums, and places of worship as spaces that "support and create the opportunities for social connections". The significance of social infrastructure also started to emerge on how to manage healthcare during the COVID-19 pandemic in 2020 (Nandy, Tiwari and Kundu, 2021). Hence, this study posits the critical role of social infrastructure to the provision of essential goods, services, and quality of life to all people (Grum and Kobal Grum, 2020).

### **1.2.2. Exploring the Social Dimension of the Built Environment**

A distinct feature of certain disaster risk reduction strategies is their focus on the capitalization of local resources and capacities of a community in reducing its vulnerability from disasters (Victoria, 2003). However, challenges are faced by communities that have significantly limited supply of assets and resources, such as those experienced by informal settlers. When communities develop the ability to cope with external stresses to their social, political, and environmental change, this ability is called social resilience. Examining the dimensions of social resilience through the context of its built environment is beneficial in identifying strengths and weaknesses of the community in handling disaster risks. In discussing the vulnerabilities of developing countries to informal settlements, many studies noted the presence and perception of strength from the vulnerable (Chambers, 2006; Jabeen, Johnson and Allen, 2010; Legaspi *et al.*, 2014). Thus, it is beneficial for studies to explore further the innate capacities for resilience of vulnerable communities, especially in their present built environment.

Many studies have begun to feature the creating and maintaining of sustainable and vibrant urban systems in the built environment. Topics that discuss the role of social

infrastructure in the urban environment include economic development, housing, and play space (Jamrozik, 2021; Kumari and Sharma, 2017; Loosemore *et al.*, 2010). Other studies in social infrastructure target a specific audience and analyse capacity building in creating community resilience (Aldrich, 2012b; Choi *et al.*, 2018). However, there is a need to examine further the integration of the 'hard and soft system of infrastructure' in managing uncertainties in disaster management (O'Sullivan *et al.*, 2013). Grum and Grum (2020) also mentions the rarity of studies in the relationship between users and the social infrastructures that they use in everyday life. Due to the limited 'integrated studies' between the physical and social aspect of the built environment, this study aims to explore the social dimension of social infrastructure.

### **1.2.3. Discovering Resilience in the Informal Built Environment**

An estimated 25% of the world's urban population, approximately 1.05 billion, live in informal settlements (Un-Habitat, 2013). Informal settlements are areas developed outside of planning regulations and legally sanctioned housing and land markets (Jason, 2018). Due to their limited resources, people who live in slums or informal settlements are the most vulnerable to different forms of risks (Chambers, 2012). Consequently, studies in managing hazards highlight the importance of livelihood and social support in an assets-based disaster resilience framework (Sanderson, 2000; Wisner, Gaillard and Kelman, 2012). Other disaster studies on the other hand underscore the meaning and process of providing the resources from governments and humanitarian institutions to these vulnerable communities (Balgos, 2016; Sanderson, 2018). The advantage of exploring social infrastructure in informal settlements is their availability and accessibility to the local communities.

Informal settlers in urban areas often "settle" in locations where there is easy access to resources, jobs, and government support (Dovey, 2013). Examining how informal communities manage their existing resources enables the government, institutions, and organizations to formulate more efficient DRRM practices. Many types of social infrastructure that are present in informal built environments in the Philippines include public schools, basketball courts, and churches. Studies have noted positive intrinsic aspect of resilience of informal settlers in the Philippines to consider is the religiosity of their communities (Abad, 1995). Social worker Michael Sheridan argues the meaningfulness of 'spirituality, religion, and social justice' in the current theory and practices of social work (Bermúdez, 2015). Hence, the use of places of worship in informal settlements as a research context for this research is beneficial in investigating the resilience and vulnerabilities of the Philippine informal urban environment.

### **1.3. Places of Worship in the Built Environment**

The meaning of disaster came from an Old Italian word meaning ‘ill-starred event’ (Burgess, Alemanno and Zinn, 2016). However, concepts of disasters have changed over time from causality with God and religion, to nature and science, to humanity and politics. The evolution of the concept has driven disaster studies to focus on the context of risks and vulnerabilities from environmental issues and extreme events (Cutter, 2016b; Dodds, 2015). Many disaster studies have also began to relate religious beliefs and practices with how communities cope with disasters (Aten *et al.*, 2014; Baidhawy, 2016; Baytiyeh and Naja, 2016; Bergman, 2011). Hence, the religious practices were found to be a pertinent factor in the creation of social resilience in the urban environment.

#### **1.3.1. Making Relevance of Social Resilience from Places of Worship**

The ability for people to mitigate their vulnerabilities in facing natural hazards are fundamentally social, political, and economic in nature (Gaillard, 2008). Cannon (Cannon, 2008) on the other hand also discussed how some disasters are entirely social constructed, wherein people deliberately chose to live in hazard-prone places. Thus, by using local knowledge and available resources of the community, the community is more effective in building resilience (UNDRR, 2015a). So how do communities with limited resources deal with the risks of disasters and extreme weather events? This study provides benefits to the dialogue on disaster resilience in exploring the abundant presence of schools, markets, and churches found in the informal settlement areas in Barangay San Andres, distinctively located along the Manggahan floodway.

Despite being located along the highly hazardous banks of a floodway, these informal settlements are characterized by vibrant communities with regular and festive religious activities. Places of worship in the area are often found located beside government centres, public basketball courts, and day care centres. The integration of the activities of these spaces has provided the community with a sense of protection and refuge for the community despite the regular occurrence of devastating floods in during extreme weather events. Therefore, this study finds it beneficial for disaster risks studies in exploring the mechanisms and structures (either physical or social) that considerably influences the contribution of resilience in highly vulnerable areas.

## 1.4 Research Problem

The role of social infrastructures in promoting community-building activities among diverse groups of people has continued to become a significant factor in the proper development of the built environment (Klinenberg, 2018); (Latham and Layton, 2019). (O'Sullivan *et al.*, 2013) clarified the critical role of social infrastructures (e.g., health facilities, medical centres) in serving as a 'lifeline' network to people in engaging with situations of uncertainty and complexity. As early as 1991, urban sociologist Henry Lefebvre had already highlighted the importance of space in creating new spatial networks and associations across societal diversities (Urry, 2005). In addition, the use of these structures as shelters and emergency operation centres (EOC) are often one of the ways informal settlers use in coping with disasters. These 'vulnerable' citizens are also mentioned to "have no choice as to where to build or relocate" from the effects of disasters (Porio, 2011). However, there is limited discussion on the relevance of religious structures as instruments of resilience both in the professional field and academic literature (Bramadat, 2005); (Brenneman and Miller, 2016). Hence, understanding how places of worship are used in communities could provide planners, community leaders, and religious leaders an important facet in understanding how social resilience is enhanced.

With the limited studies on the effect and influence of resilience from physical structures, there is a need to understand how places of worship function as a social infrastructure (Olsson *et al.*, 2015b). By studying places of worship as a social infrastructure, the study explores how these spaces are being used and practised. This involves knowing their value, why they matter, and maybe why they are taken for granted (Brenneman and Miller, 2016).

### 1.4.1. Research Aims and Research Objectives

Through a brief overview of how the built environment plays a vital role in planning, preparing, and mitigating the effects of disaster risks, the study focuses on the social role of places of worship as a social infrastructure. The research question generated from the brief review is:

***How does the concept of using places of worship as a social infrastructure in informal settlements be assessed using the social resilience framework?***

In orienting the study towards places of worship, the aim of this research is: **To develop an approach in assessing the role of places of worship in the development of social resilience in the DRRM context of the informal built environment.** Three main objectives are developed in reference to the main question are as follows:

1. **Research objective # 1:** To identify the critical parameters of social resilience of communities through their use of places of worship not only as a social infrastructure, but also as a religious/spiritual element. The output of this objective includes the identification and synthesis of relevant religious and spiritual dimensions that may influence the social resilience of a Filipino informal built environment.
2. **Research objective # 2:** To examine the significance of the religious/spiritual aspects of places of worship as a social infrastructure to the management of disaster risks. The output of this objective includes cross referencing the contributions of religious/spiritual positions in disaster resilience the dimensions of the social resilience framework.
3. **Research objective # 3.** To provide recommendations on how to reframe the approaches in assessing places of worship through the social resilience framework. The output of this objective includes a framework on how social infrastructures and social resilience could be assessed in future studies.

## 1.5 Rationale and Significance of the Research

The intention of this research is to narrow down the conceptual gap among authorities and citizens on how they understand resilience. This discrepancy is especially evident among informal settlers who live in highly vulnerable areas, such as coastlines, riverbanks, and floodway. Physical structures are often crucial in preparing, mitigating, and recovering from the negative effects of disasters (UNDRR, 2018). Hence, it is beneficial for the research to draw on how social infrastructures and social capital can significantly impact the lives of informal settlers. This study maintains how the different stages and dimensions of capacities for resilience significantly relate to the usage of their resources. Current literature tends to gloss over parameters such as the number of years since migration, place of origin, and socio-economic variables that are likely relevant to disaster study (Hanna, Dale, & Ling, 2009). However, by relating the different dimensions of resilience of informal communities, the study can assist us in understanding communities with limited resources still choose to live in high-hazard areas.

In most literature, social infrastructure such as churches and classrooms, are essential in enhancing resilience to the communities. But there is a limited study on identifying the significant adaptive characteristics of informal settlers in facing and mitigating the difficulties they face from the effects of disasters. Interestingly, many studies continue to

focus on solving the negative effects of informal settlers such as poor sanitation, congestion, and garbage collection, with which in effect might suggest the people who live there are also part of the problem. Though theories, concepts and indicators that evaluate their depressed state are plenty, but these studies fail to factor in positive aspects that are innate and natural to their past (history, culture, and character) which can be fundamental in making them truly resilient. Some literature discusses how parameters such as trust, cultural norms and sense of community influence the communities' response to disasters. In the same manner, this study will explore how physical structures and social networks influence the ability informal settlers to live in highly vulnerable areas (See Figure 1.5.).

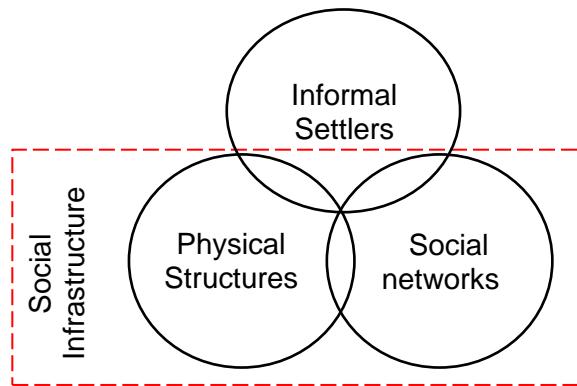


Figure 1.5. A Venn diagram of how physical structures and social networks may relate to the disaster resilience of ISFs.

The study makes at least three distinct contributions to the field of disaster risk reduction and management and places of worship. First, it adds to the *theories of resilience by shifting the focus from the vulnerability aspect of informal settlers towards to their capacity to generate 'in-built' resilience*. Second, it contributes to the analysis of the *use of spaces in places of worship from the social resilience perspective*. This helps enrich the knowledge on the limited insights of small-scale social behaviours in disaster risk reduction. Finally, the study provides insight to the *link between social resilience and role of places of worship in the built environment*. Since places of worship are not part in the planning process of local government units and agencies in the built environment, this linkage might provide insight to the effectiveness of places of worship in the disaster risk reduction process.

Thus, the approach in assessing places of worship is composed of two components, the physical and the social dimension. Initially, places of worship will be assessed based on Latham and Layton's (2019) criteria as a social infrastructure. The next step aims to apply a social resilience approach in assessing the utilization of space in places of worship (Saja et al., 2018). This involves several data-gathering tools that involves recording the dynamic nature and relationships of places of worship as a socio-spatial construct. This approach is also harmonious with Brenneman and Miller's (2016) theory that places of worship as a social construct.

## 1.6 Scope of the Research

This research focuses on the role of places of worship in the built environment. However, emphasis of the study is oriented towards assessing the use of these places as a social infrastructure through a social resilience framework. The scope of the study is also confined in a case study of informal settlements located in the urban context in the region of Metro Manila, Philippines.

*Social infrastructure and social resilience.* While the study begins with a discussion on the importance disaster risk reduction and management in an urban setting, the research focuses on the limited debates on the relevance of social infrastructure in the built environment. Among the types of social infrastructure examined in various literature, special attention is oriented to the study of places of worship. To counter the limited conversations in religious spaces, the abundance of research in social resilience benefits in substantiating the assessment of places of worship. In addition, the multiple research methods and theories conducted on social resilience also helps the research base its analysis on different perceptions and insight into the complex theory of resilience.

*Urban context.* The case study to be used in the research is situated in Barangay San Andres in the municipality of Cainta, Rizal, Philippines. Barangay San Andres is situated along the riverbanks of the 10-kilometer man-made Manggahan floodway constructed in 1986. While the floodway aims to prevent flooding of the Pasig River during a heavy rainfall, the site is constantly prone to requiring government assistance to informal settlers that live along the floodway. Thus, the aim of this study is to identify potential social indicators that characterize the resilience of a built environment that is highly exposed to risks and hazards. The geographic scope of the study will not include the whole barangay of San Andres, but only areas that is highly subjected to the risks of flooding along the floodway. The findings of the study are designed to be generic but especially applicable to the urban context of informal settlements.

## 1.7 Structure of the Thesis

This research consists of eight chapters with an outline of the content before each chapter. The following chapters to be discussed are as follows:

**Chapter 1 – Introduction:** The introduction chapter starts with the broader issue of disaster risk reduction and management as significant concern. This chapter briefly discusses the background of DRRM in the built environment and the potential use of the social resilience framework in exploring places of worship. This chapter also includes the research problem, research aims, research objectives, and the significance of the research, and the scope of the study.

**Chapter 2 – Review of Related Literature** – This chapter is divided into four sections, namely: (1) DRRM and the built environment, (2) the role of social infrastructure, (3) exploring through the lens of social resilience, and (4) evaluation of the role of places of worship. A summary of the chapter then associates the implications of past and current theories and concepts in this study.

**Chapter 3 – Theoretical Framework** – This chapter is divided into 2 sections. Section 3.1 discusses the parameters of a social infrastructure and how places of worship are analysed. Section 3.2 details the framework on how the social resilience framework is operationalized in the research of places of worship.

**Chapter 4 – Research Methods** – This chapter is divided into three sections. Section 4.1 discusses the philosophical underpinning of the research methodology. It also includes the implications of the COVID-19 pandemic and research ethics to the current research. Section 4.2. then discusses first phase (qualitative approach) in the gathering of data. Finally, Section 4.3 discusses the second phase (quantitative approach) using structural equation modelling.

**Chapter 5 – Qualitative Findings (interviews)** – This chapter is divided into three stages. Stage 1 (Section 5.1) discusses the main findings of the semi-structured interviews through a contextual thematic analysis. Stage 2 (Section 5.2) then quantifies the content manifested from the interviews by using NVivo. Stage 3 (Section 5.3) finally qualifies the latent content, or themes, that is used to formulate the survey to be used through quantitative analysis. The survey is based on the six dimensions of social resilience that was based on the emerging themes from the interviews.

**Chapter 6 – Quantitative Findings (survey)** – This chapter is again divided into three stages. Stage 1 (section 6.1) discusses and summarizes the results of the survey. Stage 2 (Section 6.2) describes the statistical results from the survey. A discussion in inferential statistics is also included in this section. Finally, stage 3 (Section 6.3) assesses the results of the survey through the six dimensions of the social resilience framework through SEM.

**Chapter 7 – Discussion and Synthesis of Results** – This chapter is divided into four sections. The first section synthesizes the key findings in chapters 5 and 6. Section 7.2 will discuss how research objective # 1 was achieved and its related outputs. Section 7.3 will discuss about research objective # 2 and Section 7.4 will discuss about research objective # 3.

**Chapter 8 – Conclusions and Recommendations** – The concluding chapter will discuss how the three (3) research objectives were achieved. Section 8.2 will discuss how the study is able to contribute to the knowledge and practice of DRRM and social resilience. Section 8.3 will discuss the limitations of the research while section 8.4 will be about the key recommendations for future research.

## **Research Outline**

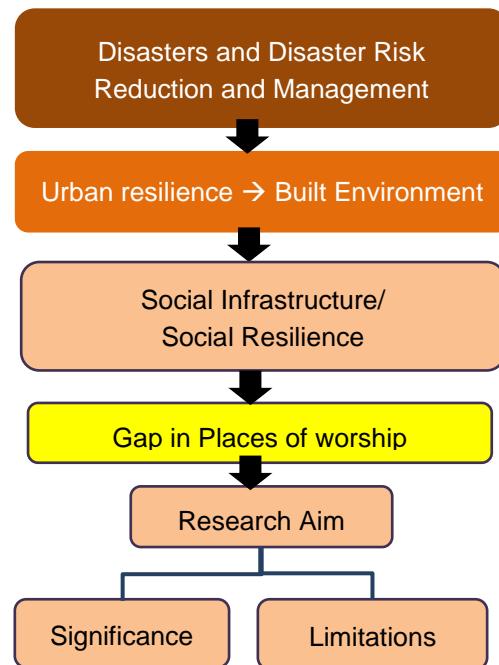
- 1. Introduction and Aims**
- 2. Review of Related Literature**
  - 2.1. DRRM and the built environment
  - 2.2. The role of social infrastructure in DRRM
  - 2.3. Exploring through the lens of social resilience
  - 2.4. Evaluating the role of places of worship
  - 2.5. Summary and implications of the review
- 3. Theoretical Framework**
- 4. Research Methods**
- 5. Interview Results/Analysis**
- 6. Survey Results/Analysis**
- 7. Synthesis of key Findings**
- 8. Discussion/Recommendations for Future Research**

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## **Chapter 2: Literature Review**

This literature review chapter consists of four sections, which includes a summary section at the end of the chapter. The review begins with the description and exploration of the practices and theories of DRRM in the built environment in Section 2.1. As the relevance of DRRM is clarified in the built environment, Then Section 2.2. focuses on the role of social infrastructure in the processes and mechanisms of DRRM. Section 2.3. then follows an examination of the social dimension of DRRM through the lens of theories in social resilience. Finally, Section 2.4. evaluates the role and significance of places of worship in their physical and social dimensions in DRRM.

The discussion of the related literature starts on the context of disaster risk reduction and management of the built environment. Figure 2.1. provides as guide as to how the research problem was formulated in the previous chapter. The literature review diagram helps find the relevance of the social infrastructure and social resilience dimensions of the built environment in the context of DRRM. As possible gaps found in the literature with regards to places of worship, the review examines the different views and concepts that highlights the significance and limitations of the research study.



**Figure 2.1. Preliminary literature review diagram**

## **2.1. Disaster Risk Reduction and Management (DRRM) and the Built Environment**

Developing countries are often associated with being “less developed” relative to other countries with regards to their ability to recover their economy, energy, health, and infrastructure during and after a disaster. More than 95 percent of the people affected by natural disasters during the past 105 years were either Asian or African (Larson, 2008). With natural disasters costing global economies as much as \$350 billion dollars in 2010, organizations and institutions have developed various tools and information in measuring the economic vulnerability and resilience of buildings and lifeline systems (Briguglio, 2009; Rose, 2004). Due to the complexity of the effects of natural disasters, various studies have examined disasters through different fields of research such as economic, social, and ecological aspects. Other different approaches in analysing their ability to cope with disasters include capital-based or infrastructure-based research (Israel and Briones, 2014). Nonetheless, many insights in facing disasters can be realized by exploring the effects and consequences of disaster risks that occur in the third most-disaster-prone country in the world, the Philippines (UNFPA Philippines, 2019).

Disaster is defined as the “serious disruption in the functioning of a community or society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope with using its

own resources" (UNISDR, 2009)<sup>1</sup>. As the frequency of disasters continues to increase globally, scholarly literature continues to find ways to manage the risks (the probability of negative consequences) and hazards (a dangerous process or condition) from disasters in adversely affecting human lives<sup>2</sup>. Studies on disasters, resilience, and vulnerability have significantly altered how policies and practices in disaster risk reduction are understood in the past 40 years. However, these practices are yet to grasp the effects and consequences of disasters to the people who are most vulnerable. On addressing these vulnerable qualities and characteristics, risk is widely accepted to be defined by the following formula (UNISDR, 2015):

$$\text{Risk} = \text{Hazard} \times \text{Vulnerability} \times \text{Exposure} / \text{Adaptive capacity}$$

Due to the different definitions and concepts of resilience, the term has since been used and classified into different studies and fields of ecology, engineering, psychology, social research, sustainability science and most recently, climate change adaptation (Alexander, 2013). Although 'resilience' was initially used to describe ecosystems returning to its 'state of equilibrium' such 'stability' provides little insight as to the varying behaviours and cultures of the people when facing disasters (Holling, 1973; Olsson *et al.*, 2015a). Due to the malleability of resilience's definition, the term here will be used to depict the reduction of vulnerabilities and the enhancement of adaptive capacities under a specific context and circumstances of an urban environment (Gaillard, 2019; Meerow, Newell and Stults, 2016).

### **2.1.1. Making Sense of Resilience in the Built Environment**

As urbanization is set to define the century, more than 50% world population now live in cities. (Graham and Marvin, 2002; Marcotullio and McGranahan, 2012). In 1980s, the share of the urban world population of 39% has increased to 54% in 2015 and is expected to increase up to 66% by 2050, with approximately 6.419 billion people living in cities (UNESCAP, 2013). As cities are becoming increasingly complex due to physical infrastructures and human behaviour, they also become very vulnerable to disasters when their subsystems are destroyed or fail to adapt (Coaffee, 2010; Sanderson, 2000). Much literature has discussed on the importance of preparing risk management plans, early warning systems and hazards maps in enhancing urban resilience (Shaw *et al.*, 2016). For resilience strategies to be effective, it requires approaches and planning that are defined for

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<sup>1</sup> In principle, this research adopts the definitions of terms such as disaster, risks, resilience, hazard, and vulnerability based on the terminologies defined by the United Nations International Strategy for Disaster Risk Reduction (UN, 2016). This 2009 definition notes the ability of the community or society to cope with its own resources and is mentioned here for simplicity.

<sup>2</sup> This study is limited to its exploration of disasters to those that occur naturally, thus excluding man-made and technological disasters in the discourse.

what purpose and for whom the strategy is to be catered to (Cutter, 2016a; Friend and Moench, 2013). Although urban resilience was defined by the ability and active process of an urban system through a concerted effort to withstand external shocks and stresses, its capacity to rebound not only rests in good planning but also of resilient citizens (Campanella, 2006; Leichenko, 2011)

As the studies in understanding resilience continues to expand, different concepts and definitions may start to confuse scholars and policymakers in finding the right context in applying resilience. (Leichenko, 2011) sorted the literature of urban resilience into four branches of (1) ecological resilience, (2) hazards and disaster risk reduction, (3) urban and regional economies and (4) resilience through urban governance and institutions. The advantage of the area in 'governance' literature is that they advocate diversity of approaches and suggest different forms of solutions rather than a single, 'best practice' strategy in addressing resilience (Ostrom, 2010). Even though there is a 400 percent increase in number of articles on resilience in the past 10 years, there is still relatively little research that exist for the assessment of urban resilience (Bahadur and Tanner, 2014). To collate various resilience studies into one assessment framework, Sharifi and Yamagata (2014) was able to categorize assessing resilience into six major themes from 332 publications. These themes include the following: (1) infrastructure, (2) security, (3) environment, (4) economy, (5) Institutions and (6) social and demographics (Sharifi and Yamagata, 2014). With people being central to the function of cities, it is important to analyse human vulnerability in relation to their urban environment.

International development practitioners identify the importance of understanding urban resilience through its intangible qualities such as being resourceful, robust, inclusive, and flexible, and applying these tools at the local geographic context (Arup, 2014; EMI, 2015). This paper takes on the perspective of international practitioners of resilience based on the four components of urban resilience by the World Bank. The four components of resilience include (1) infrastructure, (2) institutional, (3) economic, and (4) social elements (Jha, et al., 2013). Given the complexity of urban systems and the interdependence of its elements, the following sections examines the infrastructure through the facet of the built environment.

### **2.1.2. DRRM and Managing Risks in the Built Environment**

Disaster Risk Reduction and Management (DRRM) has been a dominant theme in many institutional studies and academic literature. Disaster risk reduction and management is a systematic approach to reduce the impact of disasters on the built environment which includes implementing strategies and policies that improve the coping capacities to avoid the diverse effects of disasters (Bosher and Chmutina, 2016; Etinay, Egbu and Murray, 2018). The United Nations Office for Disaster Risk Reduction (UNDRR) defines disaster risk management as

*“the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses (UNDRR, 2016).”*

Many initiatives in DRRM are understood in terms of physical infrastructure that prepares, mitigates, and responds from various forms of disasters. These physical structures include buildings such as emergency shelters, medical facilities, and coordination centres (Burnell and Sanderson, 2011).

A simplified approach for people to comprehend the extent of damage of disasters is often to measure them either in terms of lives lost or monetary losses. As human and capital costs of disaster continue to increase, governments and international organizations now find ways to be more efficient in managing and preventing disasters (Oliver-Smith, 2009). Disaster risk reduction (DRR) was used in the 1970s under the understanding of mitigating risks and vulnerabilities of entities towards the occurrence of disasters. As different approaches and strategies were created, formed, and identified, the United Nations International strategy for Disaster Reduction (now UNDRR) was formed in 1999 (UNISDR, 2004). The most recent the Sendai Framework for DRR is set to understand, strengthen, invest, and enhance DRR and to “build back better” in recovery, rehabilitation, and reconstruction. Through decades of doing research in DRR, there is a large agreement that people’s vulnerability to hazards and the lack of capacity to address these risks and vulnerabilities greatly affects much damage will be done or deterred (Oliver-Smith, 2013; Wisner *et al.*, 2004). The concept of disaster resilience has been dissected into different components, discussed as a complex system, and is approached based on performance and perception (Beccari, 2016; Legaspi *et al.*, 2014; Yang and Quan, 2016). In this discussion, we will use the Governance and Social Development Resource Centre’s (GSDRC)

application of disaster resilience as" the ability of humans, communities, or organizations in recovering from the adverse effects of disaster risks" (GSDRC, 2016)

Disasters are often understood and experienced with the broad and complex patterns of human society. In this aspect, Wisner, Gaillard and Kelman (Wisner, Gaillard and Kelman, 2012, p. 33) thematized hazards and disaster risk reduction into three main themes: (1) politics, history, and power; (2) culture, knowledge, and religion; and (3) environment, development, and sustainability. Other researchers define DRRM into phases such as (1) hazard identification, (2) mitigative adaptations, and (3) preparedness planning (Bosher and Chmutina, 2016). Indeed, studies need to analyse disaster risks and their effects in different dimensions. This may provide a much more effective way of creating policies and building physical infrastructure that help reduce disaster risks and mitigate hazards (Wisner *et al.*, 2003).

### Effect of the Built Environment to DRRM

Globally, urban areas contain more than 50% of the world's population. As unforeseen disaster events hit cities and communities around the world, there is an emerging challenge in urban areas on how to manage risks contributed by extreme weather events (Reu Junqueira, Serrao-Neumann and White, 2021; Shaw, 2016). Urban areas, or cities, are generally defined as an entity of human settlement that is composed of different systems for housing, transportation, utilities, and communication. Alternately, the term 'built environment' is described as the human-made surroundings that is built not only by walls and structures, but also by the social processes that gave rise to its built form (Lawrence and Low, 1990). The built environment is also a system described as a group of interacting elements delineated by spatial and temporal boundaries. In effect, disasters in urban areas greatly influence the city's economic status, technological advancement, network systems, political organization, and even mental health (Evans, 2003; Malalgoda, Amaralunga and Haigh, 2014; Zhao, McCoy and Smoke, 2015).

By looking at Bartuska's concept of the built environment, the environment can significantly influence a community's vulnerability to disasters (Bartuska, 2007). While it is true that cities are expected to provide better protection to its people and other facilities, disasters have highlighted some weaknesses in the resilience of the urban built environment. In a global level, the United Nations office for Disaster Risk Reduction highlighted a "build back better" initiative through the 'implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political,

and institutional measures' (UNDRR, 2015b). In an urban level however, urban recovery from disasters is noted to occur not just by building structures but also by reconstructing the myriad social relations embedded in it (Campanella, 2006). In addition, a goal to achieving a 'resilience city' includes strong public policies that promote community development that include both technical and social approaches (Godschalk, 2003). It can be said that the broad and diverse research in managing urban resilience and sustainability in academic papers can show inconsistent definitions (Etimay, Egbu and Murray, 2018; Meerow, Newell and Stults, 2016; Reu Junqueira, Serrao-Neumann and White, 2021). Thus, this paper intends to explore the role of physical structures in the built environment based on Meerow, Newell and Stults' understanding of the ability of an urban system 'to adapt to change, and to quickly transform systems' in the face of a disastrous event (Meerow, Newell and Stults, 2016, p. 46).

### **2.1.3. The Role and Importance of the Built Environment in DRRM**

In 2009, Typhoon Ketsana cause widespread flooding in the National Capital Region in the Philippines, causing major roads to be impassable and flights to be cancelled (Ubalde, 2009). While the effects of disasters are often felt through the disruption of the daily normal activities of people, reports tend to communicate damage in terms of economy. The estimated costs of P6 billion pesos, P4.1 billion to infrastructure, P1.9 billion to schools and P882 million to agriculture vaguely paints a picture of the tragedy that has struck the community (CDRC, 2009). Thus, aside from the emphasis on numbers, it is essential for studies to see the effects and interdependence of the various components of the built environment from disastrous events.

#### **The Complexity of Urban Areas and the Built Environment**

Dicken defines the city as an urban system. This system is multi-scalar, complex and adaptive to its environment (Dicken, 2011). In creating order, some academic research classify the "urban system" into four categories or hierarchies like the: (1) governance networks, (2) networks materials, (3) urban infrastructure, and (4) socio-economic dynamics. S. Cruz on the other hand, only grouped the urban system into three types of structures: the physical environment structure, the socio-economic structure, and the institutional structure (Sara Santos Cruz, 2013). This study however does find the World Bank's definition of 'urban resilience' as clear and inclusive (Jha, Miner and Stanton-Geddes, 2013).

The said report defined the tools in building urban resilience as divided into four operating components such as its (1) infrastructural, (2) institutional, (3) economic, and (4) social components. These four components are also used in whole or partially by international and multilateral institutions (i.e., WB, WHO, OECD) in their various projects and programs in assisting areas affected by natural disasters (Jha, Miner and Stanton-Geddes, 2013). The advantage of having different categories of scale and structures on how urban resilience is understood lies in its adaptability. The complexity of an urban system could be used to tailor these concepts and strategies to fit the different and distinct objectives of each human environment.

In discussing the different concepts of urban resilience, it is important to be specific as to how these concepts are to be used. Carpenter and other researchers clarify how important that certain resilience strategies should identify for whom, for what, when, where, and why it is design for (Carpenter *et al.*, 2001; Cutter, 2016a; Vale, 2014). Arup, a multinational professional services firm in London, defines urban resilience as having “the capacity to function so people can survive no matter what stress or shocks” they encounter (Arup, 2014). ”

Thus, urban resilience capacities should be characterized as having multi-functionality, redundancy and modularization, diversity, connectivity and adaptive planning and design (Ahern, 2011). By studying 25 different definitions of urban resilience, the boundaries of urban resilience were defined and its flexibility and interconnectivity across different scales was well-noted. Ahern’s study found it beneficial to use Meerow’s definition of urban resilience as “the ability of an urban system, and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales, in order to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacities.” (Meerow, Newell and Stults, 2016). Through this definition, this research will focus the physical aspect of the urban system, the built environment (Miller, 2015).

The term ‘built environment,’ first used by social scientist Amos Rapoport in 1976, generally pertains to the man-made buildings and the physical infrastructure around a specific human environment (Hassler and Kohler, 2014). The term has also evolved into what is sometimes called the ‘urban fabric,’ which pertains to a much more complex socio-technical system that includes the physical, economic, social, and institutional regimes. The challenge is exploring the built environment is its common notion as a physical entity. It is often described as the physical structures designed, built, and maintained by the construction industry, which

includes civil engineering and infrastructure work such as roads, bridges, and railways (Bosher *et al.*, 2020). This perspective often limits the integration and interaction of the exact sciences with the social arts, psychology, and well-being of human beings. Thus, it is advantageous to discuss the built environment as a compose of institutional arrangements, resources, and political integrity that contributes to the resilience of cities (Malalgoda, Amaratunga and Haigh, 2014). Hence, it is critical to design the urban built environment with a broad understanding of its various dimensions to manage and reduce disasters risks properly in times of disaster.

#### **2.1.4. How Physical Infrastructure is Discussed in the Built Environment**

**Infrastructure Resilience** is mentioned to be a system of interacting components that work together “to achieve a particular, domain specific function” (Alderson, Brown, and Carlyle, 2015, p. 563) Studies in infrastructure resilience includes discussion that ranges from multi-billion projects such as coastal roads and bridges to focused developments such as rain gardens and wastewater-treatment plants (DPWH, 2018a; Jia *et al.*, 2016; Karamouz *et al.*, 2019). This study focuses on the physical infrastructure system that is often used in communities to prepare and recover from the effects of extreme weather events, specifically floods. Communities are reportedly more resilient to the effects of calamities when there are assets and resources made available by the community or government that manages it (Sanderson, 2000). Thus, when communities utilize well their access to resources as a group, they can better facilitate disaster recovery faster (Wisner, *et al.*, 2004; Sharifi, 2016).

Infrastructure resilience also refers to the “reduction of vulnerability of built structures”, critical infrastructure, roads, sheltering capacity, and the capacity of communities to response and recover from disasters (Jha, Miner and Stanton-Geddes, 2013). On the aspect of organizational management, some studies emphasize the proactiveness and integration of emergency management practices and other professions in the construction industry (Bosher *et al.*, 2020). Other studies focus on the planning processes and training programmes to the local community. Empowering local governments through proper funding and implementation contributes greatly to making their city’s built-environment more resilient to disasters. (Malalgoda, Amaratunga and Haigh, 2014, pp. 742–743). These approaches to resilience and infrastructure aids to further consider the two (2) main aspects of infrastructure resilience, the physical and the social.

As many urban planners and decision-makers prefer to highlight the use of physical defences and construction in addressing ‘exposure’ as a ‘vulnerability’, the importance of

social resilience in Disaster Risk Reduction and Management (DRRM) is often underestimated (Hewitt, 1983). It is only when vulnerability is viewed as a 'process' aside as an output or outcome, issues in coping mechanisms and social perception start to emerge (Adger, 2006). The triangulation method is often used in various research to combine different methodologies to study the same phenomenon. This approach has been used by Amaratunga *et al.*, (Amaratunga *et al.*, 2002) in exploring and studying the built environment, on the premise that the weaknesses in a certain research method will be compensated by the counter-balancing strengths of other methods such as qualitative vs quantitative approaches. In Bosher and Chmutina's (Bosher and Chmutina, 2016) book on *Disaster Risk Reduction for the Built Environment*, the authors categorize resilience through different types of disasters risks, such as earthquakes and floods. These classifications help identify the specific hazards and opportunities that are pertinent to the corresponding type of environment with which the research is based. These different approaches in the discourse of the built environment helps us grasp the breadth and complexity of DRR in the built environment. Hence, it is important to discuss and narrow down the various challenges in studying the built environment in the following section.

#### **2.1.5. Challenges of Studying the Built Environment**

Challenges in the research of the built environment often develop from the assessing its performance in the engineering sciences to the health and well-being of its users (EPSRC, 2016). Some 'grand challenges' of studying the built environment include factors such as climate change, energy consumption, urbanization, and growth and innovation (Wang *et al.*, 2019). While built environment studies often include discussions on technological advancement and systems management, they are also often associated to intangible factors such as religion, culture, and various social aspects of human behaviour (Malalgoda, Amaratunga and Haigh, 2016; Wang *et al.*, 2019). In addition, the COVID-19 pandemic has also provided additional paradigm shifts in the development of the built environment in terms of design, spatial planning, and scale strategies in the community level (Cheshmehzangi, 2021). These different approaches and aspects in understanding the built environment has helped us to focus on the importance of sustainable infrastructure in the urban built environment (Boyle *et al.*, 2010).

The term 'infrastructure' is often understood as the big physical structures that provide the range of essential services to a city. Emerging theories in infrastructure could be attributed to Graham and Marvin (2002), wherein they engaged in the interdisciplinary nature

of the complex interactions between infrastructure networks and urban spaces. These provide essential services that range from transport, communications, electricity, water, or waste (Roberts, 2008). Some studies rather find it helpful in further categorizing them based on function such as an institutional, material, and personal infrastructure (Buhr, 2003). In studies in resilience however, infrastructure resilience as earlier discussed by Jha, was implicitly to be of two types – hard and soft. Although there is clarity with the importance of physical critical infrastructure, roads and shelter units in mitigating disasters, there seems to be an overlap on physical infrastructures that promote social capital and the ‘soft infrastructure’ that happens within them. Economist Keitaro Aoyagi et al. also saw the impact of the distance of physical infrastructure, in his case irrigation systems, on the accumulation of social capital (Shoji *et al.*, 2012). Discussion of infrastructure in terms of its social dimension was done as early as 1999, wherein infrastructure is studied as a “relationship” and never as a “thing” (Star, 1999). A challenge encountered in studying infrastructure as a “relationship” is defining it with specific levels or indicators, more so with standardizing how it is to be used. Nonetheless, some government and institutions begin to standardize the use and implementation of building infrastructure in their policies and regulations (Casey, 2005; Karamouz *et al.*, 2019).

In some emerging studies on urban areas, sociologist Eric Klinenberg defined the network of physical spaces and institutions that promote community-building activities as the social infrastructure (Latham and Layton, 2019). Consulting companies has also started to use social infrastructure to pertain to public buildings that promote education and healthcare (McKinsey & Company, 2021). In academic literature, social infrastructure has been considered extensively as structures that promote disaster resilience and build the positive public realm (Chen, Li and Zhan, 2021; Yelvington, 2020). Nonetheless there is a challenge on how environments with limited resources can prepare and mitigate the effects from disaster risks.

#### **2.1.6. Examining resilience in the vulnerable built environment of informal settlements**

In examining the role of the built environment in places with high risk, the perception of risk needs to be understood. Risk perception was mentioned to be high among inhabitants of Bacolor, Pampanga, but also is their determination to remain on the banks of the Pasig-Potrero River despite evident risks and hazards in the area. The daily struggles for access to resources and strategies to protect themselves have become inherent in their daily routines of life (Gaillard *et al.*, 2008). Inhabitants of informal settlements are often described as located in densely populated areas with low-income households and low security of tenured

housing (Morin, Ahmad and Warnitchai, 2016). However, Usamah et al. (2014) attributes their geographical compactness to strengthen their social cohesion and sense of community in times of disasters.

The question “How safe is safe enough?” was tackled by scholars to understand how people perceive risk (Slovic, 1987). As “risk” may mean different things to different people, some studies have shown that perceived risk is quantifiable and predictable. Eva et al. (2010) determined that poverty, the availability of jobs and the Manggahan Floodway itself tends to be the root cause of flooding during The Typhoon ‘Ondoy’ in 2009. These different points of views may detract governments and the people from understanding the real effects of natural disasters in a specific area or context. Some have mentioned of the challenges of resilience to clearly capture the operations of social dynamics. Thus, it is important to note that the following approaches and measurements to resilience is subject to ‘preferences’ and ‘values’ of the subject it is to be applied to (Davidson, 2010).

In 2010, there are 6,700 informal settler households that occupy the 10-km stretch of the Manggahan floodway (Panares, 2010). This number of households has increased to 9,216 in 2018, an average of an additional 300 families each year. To address the issue of increasing disasters risks, the Philippine government provided the Japan International Cooperation Agency (JICA) resettlement action plan for the Manggahan Floodway for 2019. The plan proposed to construct a total of 8,136 housing units (4,736 in Cainta and 3,400 in Taytay) for the relocation of the informal settlers and is planned to be finished by 2026 (JICA, 2018). To understand the needs and perception of the local communities, the resettlement plan was conducted with public consultation in tackling the social and economic issues that affect the informal settlers in the area. However, the plan did not discuss how the existing buildings and infrastructure affects and influences the future development of the area.

The group of informal settlements along the floodway is uniquely divided by the physical and political boundaries of Pasig city and the two (2) municipalities of Taguig and Cainta. Aside from its complicated political structure, the presence of an incomplete government-built infrastructure, that is designed to prevent flooding, is the principal cause of flooding in the area. Another unique characteristic of the site that distinguishes it from other informal settlements in Metro Manila is that unlike other settlements that are formed due to neglected and deteriorated neighbourhoods, the settlement was actively created after the construction of the floodway. Through an initial ocular visit, the communities exhibit a positive inclination towards religious activities due to the significant number of places of worship that exists on site. While these types of places of worship are of different religious organizations,

the research intends to explore how these different religious beliefs influence their community resilience. It is also good to note that despite the site comprised of unstable foundation and inadequate infrastructure, these communities continue to grow and thrive in the presence of constant hazards from extreme weather events. So how does physical infrastructure influence the resilience of a place? The following section will then discuss the significance of social infrastructure in the DRRM and the built environment.

## **2.2. The Role of Social Infrastructure in the DRRM**

Resilience in the built environment has often been considered from ecological and engineering perspectives, however, models from the socio-ecological systems have also begun to be recognized. By observing resilience as a self-organizing system instead of a designed system, this approach helps understand how people change their behaviour and activities to fit the characteristics and spatial patterns of their physical environment (Anderies, 2014; Hassler and Kohler, 2014; Hollnagel, 2014; Lawrence and Low, 1990). Many researchers have used various mapping techniques in finding relevant information needed to improve resilience in disaster risk-prone areas (Peduzzi, Herold and Dao, 2005). On a smaller scale, other studies have posited the important role of the stakeholders of the community in enhancing skills and capacities in creating a resilient urban built environment (Gaillard and Mercer, 2013; Malalgoda, Amaralunga and Haigh, 2016). While there are studies wherein ‘social infrastructure’ is used as a driver of relationships in social network studies, the use of the term was not clear and defined (Conti and Doreian, 2014; Potts *et al.*, 2008). Nonetheless, examining ‘social infrastructure’ through the concept of infrastructure as an ‘embedded system’ helps clarify ‘invisible’ thoughts and questions that need to be addressed (Latham and Layton, 2019). This approach is also amplified through Klinenberg’s (2018) emphasis on the importance of social connections.

In 2013, architect Ann Carpenter explores the positive influence of an integrated built environment in creating strong social networks and consequently, greater resilience (Carpenter, 2013b). However, the clarity of relationship between the functions of the ‘hard and soft infrastructure’ in disaster management studies has not been adequately addressed in many studies (Carpenter, 2013b; O’Sullivan *et al.*, 2013). There are studies wherein the physical infrastructure and social systems of a community is analysed in finding cause and effect of certain phenomenon (Guidotti, Gardoni and Rosenheim, 2019). In addition, with the use of the ‘infrastructure’ approach seems especially advantageous to identify and evaluate specific needs of an area or population properly. This aspect is particularly useful when applied to areas or places that have limited or constrained resources in mitigating the

negative effects of disaster risks (Aldrich and Kyota, 2017). Thus, following the perspective of Klinenberg (2018) and Latham and Layton's (2019) understanding of social infrastructure, the following literature review aims to clarify the role these spaces play in the built environment.

### **2.2.1. Assessing the Role and Trends of Social Infrastructure in the Built Environment**

Recent studies in social infrastructure associated with the built environment includes economic aspects of procurement and its role in providing sustainability due to increasing consumption, resource availability and climate change (Boyle *et al.*, 2010; Howes and Robinson, 2006). However, there are increasing studies that began to explore the importance of social infrastructure to the quality of life and healthcare of the people in the built environment (Davern *et al.*, 2017; Fried, 2020; Grum and Kobal Grum, 2020). Despite the continued growth of 'social infrastructure' research in the field of disaster studies, a standardized assessment tool or framework for these areas seems to be lacking (Nofal and van de Lindt, 2020). Hence, this research benefits from Latham and Layton's (2019) perception of social infrastructure as a public space that is operationalized into six (6) dimensions or functions. These dimensions require social infrastructure to be (1) a provider of services, (2) to be diverse, (3) to be physically maintained, (4) to be accessible, (5) to be responsive to people's needs, and (6) to capture the 'ethos of democratic living' (Latham and Layton, 2019). As a result of these dimensions, this research can be described as adequately thorough to analyse the role of social infrastructure through how these spaces are being used.

With regards research methods, studies widely vary in their use of qualitative and quantitative approaches in analysing social infrastructure' Sullivan *et al.* (2013) a community-based participatory research design involving five (5) communities in understanding the dynamic context, collaboration, and response of the community with regards to critical social infrastructure (O'Sullivan *et al.*, 2013, p. 239). Other studies explore the important elements of social infrastructure systems in facilitating post-disaster recovery through household surveys and response times (Sadri *et al.*, 2018, p. 1379). Nofal (2020) however, made use of the different dimensions of flood hazards in identifying the direct and indirect effects of flood resilient infrastructure. Lan *et al.* (2020) on the other hand, made use of NPP-visible infrared imager radiometer sensor night-time light data in gathering data to see the effects of social infrastructure on urban vitality. Looking at the comparatively diverse approaches in research methods, (Meerow and Newell, 2019) accurately described how resilience, in urban

environments, would be more comprehensively understood through the “five Ws of urban resilience”. Thus, in conjunction with using (Amaratunga *et al.*, 2002) the mixed methods approach of the built environment, studies can yield results that are comprehensive and balanced, also valid and reliable. However, there are certain challenges in exploring social infrastructure in the built environment, which will be discussed in the next section.

### **2.2.2. Challenges of Exploring Social Infrastructure in the Informal Built Environment**

As previously discussed, the built environment is a diverse terminology that is composed not only of its the physical features but also its cognitive and behavioural components. Another important characteristic of the built environment is its capacity and resources available to manage disaster risks. Gillis and Hogan (1979) differentiated the capabilities and differing capitals of formal and informal built environments (Gillis and Hogan, 1986). In addition, Habraken (2000, p. 229) noted the increasing complexity of environmental dynamics, wherein ‘increasingly complex technologies and a diversifying population’ encourages the regulation and formalization of buildings and infrastructure (Habraken, 2000). However, there seems to be an increasing interest on research regarding informal built environments, especially on how they are formed and function (Dovey and King, 2011; Gotham, 2001). The informal built environment is known to be highly susceptible to the effects of disasters and unforeseen events. Thus, considerable research has continued to explore how these informal settlements react and respond to such circumstances (Abunyewah, Gajendran and Maund, 2018; Faajalla *et al.*, 2017; Risi *et al.*, 2013). As studies in the built environment can be quite broad, a narrower scope of study would be helpful in recognizing specific behavioural mechanisms in managing disaster risks.

Individuals or communities who live in slums and informal settlements are often the most at risk from these disasters (Pelling, 2003). Thus, strategies in disaster risk management (DRM), i.e., the application of reducing risk from disasters, have been dominant topics among disaster studies and academic literature (Fekete, Hufschmidt and Kruse, 2014; Gaillard and Gomez, 2015). As individuals and communities learn to manage and adapt to these risks and hazards, they develop the ability to be resilient. While studies on resilience are multi-faceted and complex (Cutter, Burton and Emrich, 2010; Paton and Johnston, 2017), harnessing the local capacities of individuals and communities in developing resilience has become well-recognized in academic literature and real-world practices (Aldrich and Meyer, 2015; Luna, 2001). Despite the plethora of research methods to be used, conducting field activity studies using ‘assessment methods from high-income countries’ in unsafe

environments has also been a challenge (Salvo *et al.*, 2014). Thus, the following section will discuss some ways how social infrastructure can be studied in an informal built environment.

### **2.2.3. Exploring the Social Dimension of Social Infrastructure**

The importance of physical infrastructure in mitigating disasters is shown on how they emergency facilities such as shelters, and hospitals are being used in DRRM. However, there is an overlap on the ‘hard’ physical infrastructures that promote social capital and the ‘soft’ social network infrastructure that occur within and among the physical buildings. Klinenberg highlighted the importance of the physical network of spaces and institutions, called social infrastructure, to promote community-building activities among diverse groups (Klinenberg, 2018). Other studies defined this infrastructure as the elements or services that create the organisation of the needs and values of a city, region, or community (Popov, *et al.*, 2015; Klinenberg, 2013; Latham & Layton, 2019). In integrating of the two types of social infrastructure, it is important to include both types in assessing the needs of people living in informal settlements. However, the physical structures of the informal built environment often do not have compliance to the ‘standards and quality’ needed to be ‘resilient’ to the effects of disasters and extreme weather events. It is through this vulnerability that most researchers explore the ‘in-built resilience’ that most informal settlements have when facing adversities (Bosher, 2008; Jabeen, Johnson and Allen, 2010). This ‘resilience’ has often emerged as the strength of a ‘high-resilient communities’ in providing cooperation, mutual aid, and effective teamwork in facing adversities (Carpenter, 2013a).

The United Nations Economic and Social Commission for Asia and the Pacific has found that communities were more resilient to the negative effects of calamities when there is social support and there is the ability to pool resources (UNESCAP, 2013; Wisner, Piers and Davis, 2003). The expanding literature on disaster risk reduction has often indicated that community resilience and access to resources to be used as tools in assisting recovery from natural disasters (Sharifi, 2016). UNDRR on the other hand defined the way “people or organizations use available resources and abilities to face adverse consequences that could lead to a disaster” as their “coping capacity” (UNISDR, 2009). As coping capacities and community resilience may operate on different levels (e.g., individual, community, or institutional), much of the significant effects of these mechanisms are seen at the collective efforts of a community or organization. Thus, many scholars emphasize the importance of developing the social aspect of resilience in responding to disasters (Aldrich and Meyer, 2015; Pelling, 2003; Rivera and Nickels, 2014). The following section will explore how social aspect of resilience can be applied to the resilience of informal built environments.

### **2.3. Exploring through the Lens of Social Resilience**

Researchers and practitioners agree that a deeper understanding of adapting to disasters and enhancing resilience is acquired from the local communities (Gaillard and Gomez, 2015). Conversely, not all communities have the adequate number of economic resources to properly address disasters. Thus, between Aldrich and Meyer's (Aldrich and Meyer, 2015) capital-based approach and Arana and Wittek's (Arana and Wittek, 2016) utilization of common resources, the importance of community-based approaches in operationalizing resilience is emphasized. Community resilience has been defined as having "the ability of a community to utilize available resources to respond to, withstand, and recover from adverse situations" (Bosher and Chmutina, 2017). It is between Adger's (2000) definition of resilience at the community level and (Obrist, Pfeiffer and Henley, 2010) description of the ability to access resources that this paper finds a suitable use on the definition of resilience.

This research will use social resilience as "the ability of a community to utilize available resources to respond to, withstand, and recover from adverse situations" (Adger, 2000; Bosher & Chmutina, 2017). This research somehow counters what many planners and authorities' favour, i.e., the use of physical defences and construction in addressing 'exposure' and 'vulnerability'. It is only when vulnerability and resilience are viewed as 'processes' rather than as outputs when issues in coping mechanisms and social perception start to emerge (Adger, 2006).

The coping mechanisms of vulnerable communities were still evidently perceived even at six (6) years after the destructive typhoon Haiyan hit the Philippines on 2013. Survivors of the typhoon continue to insist on returning and living in no-build zones despite resettlement efforts of the government and international (Sunstar, 2019). While the government spends millions of budget allocation on building houses, academic scholars examine theories and concepts on disaster resilience. On the other hand, institutions that aid the effected communities discuss about measuring resilience and capacities. Informal settlements, based on their current resources, signal their 'wants' through resistance or staging rallies (Cellona, 2017; Ong *et al.*, 2006). Despite positive development in policy reviews and concrete housing assistance are provided to the victims, there seems to be little discussion on the 'sources' by which these victims are able to develop their own 'in-built resilience' (Bosher *et al.*, 2007; Ungar and Liebenberg, 2011; Usamah *et al.*, 2014).



Figure 2.3. Residents clash with government demolition workers along the East Bank Road of Manggahan Floodway in Sta. Lucia, Pasig City. (Source: ABS-CBN News, 2017)

Community resilience is often used in a wider scale and inclusive approach on of how communities handle disasters. However, focusing on social resilience as the “ability of groups or communities to cope with external stresses” helps emphasise the empirical dimension of community resilience (Adger, 2000; Larimian *et al.*, 2020). The wide scope and possibilities of social resilience has also become its impediment in being applied properly in many contexts in managing disasters. While coping and handling trauma or damage from the effects of disasters risk can be documented and studied, the process of recovery and sustainability is seen as one of the most important aspects in disaster risk reduction and management (Trkulja, 2015). Hence, academic scholars continue to develop clustered dimensions and sub-dimensions of the concept to create a well-structured framework based on the diverse characteristics of social resilience (Kwok *et al.*, 2016; Saja *et al.*, 2018; Trkulja, 2015).

Social resilience involves the exchange of information and communication, economic development, community competence, and social capital (Norris, *et al.*, 2008; Putnam, 1993). A resilient community is about building a cohesive society, wherein social capital is the element that connects the people within (Bourdieu, 1986; Ferragina, 2010). With respect to the varying availability of resources among communities, this study will apply Kwok *et al.*’s multi-dimensional concept of social resilience (SR)<sup>3</sup> as “the resilience of social units and systems is dependent on the functions of other societal systems such as ecosystem services, physical infrastructure, and economic activities.” (Kwok *et al.*, 2016). The social resilience approach does not only help researchers to evaluate the appropriateness and efficacy of capacity-building programs, but also capitalizes on the local resources of the community, a distinct feature of community-based DRM (CBDRM) (USAID, 2015; Victoria,

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<sup>3</sup> As there is currently no official definition of ‘social resilience’ in the UN 2016 terminology on disaster risk reduction, this research therefore adopts Kwok *et al.*’s (2016) definition of social resilience.

2003). So how do communities with limited economic capabilities coupled with poor quality housing able to cope with the adverse effects of disasters?

### **2.3.1. Social Resilience and the Built Environment**

Social resilience is the process and abilities of a social entity (e.g., community) to tolerate, absorb, and cope to various kinds of environmental and social threats (Sakdapolrak, 2018). These processes also require the integration of the two aspects of social resilience, the cognitive and the structural (Kwok, et al., 2016; Cutter, 2016). The cognitive aspect pertains to the adaptability of the community, inclusiveness, trust, and sense of community of the group, while the structural dimension concerns to the economic resources, access, skills, and spatial amenities of the community. Basing on the previous concept of continuity in urban resilience, social resilience also involves a continuous effort of willingness, empathy, and community attachment to an area or belief (Cutter, 2016). In this aspect, social resilience is considered as a process rather than just an ability. Social resilience is viewed as ability when it is described as a set of networked adaptive capacities that includes the exchange of information and communication, economic development, community competence and social capital (Norris et al., 2008). Through understanding the different and diverse facets of social and spatial patterns in resilience, this study attempts to explore how social resilience can aid in disaster risk planning and management (Chu, Tan and Mortsch, 2021, p. 3)

As much as researchers want to quantify resilience, various factors are needed in seeing the interaction of vulnerability and resilience. Factors that are identified to contribute to vulnerability include geography, economy, housing, and land tenure. On the other hand, factors that contribute to resilience include trust, social cohesion, sense of community, respect for values and culture and communication (Usamah, M. et al., 2014). One common feature of these contributors to resilience is their flexibility and adaptability to changing circumstances. Unforeseen events such as earthquakes and extreme weather events could provide opportunities in creating an “in-built resilience” among its stakeholders. In addition, Keck viewed social resilience as not only a technical issue but a political one. Keck thus described social resilience as “the capacity of actors to access capitals Is in order to develop increased competence in dealing with threat” (Keck and Sakdapolrak, 2013). Keck defines ‘capitals’ here as social relationships or networks that could serve as a key role in building and maintaining social resilience (Pelling and High, 2005).

One of the common ways studies assess and study resilience is through measuring the tangible and intangible causes and effect of disaster risks. Many researchers have begun

to use intangible assets such as social capital in terms of assessing resilience. However, there is still a need for these studies to fully comprehend how social capital interacts with the physical aspect of social infrastructure. (Aldrich and Meyer, 2015). Some methodological challenges in measuring resilience include the adequacy of indicators, conceptual differences, and the way they are being measured (Saja *et al.*, 2018, p. 863). Another issue in measuring resilience in the social aspect is the concept of duality in resilience (Copeland *et al.*, 2020, p. 1). This duality is based between the current vulnerable condition of the community and the transformations that will happen to it after being struck by a disaster. Differences in results become apparent when wealth (i.e., insurance) is considered as a “positive” indicator of resilience in a resource-limited environment. It is noteworthy that the characteristic of being resourceful, a positive characteristic of resilience, is often demonstrated by those who have fewer resources (MacKinnon and Derickson, 2013). While many studies and programs have used various indicators for such measurements, it is beneficial to create a baseline of indicators constructed upon a community’s participation, needs, and goals (Saja *et al.*, 2018, p. 862).

*Qualitative and Quantitative Approaches.* From a social dimension perspective, many studies make use of perceived measures in assessing resilience through interviews or self-administered surveys. The use of quantitative research on resilience on the other hand has continued to increase, but the usability of their results is often uncertain (Hosseini *et al.*, 2016). Therefore, much research uses a mixed-method approach in assessing social resilience (Bevington *et al.*, 2012; Maminta, 2019; Menoni *et al.*, 2012).

One advantage in understanding resilience through a mixed methods approach is seen in Santos *et al.*’s (2018) study on how the community managed to survive due to the either presence or absence of fishing and piracy, two opposing legal constructs. By defining multiple resilience functions through a selection of social theories, the study was able to reflect the interplay of opposing and sometimes synergistic traits into a single framework. (Santos *et al.*, 2018, p. 186).

Another study that assesses community resilience through the built environment was through a survey of 1,100 elderly respondents in their participation to the Ibasho project in the city of Ofunato, Tohoku, Japan (Aldrich and Kyota, 2017, p. 120). While the study attempts to underestimate the role of physical infrastructure in creating community resilience, their use of “social infrastructure” as a social capital lacks the indicators that consider the influence of physical space to its users. Even so, despite the difficulty of defining measurements in measuring resilience, these varied approaches are essential for future

studies in resilience to assist in managing not only our environment but also the different viewpoints of human societies (Pimm *et al.*, 2019).

*Social Resilience and the Informal Built Environment.* Resilience from disaster risks often rely heavily on a community's access to resources. Studying existing assets of the poor helps define the positive adaptive capacities of informal settlement families (ISF) during disasters (Adviento & Guzman, 2010; Leichenko, 2011). Apart from assets, resilience lies in the intangible qualities generated by traits, values, and the community spirit. Elements such as *bayanihan*, resourcefulness, attitude, trust, and faith in God fortify residents to renew their hopes in the future, which often involve the use of physical structures (Su & Mangada, 2016; Bankoff, 2003). Thus, the following section will discuss how social resilience is understood and affected by the social networks and community behaviour of informal settlers in the Philippines.

### **2.3.2. Social Resilience of Informal Settlements in the Philippines**

In a case study in the Municipality of Camalig, Albay, informal settlers perceived themselves to be resilient to disasters despite the frequency of disasters (Muhibuddin Usamah, 2014). It was identified that a strong sense of community, trust among members, and active community involvement enhances the social resilience of the community. Although Filipinos have a positive outlook towards being resilient, with 62-64% of them feel they are self-reliant before, during, and after a disaster, while 38% of them felt it would be difficult for them to recover from a disaster (Bollettino *et al.*, 2018). Seventy-four (74) percent of those living in the National Capital Region however felt they have little or no influence on the decisions of the local leaders during natural disasters. In addition, 73 percent felt that they could bounce back quickly from a disaster, with only 7 percent suggesting they would have a difficult time doing so (Bollettino *et al.*, 2018). These statistics exhibit the positive viewpoint of most Filipinos with regards to their ability to face and recover from disasters. While not all social resilience is to be viewed as a positive process, it is important to further explore the overlap and interaction between state of vulnerability of a community and their process of being resilient (Sapountzaki, 2007). Furthermore, the frequency of disasters in the Philippines somehow continuously develop the "in-built resilience" of the local inhabitants, turning "disasters" as a "way of life". Thus, it is important to discuss some specific traits and behaviour of Filipinos in facing and coping from the effects of disasters.

*Social Resilience in the Philippine Context.* Some literature has highlighted the capability of the Filipino spirit of 'bayanihan' (from the Filipino language that means 'collective

cooperation') akin to the "bonding" social capital. Some literature highlights how bayanihan is important to communities that lack other forms of capital, but some scholars have viewed this ability as an overstatement (Eadie & Su, 2018). Going back to understanding the capability of communities in managing disasters, many authors have used three different types of capacities namely: coping capacity, adaptive capacity and transformative capacity in describing social resilience as seen in figure 1 (Voss, 2008; Lorenz, 2010; Bene, et al., 2012). The way these dimensions change from the absorptive stage to the adaptive stage is dependent on the unfolding circumstances and resources generated or received by the victims. Access to resources, assets and linking ties often play a critical role in establishing a stable environment. In addition, social learning and participative decision-making are seen as central aspects of resilience and acknowledge the importance of "context, feedback and connectedness" in enhancing social capital (Dale & Newman, 2008; Nelson, et al., 2007; Keck & Sakdapolrak, 2013).

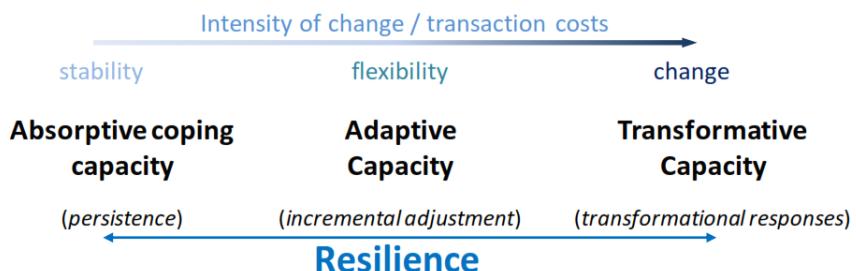


Figure 2.0.A. 3D Resilience framework (Bene et al., 2012)

*Methods of Research in Social Resilience.* Schwarzer & Schwarzer highlighted the importance of hierarchy and multi-level assessment in surveying four types of coping behaviours using questionnaires (Schwarzer & Schwarzer, 1996). Family income expenditure surveys and demographic health surveys were used to determine the coping behaviour of communities in flood hazards of Metro Manila (Zoleta-Nantes, 2000). Composite measuring tools such as the Social Vulnerability Index (SoVI) by Cutter, the Social Vulnerability Assessment by Holand, and the Community-based risk index by Bollin attempted to include indicators to identify vulnerabilities and strategies to address resilience (Cutter et al., 2003; Holand, 2011; Bollin et al., 2006). Due to the plethora of measuring resilience, a study synthesized 106 methodologies and found out that only 19% employed sensitivity or uncertainty analysis of its indicators (Beccari, 2016). Although most of these methods use transformative concepts and focus on flexibility of their strategies, only 12% of the research has measured action plans. While much of the goals of these methods are based on performance and driving change, there is a need to make resilience measurements context-specific in the dynamic nature of human environments (Saja et al., 2019). Another issue cited in collecting data for measuring resilience is the availability of reliable and valid

data. a. Therefore, this study aims to focus on the social responses of those living in the informal built environment.

### ***Defining Informal Settlements***

Informal settlers are often associated with the lack of resources to adequately adapt to any disasters that would occur in their area. However, despite being in areas with high levels of hazards, risk and vulnerability, these self-built communities continue to show their ability to exhibit vibrancy, self-reliance, and innovation in the presence of disasters (Bankoff, 2014). Often attributed to poor housing policies and unequal distribution of land, the occupation of land was usually done through negotiations with landowners and even with the permission of the local government units (Jones, 2017; Lagman, 2012). This informs the reader that informal settlements are more than just a land problem but is also affected by unequal property ownership and malfunctions in the economy (Roy, 2005). However, easy access to work, low operating costs and the informality of income generation had made living conditions in informal settlements much more bearable (World Bank, 2017). Interestingly, more literature has started to recognize the resilient attributes of informal settlements due to their geographical locations and the availability of their economic and social resources in facing natural and man-made hazards (Hechanova *et al.*, 2018; Usamah *et al.*, 2014).

With regards to the using of terms informal settlements and slums, they are sometimes used interchangeably in some literature (Jones, 2017). However, slums are often characterized by poverty and substandard living conditions whereas informal settlements are areas developed outside of legal forms of housing and land markets (UN-Habitat, 2017; Jason, 2018). While poverty is described as not having enough material possession for a person's needs, the term 'informal settlements' is adopted in the light of legal issues instead of the economic terms of the chosen case study, wherein the communities are earning 15-20 percent higher than the national minimum wage of \$250 dollars per month (DPWH, 2018). These notable differences in resources, vulnerability, and the capacity to be resilient helps studies clarify the strengths and weakness of their physical and social constructs (Sherrieb *et al.*, 2010). Hence, this research engages to explore resilience in 'informal settlements' through their vulnerability in the dimensions of geography, resources, and behaviour.

#### **2.3.3. Coping Capacities in Informal Settlements**

Some studies in resilience often conclude that informal settlers are the most vulnerable to disaster risks due to their limited economic and physical capacities. Emma

Porio has indicated multiple causes of the vulnerability of the urban poor, of which some include their socio-geographic location, lack of services, low income, continuous build-up on flood-prone areas and the lack of tenureship (Porio, 2014). The studies are based on the vulnerability concept of informal settlers from disasters based as a 'status' rather than as an exposure or process (Adger, 2006). The pressures of the lack of opportunities served as a catalyst in coping with disasters, based on the Blaikie's pressure-and-release model of vulnerability (Wisner *et al.*, 1994). The absence of entitlements and lack of effective urban policies were also considered as sources of vulnerability to informal settlers along riverside communities along the Manggahan Floodway (Porio, 2011). But to fully understand how vulnerable informal settlers are in their current situation, we would need to understand on how different capacities in disaster resilience is understood and perceived. Hence, Gaillard's encouragement to the use of local theories and practices in analysing local disasters helps the research in providing a more integrative epistemological journey of West and non-Western disaster studies (Gaillard, 2019).

To start understanding how informal settlements occur, they often develop in areas outside of planning regulations and legally sanctioned housing and land markets. In association with living in a city, livelihood is one of the important factors that influence the resilience of those affected by the calamity (Sanderson, 2000). While Rapaport views human settlements are formed by their local cultures, viewing them from a 'livelihoods perspective' is beneficial. This viewpoint helps the reader to see how they obtain resources, whether economic or social, and use these as 'a buffer against the stresses of disasters' (Sanderson, 2000; Cardosi *et al.*, 2015). In addition to the importance of livelihood, Filipinos have very strong cultural attachments to their native towns (Gaillard and Mercer, 2013).

Churches and religious statues are often used as essential territorial landmarks in most towns and cities in the Philippines. Hence, this research focuses on the informal settlements that have a significant presence of social infrastructure in their built environment. The study centres on the informal settlements that live along the banks of the Manggahan floodway in Cainta Province, Philippines.



Figure 2.3.3. An aerial view of a portion of the Manggahan Floodway (Rivera, 2016)

### Resilience of the Vulnerable along the Floodway

The Philippines is often mentioned as among the topmost vulnerable countries in the world in experiencing 'natural disasters and climate change' (Bollettino *et al.*, 2016). In addition, the ability of Filipinos to cope with disasters has been recorded as early as the 1600s. Due to the frequency of hazards in the archipelago, F. Jocano (1988) identified various coping practices such as: the use of Tagalog expressions of "bahala na" (fatalism), "bayanihan" (teamwork), and the use of sense of humour. The concept of "bayanihan" does not only mean cooperation, but also connotes concepts of shared identity, common association, and a sense of shared community support (Hilhorst *et al.*, 2015). However, not all of Jabeen *et al.*'s (2010) 'in-built resilience' of communities is used in a positive sense. Communities can also cultivate "negative resilience" by overestimating their ability to respond, to stay in hazardous areas and resist change (Shaw *et al.*, 2014). Certainly, the role of social participation and 'self-organization' is central to the ability of informal settlers in developing social resilience (Boonstra and Boelens, 2011; Nassar and Elsayed, 2018). As to the current vulnerable state that the country is perceived, it is important to look at process by which resilience is functioning and operating in the lives of the Filipinos (Sapountzaki, 2007).

"People see what they want to see and what people want to see never has anything to do with the truth" (R. Bolano, 2013). An example of this proverb is seen in the risk perception among inhabitants of Bacolor, Pampanga when Mt. Pinatubo erupted in 1991. The risk perception of the people is high, but this is also true as to their determination to remain on the banks of the Pasig-Potrero River despite evident risks and hazards in the area

(Gaillard and Gomez, 2015; Rodolfo and Crittenden, 2002). There have been some factors that seem to provide more weight in their daily lives than the negative effects of a disaster. The daily struggles for access to resources and strategies are often the manner they protect themselves, and this have become inherent practice in their daily routines of life (Jean-Christophe Gaillard, 2008). The question “How safe is safe enough?” was tackled as early as 1987 by Slovic to understand how people perceive risk (Slovic, 1987). As “risk” may mean different things to different people, some studies have shown that perceived risk is quantifiable and predictable. Interestingly, a study has determined that poverty, the availability of jobs, and the Manggahan Floodway itself tend to become the root cause of flooding during The Typhoon ‘Ondoy’ in 2009 (Jose Emmanuel Micael M. Eva VIII, 2010). These different points of views may detract governments and the people from understanding the real effects of natural disasters in a specific area or context. Some have mentioned the inability of resilience to clearly capture the operations of social dynamics (Davidson, 2010). Thus, it is important to note that the following approaches and measurements to resilience is subject to ‘preferences’ and ‘values’ of the subject it is to be applied to.

### **Engaging the Vulnerability of through the Social Infrastructure**

In 2010, there are 6,700 informal settler households that occupy the 10-km stretch of the Manggahan floodway (Panares, 2010). This number of households has increased to 9,216 in 2018, an average of an additional 300 families each year. The Japan International Cooperation Agency (JICA) resettlement action plan for the Manggahan Floodway for 2019 is constructing a total of 8,136 units (4,736 in Cainta and 3,400 in Taytay) for the relocation of the informal settlers and is planned to be finished by 2026 (DPWH, 2018b). From a sociological point of view, the JICA resettlement plan attempted to provide an inclusive and holistic approach with regards to human settlements. The plan conducted public consultation, a socio-economic survey (SES), and an income loss survey for the Informal Settler Families that are qualified to be relocated in the new residential buildings. However, one may ask the question whether such programs actually dissuade or rather encourage the growth of informal settlements in the area. While these resettlement programs seem to provide the basic needs of the communities, there is still a need to explore other actors that affect the urbanization of ‘professional squatters’ in Metro Manila (Coker, 2016).

As mentioned earlier, developing social resilience requires the support of physical structures, such as community centres, government offices, schools, and religious buildings

(UNISDR, 2007, 2010). While the influence of religion (excluding aggressive religious movements) varies in every country or region, religious buildings play a big role in establishing social relationships and networks of communities in coping and responding to disasters (Bramadat, 2005; Gianisa and Le De, 2018; Holden, Nadeau and Porio, 2017). However, scholars do admit the limited discussion in literature on the role of places of worship (PoW) in disaster studies (Alawiyah *et al.*, 2011; Koenig, 2006). By looking through the lens of its key stakeholders, the research can provide an in-depth understanding of the spatial dimension of their places of worship. Studying their past experiences can enable the study to explore how these places of worship, as a physical entity, have moulded their characters and perception towards disasters (Brenneman and Miller, 2016). How have these structures shape the surrounding areas as well as being able to adapt to the changing conditions of the site?

In congruence with the religious nature of the Filipinos, religious structures continue to become powerful sources of social capital (SC) (Abad, 1995; Greely, 1997). Excluding exclusive and aggressive religious movements, scholars have reiterated the significance of religion as a bonding and bridging form of social capital of human beings (Bramadat, 2005; Park & Bowman, 2015). ‘Bonding social capital’ pertains to social networks, civic engagements, and religious affiliations within a group while ‘bridging social capital’ refers to links between groups (Baylis, *et al.*, 2013; Putnam, 1995). With the different ways on how social infrastructure is used in various literature, this study will use the term social infrastructure to refer to physical structures that promote social capital within and outside a community (Bielaczyc, 2006). This definition helps in identifying the association between the physical built environment and the social network that enhances social resilience. As the social infrastructure continues to influence relationships, enhance health and learning among people, the study will examine how places of worship can become sources of social resilience in the informal built environment along the Manggahan floodway.

## **2.4. Evaluating the Role of Places of Worship**

For thousands of years, religious beliefs have been used by humans to comprehend uncontrollable or supernatural event such as disasters (Grandjean *et al.*, 2008). While personal opinions, biases, and fatalistic attitudes often make discussions on religious buildings unpopular, it may lead to gaps in research on buildings that have proved beneficial in fostering community resilience to disasters (Jovita *et al.*, 2019; Qasim *et al.*, 2016). A reason why research in places of worship is unpopular in disaster research is its likelihood of

political controversies and risks to which places of worship are involved – e.g., recent bombing of a Philippine Mosque in Mindanao (France-presse, 2019). Conversely, it is interesting to note how these places of worship of different religious orientations have learned to co-exist together in dense Filipino communities, especially among informal settlements. While there are studies that illustrate some negative effects of religion (e.g., social exclusivity, fatalism) in addressing natural and man-made disasters, the advantages outweigh its shortcomings (Baytiyeh and Naja, 2016; Rivera and Nickels, 2014). Through the lens of the built environment, this study attempts to assess the role places of worship play as a social infrastructure (See Figure 2.1).

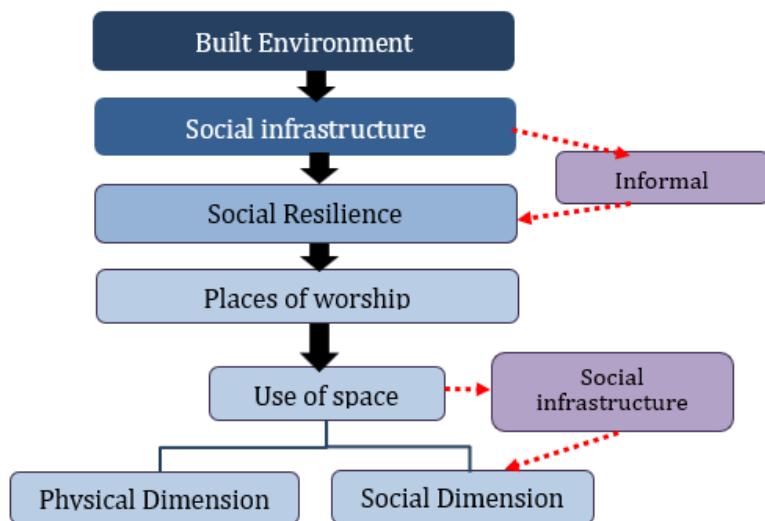


Figure 2.4.1. Flow chart of concepts in the literature review on places of worship.

#### 2.4.1. Places of Worship in the Built Environment

Sacred structure such as temples, mosques, and churches has continued to provide a setting for learning and a place of attachment for many communities (Mazumdar and Mazumdar, 1993; Turner, 1979). Some more recent studies have highlighted the role places of worship<sup>4</sup> play in providing social services to older adults and as a contributor to neighbourhood stability (Kinney and Winter, 2006; Tirrito and Spencer-Amado, 2000). In another study by Almela (2019) on religious complexes, places of worship have served as catalysts to urban life and innovation in the 16<sup>th</sup> century Islamic western city of Marrakesh, Morocco (Almela, 2019). Hence, places of worship have continued to provide significant influence on the stability, behaviour, and attachment of people to the built environment. In

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<sup>4</sup> As not all religions engage in 'worship' per se, the term operationalizes the sociological concept of 'place' as doubly constructed. Places are not only physical but also interpreted, narrated, perceived, felt, and understood (Gieryn, 2000).

creating a baseline, “places of worship” is used in this study as a generic term for a place where people assemble to practice or express their faith. While not all these places of worship can be considered structurally sound or aesthetically pleasing, these structures continue to become places of social interaction and become expressions of their beliefs and identities. These various indications may provide insight as to how the use of these spaces may positively influence the social resilience of communities during a crisis (Airriess *et al.*, 2008).

Churches and faith-based organizations often engage and provide social support to communities during and after a disaster (Airriess *et al.*, 2008; Boan *et al.*, 2015). Places of worship, such as mosques, are often used as emergency shelter in disaster-prone areas (Utaberta and Asif, 2017). In addition, religious beliefs are also mentioned to contribute to social cohesion and successful coping mechanism of communities in facing disasters (Gianisa and Le De, 2018; Hervieu-Léger, 2006). Unfortunately, religious conflicts and prejudice, while not emphasized, can be present in the process of providing financial or social support to those affected by the calamity (Miller, 2020). Property theft is also another concern in using places of worship as a space for public assistance (Ojedokun and Oduoye, 2020). Hence, it is beneficial to use a multi-dimensional framework in understanding places of worship as a contributor to social resilience.

Current literature on community-based disaster risk reduction and management (CB-DRRM) are not lacking in documented good practices. However, the influence of religious structures as a social infrastructure in communities have not been adequately studied (Bramadat, 2005; Park and Bowman, 2015a). Discussions on religion and religious beliefs with regards to disasters are often about its contribution as a coping and social strategy. One way to explore this facet is to study the interaction between the physical dimension of places of worship and its users. Understanding how places of worship are used in communities provides an important facet in understanding how social resilience is enhanced. Nonetheless, academic literature has continued to recognize a common theme with PoW – the importance of PoW as a channel in promoting disaster risk reduction and management activities in their local communities (Cheema *et al.*, 2014; Gianisa and Le De, 2018; Rivera, 2018).

#### **2.4.2. Places of Worship as a Social Infrastructure**

As previously mentioned, communities need functional support from built systems such as emergency shelters, roads, and various critical infrastructure in their DRM response

from disasters. Consequently, these buildings strengthen, and nurture social communication and coordination has ensured more continuity in the DRM process (Aldrich, 2012a). These buildings often consist of evacuation centres, medical facilities, coordination offices, distribution facilities and places of worship. In the Philippines, the presence of Community-based Disaster risk reduction and management (CBDRRM) is well-recognized. CBDRRM also exhibits the vital role of facilitating organizations in empowering and guiding the communities in the disaster risk reduction process (Bankoff, 2015; Luna, 2001). These organizations include government agencies, NGOs, people's organizations, and faith-based organizations. However, religious institutions, despite being involved in disaster management long before the European tradition of humanitarian aid, is often limited in disaster studies (Cheema *et al.*, 2014; Gaillard and Texier, 2010). However, as long as faith-based organizations continued to play a substantial role in international and local DRRM, the role of places of worship play in disaster risk reduction will continue to be significant.

While places of worship are often featured in architecture, design and cultural studies, limited discussion is done with their capacity as a social infrastructure (Smidt, 2003, 2013). As early as the 1680s, the Laws of the Indies, a body of Laws issued by the Spanish crown for its colonies, have designed places of worship to be located at central squares and plazas of a town or city. This type of planning structure has provided a space for religious activities, social events, and civic relationships of the community (Alarcon, 2001; Low, 1995). In the 21st century literature, POW is said to promote volunteerism during disasters, and performs as a "voice" wherein the community can express their identity (Hopkins, 2011; Smidt, 2003). Through different time periods and geographic places, religious places have continued to play a key role in the politics, poetics, and identity of a community or culture (Kong, 2001).

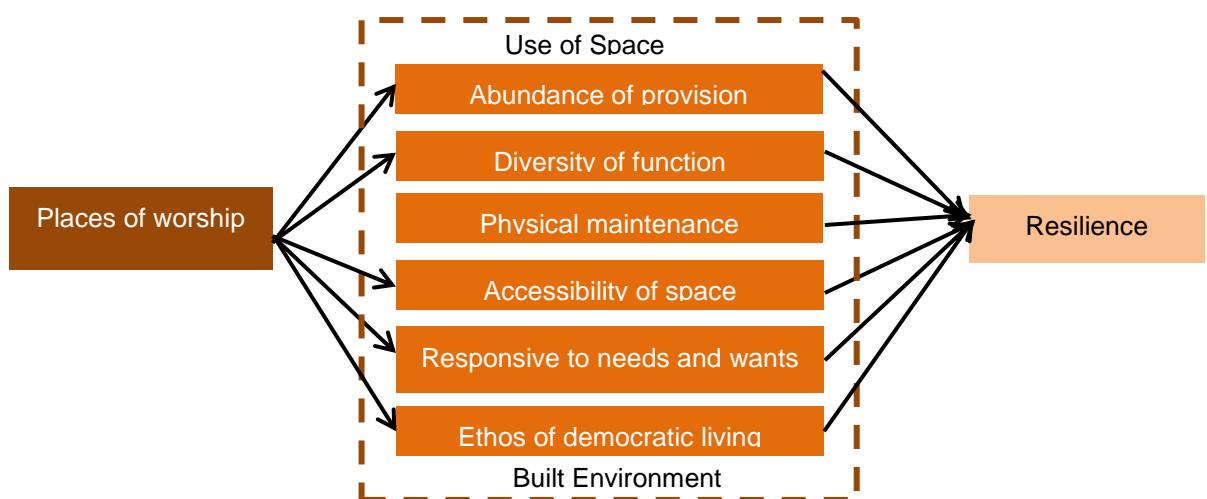


Figure 2.4. Looking at the dimensions of the social infrastructure adopted from Latham and Layton (2019)

From these studies, discussion of places of worship as a social infrastructure is often associated to civic engagement, immigration, and geographies of religious spaces in urban areas (Latham and Layton, 2019). Basing on Olsson's (2015) observation of limited studies of resilience in the social sciences, there is a need to understand how places of worship physical function as a social infrastructure (Brenemann and Miller, 2016). The term 'infrastructure' is useful precisely because it describes community engagement and participation to be an integral, embedded part of the urban fabric (Latham and Layton, 2019). By studying places of worship as a social infrastructure, one studies how they are used. This involves knowing their value<sup>5</sup>, why they matter, and maybe why they are taken for granted (Brenemann and Miller, 2016).

### **Places of Worship as a Physical Infrastructure**

Looking at resilience in the physical dimension, Nirupama (2014) highlights the importance of the built environment in helping resource-limited individuals or communities to react, prepare and mitigate from the effects of disasters (Nirupama, Popper and Quirke, 2015). Faith-based organizations (FBO) such as Tzu-chi, Red Cross and the Muhammadiyah have been known to build emergency shelters for those affected by disasters (Islam, 2012; Tzu Chi, 2018). While the roles of faith-based organizations are often discussed in disaster literature, studies dealing with how places of worship (e.g., mosques, churches, synagogues, and temples) are used by the institutions is limited (Cheema et al., 2013). By exploring a brief historical view of places of worship, this study may be able to illustrate the diversity of its usage, not only as a place for worship, but also for other activities (Jose, 1987; Pujalte and Navarra, 2017).

In the Philippines, churches are an engineered product of local disasters, while also providing valuable awareness in architecture and cultural studies (Jose, 1987; Legarda, 1960). The earthquake of 1645 in Luzon has revolutionized the design of massive buttresses and squat bell towers that are now a characteristic of Philippine colonial churches, also called "earthquake baroque" (Bankoff, 2007b). In current disaster planning and research however, POW is often interpreted in terms of physical defence, i.e., protection from immediate harm and as an emergency response system to reduce human or economic cost from natural disasters (Cain and Barthelemy, 2008; Gianisa and Le De, 2018). Other additional research performed on places of worship include exploring the meaning and values they hold in a multi-religious environment like Singapore (Kong, 1992). Unfortunately,

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<sup>5</sup> 'Value' here, as well as in the document, is used in social science perspective as the capacity to satisfy a man's desire and that could help him make rational decisions (Hanson, 1969).

the perception to the internal dynamics of human activities and adaptation to disasters in relation to places of worship has taken a backseat (Quinlan *et al.*, 2016).

### **Other Debates in Exploring Places of Worship**

In discussing the physicality of religious spaces, places of worship are often sources of motivation in architecture and urban planning as foundations in design, planning, and place making (Mazumdar and Mazumdar, 2008). While many literatures discuss the physical character and composition of religious buildings, the engagement to tackle the relationship of these buildings to political and social conflict in the environment has been quite reserved (Miller, 2020; Schalm *et al.*, 2007). Due to the social nature associated with places of worship, most research follow a qualitative approach in investigating these physical spaces. Information from qualitative data include dimensions such as the motivation for volunteering and its effect in cross-racial interaction from college students (Bowman and Park, 2014; Mencken and Fitz, 2013) Park and Bowman, 2014). Hence, the following section will explore how places of worship are comprehended as a social capital.

#### **2.4.3. Places of Worship as a Social Capital**

There are different interpretations with the use of the term assets or capital. Moser classified assets for growth to be based on labour, human capital, productive assets, household relations and social capital (Moser, 1998). Social capital, economic capital, and cultural capital on the other hand was studied as significant assets and resources for recovery (Bourdieu, 1986). In understanding community-based disaster resilience, a capital-based approach was used in seeing the resources and assets that are essential to a community to function (Israel and Briones, 2014; Mayunga, 2007). The concept of capital-based approach with sustainable development and poverty alleviation programs is not new and has also been used in international organizations in the late 1990s (Farrington *et al.*, 1999). This study uses Mayunga's five major forms of capital as follows: social capital, economic capital, human capital, physical capital, and natural capital as a basis for the classification of the different forms of capital.

Places of worship are structures that promote community-building activities among diverse groups of people (Klinenberg, 2013; Latham and Layton, 2019). In identifying how these spaces are interconnected and formed helps in understanding its role in enhancing the social resilience of a community (Bielaczyc, 2006; O'Sullivan *et al.*, 2013). When Typhoon Katrina hit the Mississippi Gulf Coast, USA in 2005, faith-based groups were the most

common source of social networks in residents with high-resilience communities (Carpenter, 2013a). In the Philippine context, faith-based groups (i.e., Caritas Manila, Tzu Chi, Christian Aid, etc.) are also very active in providing food and shelter to areas that are affected by disasters. Consequently, the use of these structures as shelters and emergency operation centres (EOC) often mean the lack of support provided by the government during disasters (Porio, 2011; Voss, 2008). In effect, these functions have led to the reliance of vulnerable communities to various types of social infrastructure, such as schools and churches, as a resource for coping and managing their resilience towards the effects of disasters (Dovey and King, 2011). As government and professional institutions lead on planning of DRRM programs, learning how places of worship contribute to the development of social capital would be greatly beneficial.

## **2.5. Summary and Implications of the Literature Review**

Addressing disaster risk reduction and management in urban areas is complex and multi-dimensional in approach. As researchers continue to narrow down and specialize in different fields of disasters, it is beneficial for this paper to narrow down on the important elements of the built environment that provides the greatest impact in reducing risks from disasters, its embedded infrastructure. The various types of infrastructure (e.g., physical, social, critical, etc.) in the towns, cities and various human settlements involves the visible and invisible components that is essential to the life of the built environment. The ability to explore the 'invisible' proves to be an important approach in studying the intricacies of resilience and vulnerability of the built environment. Hence, developing an integrated resilience framework is beneficial in adequately recognizing the different characteristics and mechanisms of the environment towards disaster hazards and risks.

The multi-dimensional issue of infrastructure resilience endeavours the study to focus on the emerging concepts and relevance of the social infrastructure. Due to the limited discussions on social infrastructure, there is a need to clearly define its concept as both as physical entity and a social mechanism. Moreover, the broad scope of social infrastructures, such as schools, libraries, and places of worship, contain different contexts and relationships that would be hard to measure or comprehend in a single framework. Thus, the study has focused on studying places of worship, a social infrastructure in the built environment of informal settlements (See Figure 2.2).

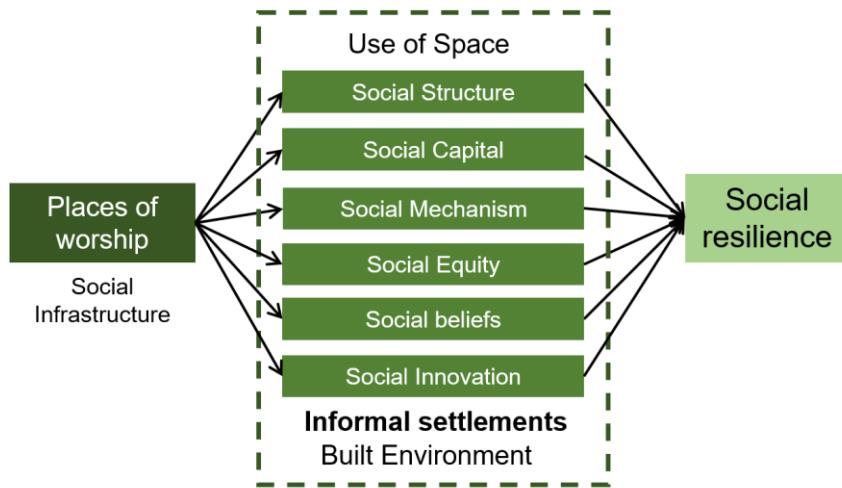


Figure 2.5. Assessing places of worship through the different dimensions of social resilience.

Being in a part of world where disasters are well-known and even celebrated, the study is set to study resilience at a hazard-prone country, the Philippines. The research then aims to address the concept of resilience through the vulnerability of the community. Since the 1800s, Filipinos have proven their resilience from disaster risks through their social support and networks. Studying how their social infrastructure has assisted them would help address the challenges in narrowing the indicators in measuring the factors that contribute to their resilience, specifically social resilience. By exploring how Filipinos located in informal settlements address their vulnerability through their use of social infrastructures, the research can gain insights through the wide-spectrum approaches of the social resilience framework.

The challenge with various research methods in social resilience is their appropriateness and usability in analysing a certain community or environment. Hence, this research applies Saja et al.'s social resilience framework in assessing the use of space in places of worship (Saja et al., 2018). The approach is to be composed of two parts, the physical and the social dimension. This involves several data-gathering tools that involves recording the dynamic nature and relationships of places of worship as a socio-spatial construct. This approach is harmonious with Brenneman and Miller's (2016) theory that places of worship matter in disaster resilience, not just as a physical space, but also as a social construct. This theoretical framework is modified to adopt to the current context of the study and then discussed further on chapter 3.

## **Research Outline**

- 1. Introduction and Aims**
- 2. Review of Related Literature**
- 3. Theoretical Framework**
  - 3.1. Exploring places of worship as a social infrastructure
  - 3.2. The social resilience framework
  - 3.3. Interpreting social dimensions into concepts of places of worship
  - 3.4. Summary
- 4. Research Methods**
- 5. Interview Results/Analysis**
- 6. Survey Results/Analysis**
- 7. Synthesis of Key Findings**
- 8. Discussion/Recommendations for Future Research**

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## **Chapter 3: Theoretical Framework**

This chapter tackles two main concepts that is associated with how places of worship function in disaster risk reduction and management. The first section deals with the dimensions of places of worship as a social infrastructure based on Latham and Layton's (2019) studies on urban sociality and public life. The second section tackles the different dimensions of Saja et al.'s (2018) social resilience framework and how they are to be used as a lens in assessing places of worship. An additional social dimension, social innovation, is added and tested for its applicability and relevance in the social resilience framework. The last section (3.3.) explores and interprets that various dimension of social resilience that is significantly related and relevant to how places of worship are used in DRRM.

### 3.1. Assessing the Use of Places of Worship During Disasters

#### 3.1.1. Exploring Places of Worship as a Social Infrastructure

Before the study embarks on assessing how places of worship are being used in the built environment, it is important to clarify the role of places of worship as a social infrastructure (Pearce, 1981). The study preliminarily examines Latham and Layton's (2019) dimensions of the social infrastructure in the context of public spaces.

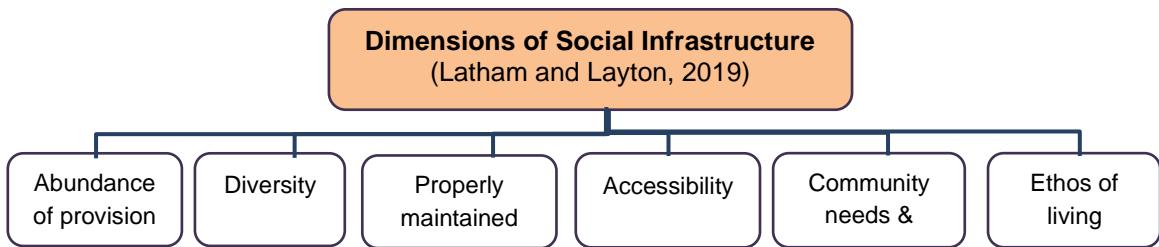


Figure 3.3. The six dimensions of social infrastructure by Latham and Layton (2019).

*The first dimension discusses the ability of social infrastructure to have an abundance of provision.* The important role of social infrastructure in the built environment lies with its attribute of being abundant in its expanse due to its vital functions that comes with it. Churches and places of worship are known to be vital structures that either define or regulate the social and even the political mechanisms of a town or city (Cartagenas, 2010; Suico, 2005). Despite the restricted use of places of worship during the pandemic in 2020-2022, these physical infrastructures continue to become primary options in being used as a sign of hope to the COVID-19 pandemic. Aside from serving as landmarks in the local communities, these places of worship serve as 'messages of God's hope' especially in informal settlements (Verster, 2013).

*The second dimension includes the diversity of functions that the social infrastructure provides in the built environment.* Places of worship are used in a variety of ways in the Philippines. These functions include serving as emergency shelters, educational centres, food distribution and medical outreach centres, and even as vaccine centres during the pandemic. The diverse ways in which places of worship are used causes the community to value its presences and provide a sense of identity, place attachment, social capital, and belief in their community (Kilde, 2007; Muntanyola-Saura and Fernandez, 2019). Consequently, the third dimension of a social infrastructure is its capacity and importance to be properly maintained. Places of worship are often properly *maintained* by the community, especially if there is a significant number of members in the religious organization (Warner et al., 2015). As a result of the significance of these buildings for the past century, churches,

mosques, and places of worship have been subjected to building code requirements, fire escapes, and provision for the physically disabled (Lipton, 2013).

The fourth dimension of a social infrastructure pertains to **the physical accessibility it has within the community**. Hoernig (2006) recommends the inclusion of places of worship in the multicultural planning of urban practitioners of “both inside and outside of the municipal planning department” (Hoernig, 2006). The perception of the availability and helpfulness of a physical structure in an environment is important in making the place an essential part of the community (Gil-Mastalerczyk, 2016). Consequently, churches and mosques are used as a public space where charitable giving and volunteering regularly occurs during disasters (Bekkers and Schuyt, 2008).

The fifth dimension involves the **responsiveness of the social infrastructure to the 'needs and wants' of the community**. Places of worship has continued to serve as places of refuge in the Philippines since the colonization of the Spanish in the 1600s. As churches are often built to withstand from disasters such as earthquakes and typhoons, they also serve as ‘sacred places’ that serve to unify people of different status, gender, and social boundaries (Knott, 2010). Religious movements and volunteering are also mentioned to draw people together, creating ‘social networks and impressions of organizational identity.’ (Becker and Dhingra, 2001). While the ‘needs and wants’ of human societies are certainly broad, this study will only consider those that emerges from the use of places of worship in the specific case study.

Lastly, places of worship acts as a social infrastructure through its ability to **‘capture the ethos of democratic living’**. Described as the ‘credibility of the speaker’, the ethos of places of worship enables it to serve as a unifying entity to the community, as a source of identity, protection, authority, and power (Gale, 2004); (Sunier, 2005). A summarized tabulation is listed in Table 3.1. on how the dimensions of social infrastructure are able to motivate and affect the use of places of worship. However, these dimensions have outlined the provisions of places of worship to the community only through a theoretical perspective. This study uses a more empirical and systematic approach in analysing how these spaces is discussed in Section 3.2.

**Table 3.1. Associating the dimensions of social infrastructure in relation to places of worship.**

	Dimensions of the Social Infrastructure	Aspects that relate to Places of Worship	References
1	Abundance of provision and services	Places of worship provide a space for various services for religious activities, emergency shelter, food distribution and many other types of activities.	Rivera and Nickels, 2014; Park and Bowman, 2014; Kahlili et al., 2015; Joakim & White, 2015; Stuart et al., 2010, Bryson et al., 2020
2	Diversity	Places of worship serve diverse forms of functionality which include social, political, and religious activities.	Park and Bowman, 2015; Chiodelli and Moroni, 2017; Lefebvre, 2020; Chen, 2021; Ellison et al., 2002; Golan et al., 2021; Ysseldyk et al., 2010;
3	Place of activity should be physically maintained well	Places of worship often maintained by the community through donations and collaborations with community leaders.	Kinney and Winter, 2006; Quilala, 2018; Yıldırım, 2013; Warner et. al., 2015; Waugh Jr. & Streib, 2006; Lipton, 2013; Villaroman, 2014
4	Accessibility	Places of worship are found to be numerous and located in urban city centres.	Hoernig, 2006; Lam, 2002; Bekkers & Schuyt, 2008; Saint-Blancat & Cancellieri, 2014
5	Responsive to people's needs	Places of worship provide a space where the community create social networks and a collective space for their physical, emotional, and religious needs.	Becker & Dhingra, 2001; Kong 2001; Gökarıksel, 2009; Knott, 2005; Saint-Blancat & Cancellieri, 2014;
6	Able to capture the ethos of democratic living	Places of worship often have a high level of credibility where the community is able to express their faith, authority, and devotion to their identity and beliefs.	Gale, 2004; Sunier, 2005; Cattivelli and Rusciano, 2020; Joakim & White, 2015;

### **3.1.2. Understanding the Social Dimension of the Social Infrastructure**

Social resilience is often discussed in several disciplines such as geography, psychology, sociology, clinical medicine, and environmental studies (Beel et al., 2017); (Cacioppo, Reis and Zautra, 2011); (Silver and Grek-Martin, 2015). The application of social resilience is often pronounced in disaster and social related studies which concerns to the various abilities or capacities of individuals or organizations in 'tolerating, absorbing, and coping to environmental and social threats' (Keck and Sakdapolrak, 2013); (Kwok et al., 2016). Psychologists on the other hand define social resilience as the 'capacity to foster, engage in, and sustain positive relationship and to endure and recover from life stressors

and social isolation.' (Cacioppo, Reis and Zautra, 2011). Technology related studies has also started exploring the use of technology in enabling the community to adapt to changes in communities (Garcia, Mavrodiev and Schweitzer, 2013). Hence, the use of a mixed methods approach is highly beneficial to holistically understand the environmental conditions of the current study.

The role of places of worship in providing social capital is significant to the development and identity of a community. Research in social resilience follows a multi-dimensional framework in assessment. This is reflected in the collation of frameworks by Kwok *et al.* (2016) on the need for social resilience to be examined across a multitude of academic disciplines (See Figure 3.2.). This framework may imply a simple classification of structural and cognitive dimensions of resilience, but human interaction in the built environment is complex and is not as easily categorized as illustrated (Saja *et al.*, 2019). Social resilience is more than just the process of linking sets of capacities within a community. Social resilience is a collective effort of people in developing capacities, and capacities to instinctively create plans for resilience and reducing risks (Norris *et al.*, 2008). However, social resilience needs to be classified into different levels, dimensions, and attributes in order to bridge the varying concepts of resilience in theory and real-world (Kwok *et al.*, 2016; Saja *et al.*, 2019).

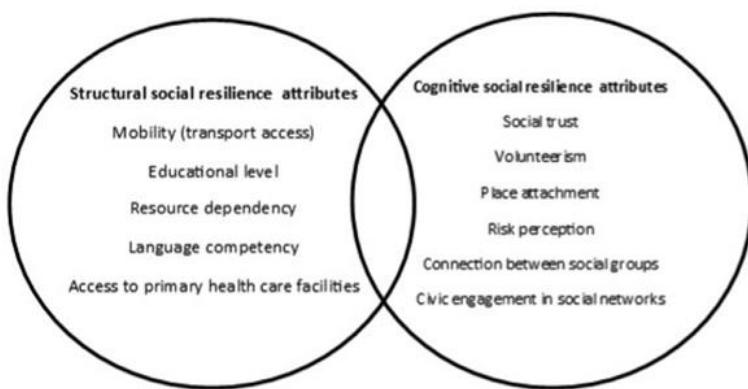


Figure 3.2. Structural and cognitive dimensions framework (Kwok *et al.*, 2016).

In analysing social resilience, the evaluation needs to be inclusive and adaptive to the different facets of risks and hazards of how a community perceives disasters (Mercado, 2016). Additionally, social resilience involves the meaning of places, sense of place, attachment to place and other shared values perceived by the community (Kwok *et al.*, 2016); (Saja *et al.*, 2018). As such, much literature has discussed the significance of physical places (e.g., community centres, schools, places of worship) in generating social capital – the bonding and bridging of relationships and networks between and among communities

and seen as a vital component of social resilience (Bramadat, 2005; GREELEY, 1997; Smidt, 2013).

In reviewing the various social resilience frameworks from different disciplines, (Saja *et al.*, 2018) formulated a unified and inclusive framework that intends to consider all the important dimensions of social resilience. While (Kwok *et al.*, 2016) effectively defined the cognitive and structural classification of social resilience, Saja *et al.*'s (2018) approach is a more holistic and clearer in its discussion and categorization. The setback the Saja *et al.*'s framework is the overlapping and intersecting of the dimensions in their function and meaning. However, Saja *et al.*'s (2018) indicator-based approach has been used to explore the social resilience of informal public workers in Bogota, in flood-vulnerable communities in Myanmar, and the socio-demographic groups in Tehran during the COVID-19 pandemic (Alizadeh and Sharifi, 2021; Bustamante, 2018; Lwin *et al.*, 2020). Thus, using Saja *et al.*'s (2018) inclusive and comprehensive framework helps in providing more in-depth understanding of the complex social dimensions of places of worship.

### **3.2. The Social Resilience Framework**

The social resilience framework that is used in this study is based on Saja *et al.*'s (2018) 'inclusive and adaptive' '5S' social resilience framework. With a matrix of 31 social resilience frameworks and 80 social resilience indicators, the framework assists the assessment of places of worship into themes and serve as a basis for the interview and survey questions of the research.

The use of the '5S' social resilience framework is useful for several reasons. First, the different dimensions provide a comprehensive foundation in exploring a scarcely studied dimension of places of worship. Another advantage in using this framework is the ability for the research methodology to be repeatable in other types of social infrastructure. By having clear and definite indicators, the framework also saved valuable time in designing more focused research questions. This approach is especially useful when face-to-face conversation and movement is limited due to the COVID-19 pandemic restrictions from 2020 to 2021.

Several limitations were also identified in the used of the '5S' framework. One limitation of using the "5S" is that there is still the possibility to miss out on other aspects of social resilience that is especially unique in the dimensions of theology and religion. For example, the effect of evolving technology towards the beliefs and traditions on religious beliefs is not yet communicated well in literature. To respond to this shortcoming, the study added another dimension on the framework designated as social innovation. Concepts such

as 'worship innovation' and the use of technology have been emerging from scholarly literature, especially as a result of the restrictions of public assembly during the COVID-19 pandemic (Darmawan *et al.*, 2021; Redman, 2004; Robinson-Neal, 2008).

The '5S' framework is designed to be adaptable to any geographic, hazard, or community context through the changing the specific characteristics of the indicators to best suit in discussing places of worship. A brief discussion of each dimension is mentioned in the following section so as to provide how these dimensions are understood and operationalized in the research methodology.

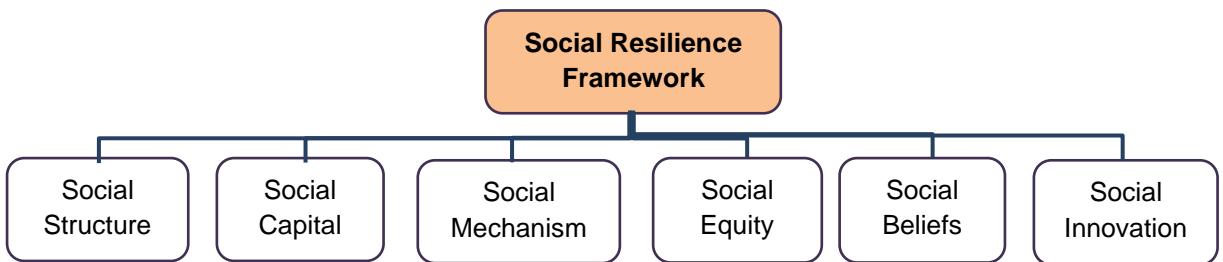


Figure 3.3. A modified six-dimension social resilience framework from Saja *et al.*'s (2018) framework.

### 3.2.1. Identification of Key Social Resilience Indicators

This section reports how the different dimensions of the social resilience framework (See Figure 3.3.) is being applied in the analysis to be developed in this study. The modified resilience framework should guide the study in providing clear and appropriate context of each dimension to how they are operationalized. In this study, the six-dimension social resilience framework was developed from the analysis of places of worship in the context of disaster resilience. Sets of indicators will be created based on the different dimensions of the modified framework.

#### Social Structure

Social structure is described based on the social network and relationships that function and operate in a defined geographic population or community (Nadel, 2013). The term "social structure" means any variables that are stable characteristics of the society outside the organization, such as institutions, laws, population characteristics, and a set of social relationships that form the organizational environment. (Stinchcombe, 2000). It can also be used to refer to specific phenomena such as the structure of social class or gender, or society, or perhaps in general means anything external to an organization (Fleetwood, 2008). However, as previously discussed in the literature review, places of worship also establish a stable physical structure that influences the social relationships and activities of

the community in terms of resilience from disaster risks (Essawy, Kamel and Elsawy, 2014; Guidotti, Gardoni and Rosenheim, 2019).

The dimension of social structure used in this study refers to the characteristics of the places of worship by which the population use it as an asset or resource in coping from the negative effects of disaster risks (Gaillard and Texier, 2010). Three characteristics in the social structure adopted in this study includes the ability of places of worship as an (1) emergency facility, (2) as a protective shelter, and (3) its accessibility to people and the community.

## **Social Capital**

Social capital is a dominant, highly influential, and widely studied aspect in determining social resilience to disasters (Aldrich and Meyer, 2015). As declared by (Sreter and Woolcock, 2004), social capital has become one of the “essentially contested concepts” in the social sciences, such as “class”, “race”, and “gender” (Kawachi, Subramanian and Kim, 2008). Social capital is also defined as resources that can be accessed or mobilized through ties in the networks (Lin, 2003). It also features social organizations, such as norms, and trusts that assess levels of agreement, facilitate action and collaborate for mutual benefit (Putnam, 2000). It can also be categorized as structural and cognitive social capital (Sanyal and Routray, 2016).

Social capital in this study involves a social relationship between a provider and a recipient: the provider and recipient may be (1) an individual, (2) all members of a category such as age, gender, or racial acting individually based on social custom, or (3) it may be generated explicitly by the conscious interaction of people in an organization (Robison, Schmid and Siles, 2002). In addition, the measurement of social capital depends on how the researcher defines the concept—as an individual attribute or a collective attribute, or from a network-based perspective or a cohesion-based perspective (Kawachi *et al.*, 2004). However, damages to community buildings, among other natural hazard consequences, can also deteriorate the social capital (Albrecht, 2017), the measure of the societal networks, participation, and resources that contribute to disaster resilience and recovery of the community (Nakagawa and Shaw, 2004); (Jovita *et al.*, 2019). In the social capital dimension, attributes such as social cohesion, social support, and social network are considered in this study.

## **Social Mechanism**

Social mechanisms have gained considerable attention in the social sciences and the philosophy of science over the past two decades. Many definitions of social mechanisms have been used to support a wide variety of methodological and theoretical claims (Ylikoski, 2017). For instance, social mechanism aims to explain the relationships between interactions among individuals and collective social structures. (Pierik, 2004). It also refers to recurrent processes generating a specific kind of outcome (Mayntz, 2004). Jon Elster has emphasized the usefulness of social mechanisms for explaining complex psychological and social phenomena (Elster, 1999). In Coleman's view, the behaviour of an individual is the basic building block of social mechanisms (Coleman, 1990).

Moreover, the social mechanism is the engagement of the community in the resilience-building process that includes community competence, collective attitude, and shared values towards coping and adapting to disasters (Saja, 2020). In this study, the resilience characteristics of the social mechanism include community engagement, community goals, community shared values, and community competence (Figure 1) (Cutter, Burton and Emrich, 2010); (Khalili, Harre and Morley, 2015); (Paton and Johnston, 2001).

## **Social Beliefs**

Local culture and social beliefs may play a critical role in determining social resilience in disasters (Kwok *et al.*, 2016). Compared to other studies, socio-cultural tradition, belief system, and religion are important sub-sets of influential social drivers in assessing vulnerability to natural hazards (Schipper and Lisa, 2015). In fact, several studies have indicated a positive relationship between the practice of religious beliefs and various variables such as mental health, happiness, and marital satisfaction (Rohani *et al.*, 2015). The results of Ellison *et al.*'s (2009) study also indicated that the increase of faith reduces the level of anxiety and stress (Ellison, Burdette and Hill, 2009). As a result, many writers have made vital contributions to research about the relationship between personal beliefs (e.g., moral beliefs) and social beliefs (Dalege and van der Does, 2021).

It has been noticed that religion and social beliefs often play a significant role in determining how people make decisions, view themselves, interpret events, resolve predicaments, and cope with adversity and disasters. (Furness and Gilligan, 2010). Also, social resilience frameworks developed in some communities are strongly grounded in culture and faith (Saja, 2020). In this study, there are three characteristics of social belief to focus on, namely Spirituality, Religious Practices, and Worship.

## **Social Equity**

Although social equity has many technical definitions, its fundamental essence comes from the broad values of fairness and justice (Johnson and Svara, 2011). Other more "complex" definitions extend the concept of social equity and apply it to public rights, access, and redistribution policy (Svara and Brunet, 2005). Social equity is also one of the normative touchstones for administrative integrity (Cooper, 2004). Therefore, social equity is now a moral obligation (Johnson and Svara, 2011), hence there are guidelines that public administrators must follow: (1) procedural fairness, equality of protection and rights; (2) equality of access to services and benefits; (3) equality in the process of providing services and benefits; (4) equal levels of outcomes for all groups; and (5) a guarantee of a place to express views on policies and service delivery. Recently, the concept of social equity has expanded to include more categories than race and gender, including sexual and gender identity, economic status, physical and mental disability, and more (Frederickson, 2005).

Therefore, social equity is rooted in the idea that every person is equal and has inalienable rights. (Guy and McCandless, 2012) The implementation of social equity in community disaster resilience aims to equalize losses between such neighbourhoods or households using intentionally distributed mitigation and recovery efforts (Kim and Sutley, 2021). When a disaster strikes, people who do not have access to equitable resources, such as families living below the poverty line, may be affected significantly differently than other people within the same community (Fothergill and Peek, 2004; Lovell and Le Masson, 2014). Social resilience also depends on the diversity of resources, as communities that rely on a limited range of resources often struggle to cope with disasters (Norris et al., 2008). In this study, there are three characteristics in social equity that include: fair access to basic needs and services, a sense of belongingness, and information awareness in the community.

## **Social Innovation**

Social Innovation is a topic of discussion for governments, companies, and NGOs around the world (Osburg and Schmidpeter, 2013). The term "Innovation" can be understood as the creation and adoption of something new; that creates value for the organization that adopts it (Baldwin and Curley, 2007). Hence, "Social" can be understood as a focused direction of Innovation (MacGregor and Fontrodona, 2008) and usually implies a normative approach that something positive is created for the society (Desa and Koch, 2014). The EU Commission defines Social Innovation as "... Innovations that are both social in their purposes and methods. Social innovations are new ideas (products, services, and models)

that simultaneously meet the social needs (more effectively than alternatives) and create new social relationships or collaborations" (EU-Commission, 2012).

Similarly, social innovation refers to new ideas that work in response to social goals (Mulgan *et al.*, 2007). It is also innovative activities and services that motivate the objective to meet a social need and that are predominantly developed and diffused through organizations whose primary purpose is social (Mulgan *et al.*, 2007). Religion, moreover, has played a role in generating, sustaining, and expanding social innovation (Mulgan, 2006). The key of social innovation may be an innovation in (1) a social program – an integrated set of actions that serve a specific purpose within the context of a larger organization (Desa and Koch, 2014); (2) an organizational model – an overarching structure for mobilizing people and resources to achieve a specific purpose, or (3) a set of principles – general guidelines and values about how to serve a given purpose (Dees, Anderson and Wei-Skillern, 2004).

Once the specific social innovation is identified, its impact can be spread through networked models of diffusion (Crutchfield and Grant, 2012) or dissemination, affiliation, and branching (Dees, Anderson, and Wei-Skillern 2004). However, if social innovation continues to be left to chance, social problems will worsen, barriers from disaster will increasingly constrain economic growth; and the costs of main sectors (like health, industry) will rise while their effectiveness stagnates (Mulgan *et al.*, 2007). Thus, with these factors being present, it is difficult to demonstrate the resilience of a community. In this study of social resilience, three key characteristics of social innovation will be discussed, namely resourcefulness, ingenuity, and fundraising.

### **3.2.2. Operationalizing the Theories and Concepts of Places of Worship in Disaster Risk Reduction and Management**

In understanding how the various dimensions of social resilience are to be applied in analysing places of worship, this study has identified two major theoretical concepts in assessing places of worship. A discussion of Latham and Layton's theories in Section 3.1.1. allows the study to examine places of worship as a social infrastructure. Section 3.2. then follows a discussion of the possible social resilience parameters that can be used in examining places of worship from a disaster risk reduction and management (DRRM) standpoint. Table 3.2. provides a concise listing of the various dimensions that are to be considered in examining the significance of places of worship in the context of DRRM.

**Table 3.2. Key classifications in the development of indicators of social resilience to be applied on places of worship.**

Key dimensions in assessing places of worship as a social infrastructure (Latham and Layton, 2019)		Key dimensions in the development of social resilience indicators (Saja et al., 2018)	
1	Abundance of provision	1	Social structure
2	Diversity of function	2	Social capital
3	Physical maintenance	3	Social mechanism
4	Accessibility of space	4	Social equity
5	Responsive to needs and wants	5	Social beliefs
6	Ethos of democratic living	6	Social innovation

Examining how the significant notions and constructs of the two theories relate to places of worship is the preliminary step in finding how Latham and Layton's (2019) theory intersect with Saja et al.'s (2018) social resilience framework. Table 3.3. provides an overview on how many of the discussed theories and concepts are interdependent upon the two main theories. It is also the aim of this study to verify how these interrelated aspects on social infrastructure and social resilience is able to be operationalized in how spaces in places of worship are being used.

**Table 3.3. Associating the dimensions of social resilience with the dimensions of the social infrastructure.**

	Social Resilience Dimensions	Interrelated aspects of social resilience and social infrastructure	Social Infrastructure Dimensions	References
1	Social structure	<ul style="list-style-type: none"> <li>Places of worship serves as an emergency shelter, food distribution area.</li> <li>Places of worship are seen as a resource and asset within the community.</li> </ul>	Provider of services	Aldrich and Meyer, 2015; Rivera and Nickels, 2014; Park and Bowman, 2014; Kahlili et al., 2015
2	Social capital	<ul style="list-style-type: none"> <li>Places of worship provide good accessibility to the community wherein it promotes social activities that strengthens their network and identity.</li> </ul>	Diversity	Park and Bowman, 2015; Chiodelli and Moroni, 2017; Lefebvre, 2020
3	Social mechanism	<ul style="list-style-type: none"> <li>Places of worship provide a place for the community to express their beliefs and volunteering spirit to help others.</li> </ul>	Place of activity should be physically maintained well	Kinney and Winter, 2006; Quilala, 2018; Dalege and van der Does, 2021; Furness and Gilligan, 2010
4	Social equity		Accessibility	
5	Social beliefs		Responsive to people's needs	
6	Social innovation		Able to capture the ethos of democratic living	

### **3.2.3. Establishing the Indicators in the Gathering of Data**

In establishing the potential indicators to be used in the study, semi-structured interviews are beneficial for exploring emerging themes and trending issues in a certain social dimension. Key elements are defined to be used as a guide in choosing the right type of indicator for the quantitative data of the survey.

#### **(1) Selection of a Context Specific Study**

The first step in establishing specific dimensions and indicators to be used in the study is to select a geographical context wherein social resilience can exhibit more its characteristics in the event of a disaster or unfortunate event. The effects of disaster risks and the processes of resilience vary in different areas and communities they occur. The selection of the site will be further explained in Chapter 4.

#### **(2) Strength of Relevance of the Indicator to the Respondent**

The next step in refining the indicators for assessing social resilience is based on the relevance of the respondents to the dimensions of social resilience. Due to the multi-faceted nature of social resilience, it is important to capture the various responses from experts, leaders, stakeholders, and users of a specified social infrastructure. The consultation of experts and the participation of the community are common in the gathering of data and insights in disaster studies (Aldrich and Kyota, 2017; Keating *et al.*, 2017). In this research, one-on-one interviews and group interviews are used in the selected case study area.

#### **(3) Sensitivity of the Indicator to the Respondent**

In discussing and exploring concepts that are subject to bias, belief, or preference, the importance of providing a neutral and impartial approach in research is essential. The relationships of the respondents with the various social dimensions of resilience will vary and significantly depend on their experiences and perceptions on the specific social infrastructure being examined. Certain personal and cultural biases are certainly present in most sociological studies. However, the aim of identifying key indicators of the framework is being cautious on exploring major characteristics and common indicators that would include certain conflict-inducing religious and cultural biases.

## **Protocol for Measuring Indicators**

One of the key reasons for using the social resilience framework is its ability to be adaptive to measuring new concepts with which its characteristics and dimensions are not yet fully defined. Therefore, the protocol for identifying the indicators needed for assessing social infrastructure needs to be identified (Raphael, Lundin and Weisaeth, 1989). The following three elements are used as a guide in assessment of social resilience in this study:

### **(1) Type of Measurement**

The use of a mixed-method approach in assessing concepts in the built environment requires an adequate time frame in collecting the data. Being one of the pioneers in assessing social infrastructure through social resilience, the types of data being measured are often those that which are existing and pronounced in the current setting. Qualitative interpretations are required as to clarify their meanings and motivations to resilience. These types of data often come from experts or respondents who have enough experience and involvement to the situation. Quantitative data on the other hand counterchecks the validity of these interpretations from the vantage point of the community.

### **(2) Methods for Accessing the Data**

The method for collecting data through the resilience framework may adjusted according to the objectives of the research. Projects may range from small tribal communities to large cities that aims to find the relevance of their social infrastructure to their disaster risk reduction and management programs. Primary data are often collected from the respondents themselves while secondary data can be retrieved from regularly updated administrative data from the local government units.

### **(3) Reliability of Sources**

The ability to compare the results of the data from two different sources help the study to compare and validate the results of the respondents. By comparing data from administrative sources (e.g., mayors, barangay captains) with the local residents of the area, the reliability and validity of the data will be more inclusive of different perspectives.

### **3.3. Interpreting Social Dimensions into Concepts of a Social Infrastructure**

After setting the approach of assessing places of worship through the social resilience framework, it is beneficial for this study to redefine these different dimensions oriented towards the facet of religion. Merging similar characteristics that may come from the different dimensions of the framework may also help synthesize the diverse results of social resilience.

#### **3.3.1. Associating the Religious Aspects of the Social Resilience Dimensions**

***Social Structure as Religious Buildings.*** In understanding how the social structure is vital in the development of resilience communities, it is also similar to the physical structure that bonds the users in achieving a common goal. Religious buildings are recognized as sacred centres where religious activities transpire (Kong, 1993). Being known to be a country with deep religious beliefs, places of worship like churches, parishes, and mosques are highly respected and recognized by Filipinos. In addition to its perception, the predominant presence of churches and religious buildings also positively affects the resilience of the community through providing easy access to social services needed in the advent of a disaster (Rivera and Nickels, 2014). While religious buildings sometimes may represent some form of conflict between state regulations and the “divine will”, these places of worship continue to become reliable indicators of community resilience (Kong, 1993; Ward, 2019). Hence, this study ascertains the nature of places of worship as a “social phenomenon”, a place where “social forces” shape and constrain the formation of groups and the identity of member belonging to them (Brenneman and Miller, 2016).

***Social Capital as a Religious Capital.*** Basing on Coleman’s perception of social capital as the structure of relationships between people, Greely (1997) discovered the significant effect of religious structures to both religious and secular activities in the community. Baker and Miles-Watson (2010) describe religious capital as "the practical contribution that faith groups make to society by creating networks of trust, guidance and support (e.g., through the use of a building, volunteers, paid community workers, training organizations and activities for particular age or interest groups etc.)." People often perceive help from disasters to be associated with food distribution, money, donations, and other physical goods. However, a much significant and relevant dialogue about religion as a social capital is often associated to their beliefs and organizational attachments (Hodge, Marsiglia and Nieri, 2011; King and Furrow, 2004).

Examining the role of religion in the building of social trust and social interaction may also help examine the behaviour of human relationships within the community despite having different cultural and religious backgrounds (Daniels and Ruhr, 2010). In this manner, the different levels of trust of Filipinos to political leaders and church leaders highly influences the way users perceive places of worship. And despite the continuous efforts of the local government in providing proper DRRM practices, the external support and assistance received from faith-based organizations continue to be present during every aftermath of a disaster. Hence, employing religion as a social capital would help highlight various indicators that may lead to the production or inhibition of social resilience in the community (Bowman and Park, 2014; Lockhart, 2005).

**Social Mechanism in Places of Worship.** Social mechanisms are the actions and engagements among the individuals or group of individuals that aggregate the differences of social beings (Pierik, 2004). Social mechanism are also the shared goals and priorities of the community wherein this study aims to examine places of places as one of its catalysts. The challenge of assessing the social mechanisms of places of worship in the framework is that it intersects much with the behaviours and results of the concept of social capital. While Saja et al. (2018) includes 'political participation' and 'involvement in public affairs' as social mechanisms of the community, these are highly influenced by the trust and competency of the involved leaders and advisers (Khalili, Harre and Morley, 2015; McClendon and Riedl, 2015). Hence, the current framework aims to analyse how places of worship influence the experiences, shared values, and communication of the community to its resilience to disaster risks. Malloch (2010) described the "fund of beliefs, examples, and commitments that are transmitted... through a religious tradition" as spiritual capital (Malloch, 2010). However, not all beliefs and experiences share a positive reminder of the community in the response of the local government and even religious leaders. Thus, the following aspect on the equity and diversity of the community is an important discussion in the social resilience framework.

**Social Equity in Religious Social Equality.** The equal distribution of resources in DRRM is often a critical topic when discussing social justice and religious morality. When people do not have the equality they expect from the political government, they often turn to religious organizations for help. Faith-based organizations often provide some form of basic needs, medical support, or other essential services to the community. In addition, some government policies even use "faith communities" as channels for the representations and dialogue in defending the rights and privileges of communities (Grillo, Teixeira and Wilson, 2010).

One challenge in discussing religious equality is its widespread disagreement on its meaning, assessment, and processes (Charlow, 2005). Focusing too much on some ideologies, such as secularism, has also caused some inconsistencies in understanding the concept of religious equality (Modood, 2005). Another possible reason why there has been a limited discussion on religion-related resilience is that it is viewed as a personal and private matter (Mutua, 2002; Vickers, 2015). Consequently, many scholarly works of literature views religion as a potential cause of tension, discrimination, and conflict in communities and workplaces (Lester and Uccellari, 2008; Macey and Carling, 2011). In limiting the discussion of possible tensions and conflicts that arise from social or religious equality, this study attempts to focus more on how places of worship are being used. Hence, this study explores the possible differences in the influence of religious equality in places of worship to social resilience.

**Social Beliefs as Religious Beliefs.** Social beliefs are often part of how communities operationalize their plans and programs. As social beliefs do always include the local culture and practices embedded in the community, this study focuses on their religious norms and beliefs in their community (Ostadtaghizadeh *et al.*, 2016). As what happened during the 2009 earthquake in Padang city, Indonesia, religious beliefs have contributed to positive coping mechanisms of the community after the disaster (Gianisa and Le De, 2018). However, some religion beliefs, such as a fatalistic attitude, could have adverse effects on making the community prepare for future disasters (Baytiyeh and Naja, 2016; Qasim *et al.*, 2016). On the other hand, faith-based actions can also contribute to mobilising diverse professional competencies and skills through developing 'inherent networks and relationships' in the community (Beer, 2018). In Korea, religious beliefs and institutions contributed to almost 90% of 50,000 churches practice church-based disaster response in their communities in 2005 (Ha, 2015). Through these brief theoretical and empirical studies, this study aims to explore how religious traditions and beliefs affect how the community use places of worship in the context of disaster risk management.

**Social Innovation as Religious Innovation.** New religious movements in the 1980s have seen noteworthy influences on the social institutions and power structure of its believers (Kessler, Ackerman and Lee, 1989). Recently, the Emerging Church Movement, consisting of institutional entrepreneurs, have been reframing beliefs and practices through spreading alternative ideas through trusted and network relationships (Martí, 2017). Studies in religious innovation and social change has shown how new network structures have effectively promoted information and collaboration of groups despite geographic limitations (Collar, 2007; Martí, 2017). On the other hand, innovation has also been discussed as a

dynamic approach to overcoming social problems that may arise in preparing or responding from the effects of disasters (Wilkin, Biggs and Tatem, 2019). In the discussion of post-disaster housing, Cai et al., (2017) sees the use of social media in places of worship as a support to the community through the formation of trust and alternative forms of their governing mechanisms (Cai, 2017). Hence, investigating on innovation as another dimension (Captari et al., 2019) of social resilience can provide additional insights on emerging practices that may be relevant to managing disaster risks.

### **3.3.2. Engaging in the Spiritual or Religious Aspects of Resilience**

In assessing the different dimensions in the framework, it is beneficial to combine and simplify concepts that are reasonably similar in characteristics and functions. In this stage of reframing the concepts of social resilience, the study converges the six (6) dimensions in three (3) concepts that would help improve specific findings that would be gathered from the research. The following consolidated concepts found from various scholarly literature include (1) spiritual spaces, (2) spiritual capital, and (3) spiritual beliefs.

**Spiritual Spaces.** Scholarly literature often refers to religious buildings when discussing places where people practice their religious beliefs or sometimes as a 'sacred space' (Kong, 1993; Brenneman and Miller, 2016). On the other hand, some literature mentions spaces that "has a religious function or uses vocabulary of forms consistent with religious practices" as a "spiritual space" (Alexander, 2002; Essawy, Kamel and Elsawy, 2014; Krause, 2017). Using spiritual space as a conceptual term helps highlight the social and spiritual aspect of places of worship. While using this approach intends to deviate from discussions on the physical form, engineering, and historical conflicts on religious buildings, a dialogue about urban conflicts and socio-political issues is expected. This study intends to use the religious buildings as spiritual spaces that provide spiritual values and socio-cultural activities that promote social resilience (Captari et al., 2019; Rivera and Nickels, 2014).

**Spiritual Capital.** The common characteristics between social capital and social mechanism enables the association of these two dimensions into one entity. In discussing social capital through theories in religion, Verter (2003) examined the concepts of religious and spiritual capital through Bourdieu's three forms of cultural capital. First, religious capital is defined as the "skills and experiences specific to one's own religion" that creates resources that people define as valuable (Templeton and Harper, 2005). On the other hand, spiritual capital is described as something that can be acquired, invested, squandered, and inherited (Verter, 2003b). However, Templeton (2005) mentioned use of spiritual capital in favour of

religious capital because religion is a primary system of beliefs and is not epiphenomenal<sup>6</sup>. The term spiritual capital has now been used often to identify the “capacity building and spiritual” contributions of faith-based organizations to civil society (Palmer and Wong, 2013). On the other hand, some scholars negate the use of ‘spiritual capital’ as it may tend to ignore political hierarchies, influences, and prejudice in societies. In addition, Montemaggi (2011) cautions using the term as a “catch-all phrase for everything that benefits social society” (Montemaggi, 2011).

The spiritual capital theory fit well into the context of discussing places of worship, religion, and the social mechanisms that occur in the current case study. While religious capital is the concrete and tangible actions and resources of religious organizations, spiritual capital is the religious motivational underpinning of certain communities to be resilient to the effects of disaster risks (Baker and Miles-Watson, 2010). With spiritual capital itself to be multi-dimensional in concept, it relates to a broad range of professions and theories. Spiritual capital is mentioned to help improve health, lower crime rates, and increase the tendency for virtues such as discipline, justice, and temperance (Hummer *et al.*, 2000; Wilhoit *et al.*, 2008; Wortham and Wortham, 2007). In using the spiritual construct as a cornerstone in discussing certain theories, spiritual capital continues to provide additional insights into the well-being and resilience of an individual (see Figure 3.5) (Vasconcelos, 2021). Hence, assessing places of worship through the lens of spiritual capital helps identify possible relevant and timely questions and issues that may arise from the study of places of worship.

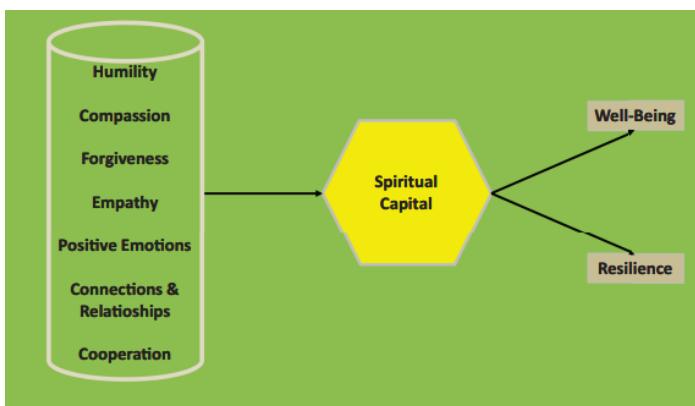


Figure 3.5. Conceptual model of spiritual capital (Vasconcelos, 2021)

**Spiritual Beliefs.** There are four kinds of beliefs: convictions, conceptions, perception, and confidence (Khalil, 2010). In the religious aspect, Barrett and Lanman (2008) defined reflective and non-reflective forms of religious beliefs. Other studies define religious

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<sup>6</sup> Epiphenomenon is “a secondary phenomenon that occurs alongside or in parallel to a primary phenomenon.” The word either connotes known causation or one that connotes absence of causation. (Merriam-Webster, 2016)

beliefs as significantly related to political participation or national tradition (Driskell, Embry and Lyon, 2008).

As problems caused by disaster risks has increased over the years, health and well-being is a frequently discussed topic in disaster management and rehabilitation. In addition, the World Health Organization (1996) consider spiritual health to be as important as traditional psychological and social well-being (WHO, 1996). Spiritual health has been defined as 'a state of having' while spirituality as 'the state of being' (ABBASI M. *et al.*, 2012). Hence, studies in human behaviour have seen significant effects of religious beliefs to the communities' response to disaster risks (Gianisa and Le De, 2018; McGeehan and Baker, 2017; Richman, 2012). However, the presence of negative religious and spiritual beliefs has made some leave their religion following a calamity and became more "existentially resilient to threats" afterwards (Joseph, 1998; van Tongeren, 2020).

In discussing the 'spiritual' side of disaster psychology, some literature interchangeably uses the terms 'religious beliefs' and 'spiritual beliefs' in a similar manner (Aten *et al.*, 2014). By using 'spiritual beliefs' as a terminology helps this framework to be consistent with the other terms of 'spiritual spaces' and 'spiritual capital' in defining the spiritual dimension of places of worship. This 'spiritually' could help include the behaviour and spaces of other types of 'spirituality' that does not belong to a religious denomination.

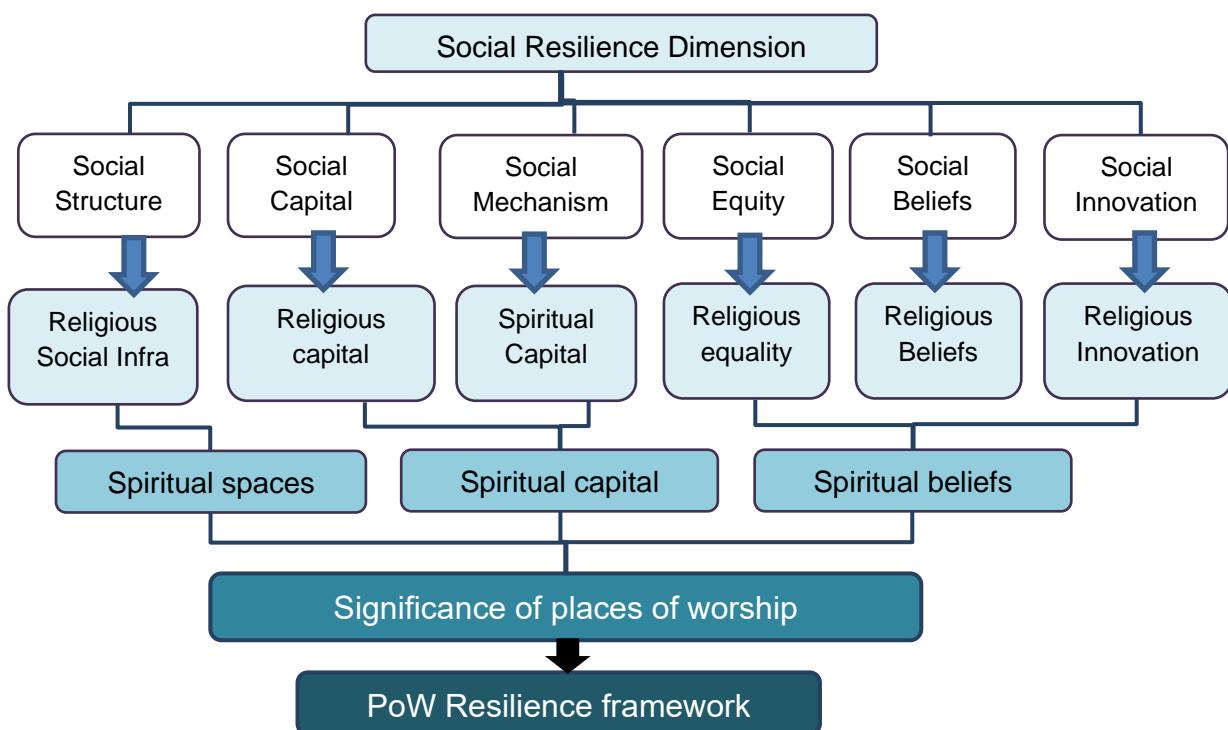


Figure 3.4. Conceptual assessment of literature themes on analysing places of worship through the social resilience framework

### **3.4. Summary**

The use of the social resilience framework in assessing social infrastructure such as places of worship comprise of parameters that are complex for direct measurement. First, well-defined indicators that are systematically derived from the emerging qualitative themes and behaviours of experts, leaders, and the residents. Then the formulated indicators can be supported through a quantitative survey to validate the characteristics of social resilience that these social infrastructures produce or inhibit. The conceptual social resilience framework is proposed to include three key steps in the assessment process: (1) selecting a context-specific site for evaluation, (2) selecting key resilience dimensions that are relevant to the context, (3) validate the dimensions and indicators through collecting both qualitative and quantitative data.

The use of the social resilience on social infrastructure have not been tested in disaster risk reduction and management studies to date. Assessing social infrastructure through these dimensions help initiate studies on the role of social infrastructure in the resilience process of the urban built environment. This type of framework was developed with the intention of making it adaptable to other types of physical structures in the urban setting. When studying through theoretical lenses, the addition of other dimensions such as economic, psychological, medical, and even technological can be adopted to other studies if suitable or necessary. This framework can also be applied by disaster management policy makers and practitioners to develop appropriate strategies in their DRRM programs, even in the informal built environment.

## **Research Outline**

- 1. Introduction and Aims**
- 2. Review of Related Literature**
- 3. Theoretical Framework**
- 4. Research Methods**
  - 4.1. Research philosophy
    - 4.1.1. Case study research
    - 4.1.2. Site Selection
  - 4.2. Research methods
    - 4.2.1. Finding appropriate research methods
    - 4.2.2. Phases of research strategies
    - 4.2.3. Ethical considerations in research
  - 4.3. Study area of the research
  - 4.4. Phase I - Interview Analysis
    - 4.4.1. Phase I - data collection, sampling
    - 4.4.2. Phase I - Development of interview questions
    - 4.4.3. Phase I – interview data analysis
  - 4.5. Phase II - Survey Analysis
    - 4.5.1. Phase II - survey data collection, sampling
    - 4.5.2. Phase II - Development of Survey questionnaire
- 5. Interview Results/Analysis**
- 6. Survey Results/Analysis**
- 7. Synthesis of Key Findings**
- 8. Discussion/Recommendations for Future Research**

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## **Chapter 4: Research Design**

This section will discuss the development of the research design in guiding the research process. The first section discusses the philosophical position of the research in terms of the different philosophical fields of research. These philosophical approaches in research then links the places of worship to be reviewed, studied, and analysed. The second part explores the research strategies needed to attain the objectives of the research. Section 4.3. describes the selected the study area and relevant characteristics required for the data analysis. Finally, Sections 4.4. and 4.5. lists the steps and processes for each phase of the research methodology.

## 4.1. Research Design Philosophy

Research methods dealing with disaster management and resilience have ranged from approaches in ecological studies to the social aspect of community resilience. Many studies in social resilience involve the application of composite indicators (Burton, 2015). While applying measuring tools in complex conditions may provide a clear and objective discussion of a phenomenon, the study might not be able to include other behaviours that are unique to a specific context. As this study deals with topics (i.e., places of worship) that are relatively uncommon in academic literature, a pragmatic approach in research would allow for the exploration of different perspectives of how these places are being used. A combination of using measuring tools (i.e., social resilience frameworks) and field observation methods help the study provide a more holistic assessment of the specific case study. As social resilience significantly impacts the resilient capacities of key stakeholders during disasters (Bankoff, 2015; Williams, Crespo and Abu, 2019), it is important to see how resilience is perceived and understood by the people. Research in social resilience often involves assessing vulnerabilities (Fekete, 2018; Nirupama, Popper and Quirke, 2015) and understanding relationships of people the challenges and insecurities of their in-situ conditions (Peth and Sakdapolrak, 2020). By using the pragmatic mixed method approach, the study is able to observe and perceive the strength and limitations of a research method for the selected topic of study (See table 4.1.).

Through an in-depth case study, a meaningful communication and interaction with key stakeholders of the community is required to find the association of their use of Places of worship and their capacity to be resilient. Integrating the research of Places of Worship with emerging analytical methods of Social Resilience enables the study to explore the different possible values of Places of worship as a social infrastructure in promoting or impeding resilience (Greely, 1997; Brenemann and Miller, 2016). In turn, this approach attempts to create a framework on how to assess the values and contributions of a physical space to Social Resilience.

**Table 4.1. Ontological vs Epistemological Position of the Research.**

Knowledge claims	Research approach	Strategy of inquiry	Methods
Post-positivist	Quantitative	Experiment design	Measuring attitudes, ratings, behaviours
Constructivist	Qualitative	Ethnography design	Field observations
Emancipatory	Qualitative	Narrative design	Open-ended interviewing
Pragmatic	Mixed methods	Mixed methods design	Closed-ended measures. Open-ended observations

Source: (Creswell and Creswell, 2017)

#### 4.1.1. Case Study Research

The use of case studies in research often requires more an “in-depth” description of a social phenomenon, which is required for analysing social resilience (Yin *et al.*, 2016). In the current case study in Barangay San Andres of the municipality of Cainta, Philippines, adequate literature has discussed on how the area is vulnerable to extreme weather events, man-made disasters and social issues (Eva *et al.*, 2010; Lagmay and Arcilla, 2010; Zoleta-Nantes, 2000). While there is limited discussion in academic literature with regards to places of worship, the study intends to explore this avenue of research through key informants and stakeholders in providing meaningful data with regards to its association with social resilience. The research method however needs to stay adaptive. As the data collected from user of places might differ from the proposed research objective or hypothesis, some of the interview questions are designed to be open-ended, such as “If there is a better place that provides better refuge than places of worship, what would it be?”. Due to the COVID pandemic, the study sees the importance of analysing different methods of research based on the research question and the control over behavioural events (see table 4.1.1.). Being able to explore issues in the contemporary context and giving liberty to the respondents of their perception and understanding of the phenomenon being studied helps the research data to be relevant, unbiased and provide a deeper insight through addressing the “why” question.

**Table 4.1.1. Methods of research based on research question and control of events.**

Method	Form of research question	Requires control over behavioural events?	Focuses on contemporary events?
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival analysis	Who, what, where, how many, how much?	No	Yes/no
History	How, why?	No	No
Case study	How, why?	No	Yes

Source: (Yin, Bateman and Moore, 1985)

In providing the case study with a systematic approach in research, major parts of a case study protocol include (1) an overview of social resilience and places of worship, (2) the process by which data will be collected from key informants and stakeholders in barangay San Andres, (3) specific questions based on academic research (i.e., social resilience frameworks) and (4) a tentative outline for the case study.

#### 4.1.2. Site Selection

The research will focus on informal settlements located along the west bank of the Manggahan Floodway in Barangay San Andres (63,750m<sup>2</sup>) in the municipality of Cainta, province of Rizal. The site was selected based on studies that define its location and exposure to natural and man-made disasters. Among the seven (7) barangays composing the municipality of Cainta, two (2) of them are located along the banks of the Manggahan floodway, namely San Andres and San Juan. By analysing the geographical attributes of each barangay, data shows the distinct vulnerability of Barangay San Andres as having the lowest elevation based on sea level and the highest exposure to a five-year flood hazard based on the hazard mapping application of the University of the Philippines' Nationwide Operational Assessment of Hazards (UP-NOAH) using LIDAR technology (Cadiz, 2018). Further figures confirm that Barangay San Andres has the highest density in terms of population among the seven barangays (see table 4.1.2.), exhibiting increased vulnerability to hazard risks (Tenerelli, Demšar and Luque, 2016).



Figure 4.1.2. The selected case study is in Barangay San Andres that is transversed by the Manggahan Floodway to the south. (Source: Wikipedia, 2020)

**Table 4.1.2. Geographical and Social Attributes of Barangays in the Municipality of Cainta**

Barangay	Area *	Population (2015)	Density (pax/km <sup>2</sup> )	Elevation ** (meters above sea level)	5-year flood hazard rating***
San Andres	3.23 km <sup>2</sup>	95,838	29,671	6.20 m	High
San Isidro	21.58 km <sup>2</sup>	69,377	3,214	12.60 m	Low
San Juan	6.75 km <sup>2</sup>	98,849	14,644	17.40 m	High
San Roque	0.69 km <sup>2</sup>	8,817	12,778	9.70 m	Medium
Santa Rosa	0.28 km <sup>2</sup>	1,627	5,810	12.60 m	Medium
Santo Domingo	10.21 km <sup>2</sup>	41,507	4,065	10.10 m	Medium
Santo Nino	0.41 km <sup>2</sup>	6,113	14,909	12.10 m	Medium

\* [www.cainta.gov.ph](http://www.cainta.gov.ph) (2016)

\* [www.philatlas.com](http://www.philatlas.com) (2020)

\* [www.noah.up.edu](http://www.noah.up.edu) (2020)

Initial ocular site visits have also contributed to selecting the site as it exhibits unique social characteristics and dimensions of the community in exhibiting resilience in an informal settlement (e.g., social practices, activities, values, and beliefs). Basing the site selection on these criteria is important in two ways. First, these characteristics may demonstrate the various types of needs, sense of attachment, and perception of PoW to the local users

(Paton, 2014; Sherrieb, Norris and Galea, 2010). Second, the site is located in an area highly exposed to risks and hazards of the floodway. Conversely, this condition would allow the research to evaluate how activities and practices in using PoW can help communities with limited resources in developing their own resilient capacities in DRRM.

## **4.2. Research Methods and Strategies**

Conceptually coming from a disaster risk management perspective, the research will use different methods approaches in implementing the research. Based on Jabeen et al.'s (2010) case study approach, these methods require the observing and identifying crucial parameters of how places of worship are used as a coping or adaptive strategy from disasters. Humans around the world have been using places of worship as places of refuge for many centuries. However, the lack of discussion on theories and concepts on places of worship has promoted different fields of research on doing inductive approaches on places of worship. While it would be prudent to start from an inductive approach of observing and identifying thematic evidence and ideas for places of worship, the inductive research still entails a degree of deductive processes (Bryman, 2016).

### **4.2.1. Finding an Appropriate Research Method for Social Resilience and Places of Worship**

The qualitative approach of research is found suitable in the study of the utilization of spaces as it puts emphasis on the expressions and activities of the people in a certain spatial and temporal context of places of worship (Flick, 2014)). While qualitative research usually puts emphasis on words (e.g., interviewing social workers and church leaders), it also entails the collection of some types of quantitative data (e.g., demography, time used) in assessing how these places are being used (Bryman and Cramer, 2012). As the COVID pandemic in 2020 has limited prolonged interaction between people, the World Health Organization has recommended the use of cross-sectional studies in conducting research on risk perceptions and human behaviours (Emanuel et al., 2004).

As discussed earlier, quantitative methods in research also form an important component of the whole research methodology. Through objective measurements such as polls, questionnaires, or surveys, quantitative research helps determine the relationship of places of worship and social resilience through the collection of numerical data (Babbie, 2010). While this method has the ability to be replicated in other areas and be applied in different contexts, it may fail to provide additional insights as to the other 'why's' these responses are being made.

Mixed method – By integrating qualitative and quantitative approaches in research, the processes allow the study to corroborate different sources of information and observe different viewpoints of different levels of the community (Sharp *et al.*, 2012). Among the three types of mixed methods tabulated in table 4, the researcher finds the use of sequential exploratory mixed methods research to be most suitable for the study of social resilience and places of worship.

**Table 4.2.1. Types of Mixed Method Approaches in Research.**

Designs	Data collection	Role of qualitative/quantitative research
Sequential explanatory	Quantitative research first, then followed by qualitative approach. Focus on variations of quantitative data.	Explain unexpected outcomes in quantitative. Qualitative to augment results.
Sequential exploratory	Qualitative first then quantitative. Focus on variations in qualitative.	Qualitative data is used to develop theory and explore relationships.
Concurrent triangulation	Quantitative and qualitative are conducted simultaneously. There is equal focus is both types of data.	Qualitative data is used to cross-validate findings of quantitative data.

Source: (Boeije, Drabble and O'Cathain, 2015)

In using the sequential exploratory strategy in analysing places of worship, the research method is able to explore how these places are being used during and after disasters. By identifying recurring themes and concepts based on the social resilience framework, these indicators can be used to be evaluated against different viewpoints of its users. By using the pragmatic perspective of research in this study, the analysis of the data would provide greater flexibility to explore, interpret and survey possible different viewpoints of the leaders and stakeholders of places of worship.

Discussions on religion buildings and beliefs in disasters studies are often about its contribution as a coping and social strategy, but barely on its physical dimensions<sup>7</sup>. As there are many studies that refer to the ecological, social, or psychological dimension of resilience, it is beneficial for this study to anchor the framework based on these concepts. The study aims to base its approach in understanding places of worship using a mixed-methods approach of the built environment (Amaratunga *et al.*, 2002) (See Figure 3.2.). In the

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<sup>7</sup> The 'physical dimensions' of buildings referred in this study is based on Carmona *et al.*'s (2010) social construction of place. It refers to the physical setting of a place that is the human physical perception of scale, texture, space to building ratios, and other elements related to the 'sense of place'.

collection of data, this study aims to gather both qualitative and quantitative data. This inclusive approach explores the interaction of the physical and social dimension of places of worship and its users. With regards to theoretical applications, the study uses Latham and Layton's (2019) concepts in social infrastructure and Saja et al.'s (2018) social resilience framework.

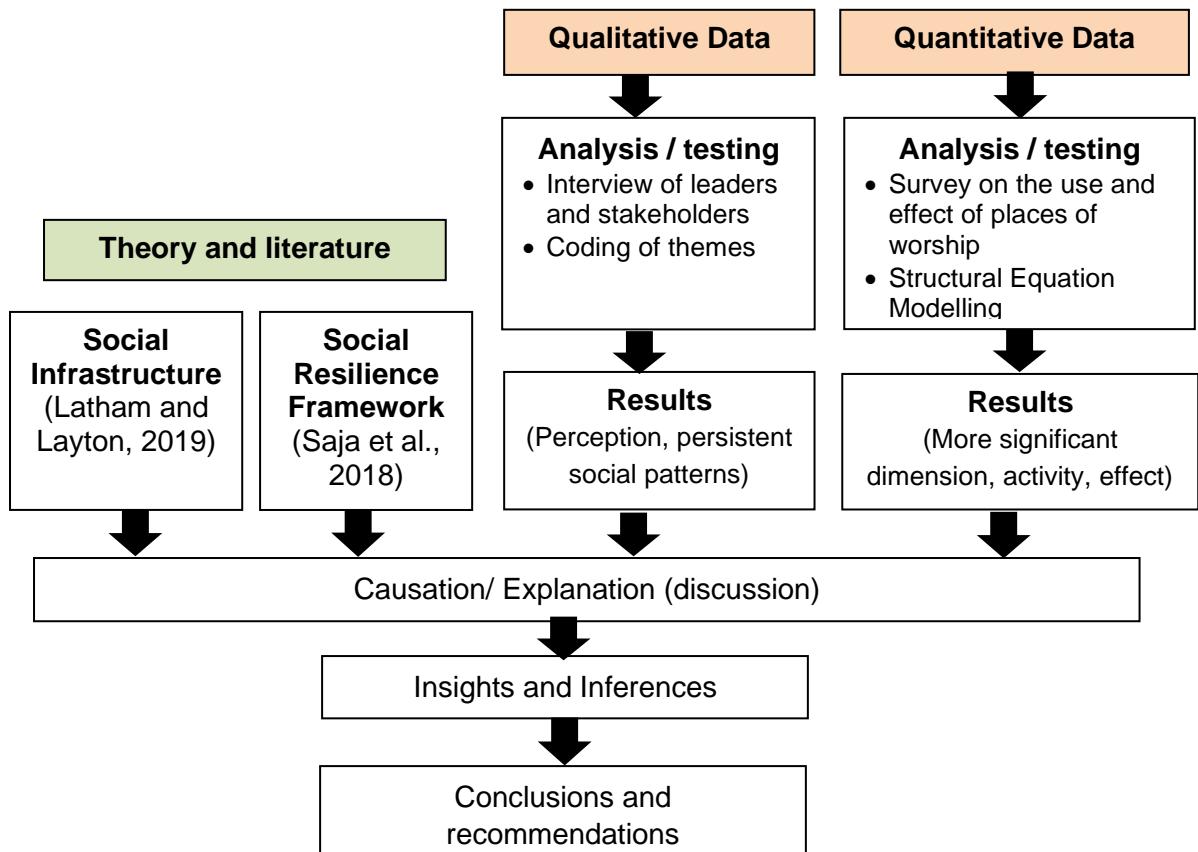


Figure 4.2.1. Proposed mixed-methods approach (adapted from Amaratunga et al., 2002)

#### 4.2.2. Interpreting the Religious Dimensions of Places of Worship from the Social Resilience Perspective

In exploring the dimensions of the social resilience framework, the analysis needs to be clear how each dimension is related to the characteristics of how places of worship are being used. In this way, the study attempts to translate the dimension into their religious counterparts and explore their meanings. The study examines how they are operationalised in the context of disaster resilience. However, translation and interpreting words, statements, and more so theories are a bilingual process (He, 2019). Hence, interpreting social dimensions such as "social structure" and "social capital" requires a form of rigor in analysis

as translating culture can be quite challenging especially when the report is done in a different language (Fernández Guerra, 2012).

When certain social dimensions are to be decoded as “religious buildings” or when “social capital” is to “spiritual capital,” a “direct transfer” of meaning is almost impossible (Fernández Guerra, 2012). In addition, it is also important to merge dimensions that may be similar or overlap in meaning and the purpose of how they are applied to the context of the study. Social cultures, behaviour, capabilities, values, beliefs, and identity have all different levels of meaning to different people (Katan, no date). Due to this concern, the study aims to translate the conceptual terms into a simple, recognizable, and memorable type of understanding (Naciscione, 2011). It is also important to note that the ability to “back-translate” the words can be quite beneficial when it is to be used in future studies. Therefore, the approach on how places of worship can be interpreted through the dimensions of social infrastructure, social resilience, and religious/spiritual characteristics are tackled in the research problem.

#### 4.2.3. Phasing of Research Strategies in Social Resilience

The research strategy to be applied in this study uses Saja et al.'s (2018) five social resilience framework in consideration with another dimension by Bustamante (2019) on his research in urban informal workers. In application of the sequential exploratory approach in research, the following steps guides the research in the gathering and analysis of relevant data: (Creswell and Creswell, 2017; Flick, 2014)

- a. Phase 1: Qualitative data collection (exploration through interviews, field observations) and qualitative data analysis (developing categories and highlighting important descriptions of the case study)
- b. Phase 2: Quantitative data collection (online question survey)
- c. Phase 3: Analysis and evaluation of qualitative data and quantitative data

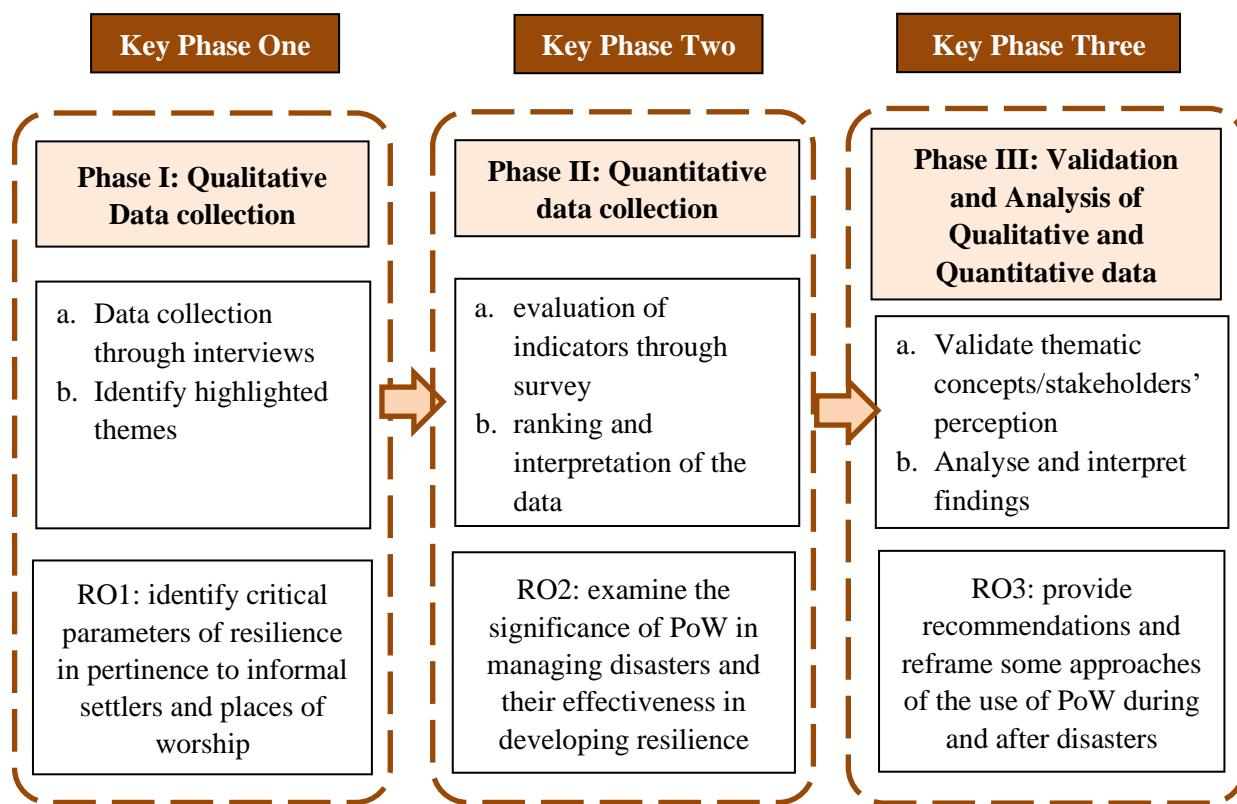


Figure 4.2.2. Overall research process on the utilization of places of worship in a social resilience perspective.

## **Phase I: Identifying Critical Parameters and Thematic Codes in Case-study Research**

Phase one (1) of the study involves the collection of qualitative data gathered from interviews of key informants that manage disaster management operations in places of worship. These informants and specialist familiar with the functions, uses and roles of places of worship during and after a disaster are selected through two levels of purposive sampling. The researcher first selects an area among the different barangays of the Cainta municipality that is most exposed to risk from floods and extreme weather events (See barangay comparison table). This initial selection can provide a good overview of the setting and background of the case study (Yin, 2018). After choosing Barangay San Andres, the research then sought to gather perceptions and viewpoints of selected key informants among government offices, religious and private organizations. This mix of selection allows the study to explore different social settings, privileges and resources that are available in each sector (Savage et al., 2005). The challenge of interviewing key persons' is that the researcher should cater to the schedule and availability of the interviewees' instead of the latter. This schedule might cause some differences, delays, and adjustments in the research timeline.

Through the sequential exploratory approach, this research aims to achieve research objective 1 (RO1): "To identify the critical parameters of resilience and their pertinence to Filipino informal settlers through their use of PoW." This objective aligns with the initial phase of exploring and identifying key ideas and themes that may arise from the qualitative interview with key informants and specialists. This is then followed by an extensive literature review of the highlighted themes and validating their relevance and significance in comparison to other recent studies in disaster management and places of worship.

Three (3) stages of analysis are used to identify characteristics and themes which include key social resilience indicators that are appropriate in evaluating the use of places of worship during and after disasters in case study research. In establishing these indicators and their relationship with places of worship, the interviews also allow the exploration of other potential characteristics and behaviours of interviewees and participants through open-ended questions.

## **Phase II: Administration of Self-completion Questionnaires to Stakeholders**

After exploring and analysing thematic codes that may have arisen from the interviews and field observations, a quantitative approach is conducted through the personal and online interviews and questionnaires conducted in Phase two (2). Both phases one and two are cross-examined to achieve research objective 2 (RO2): "To examine the significance of PoW in managing disasters and investigate their effectiveness in strengthening the

resilience of informal settlements.” By using different methods, the research may overcome some potential bias resulting from the use of a single method in the gathering of data, increasing the validity and reliability of the research (Strauss and Corbin, 1998). However, Fetter & Molina-Azorin (Fetters and Molina-Azorin, 2017) cautions that bringing together different sources of data may not always be appropriate to confirm the breadth and depth of the research objective.

While there has been some critique regarding the use of “cross-sectional” or “one moment in time” approaches in research (Nimon and Astakhova, 2015), the current COVID pandemic has limited the research method in engaging in a more prolonged and more rigorous examination of the context of the research (Anderson, 2017). In using the paradigmatic positioning in analysing this research data, this approach enables the researcher to provide meaningful understanding with the participants in exploring implications of social resilience through the photographs and personal description of their places of worship (Bradbury-Jones, Taylor and Herber, 2014). In Phase II, self-completion questionnaires are based on the six (6) evaluation criteria of the social resilience framework and are administered through purposive sampling using online survey in validating the relationship of social resilience with the use of places of worship.

### **Phase III: Evaluation and Interpretation of Research Data**

In phase three of the research methods, the validation and interpretation of the findings would assist in achieving research objective number three (RO3): “To provide recommendations on how to reframe some approaches to the Social Resilience of informal settlements based on analysing specific conditions of how POW are used in the context of disaster risk management studies.”

In phase three (III), the three steps in evaluating and the interpretation of data include (1) the assessment of social resilience indicators against the participants’ response to the six (6) evaluation criteria from the online survey, (2) ranking the significance of indicators using structural equation modelling and (3) the selection of ideal indicators for application in future research.

#### **4.2.3. Research Ethics**

Research ethics are the standards of conduct and practice that protect the dignity and welfare of research participants. The Economic and Social Research Council (ESRC) specifies that the research should contribute and maximize its benefits for individuals and society while minimizing the risk and harm it creates (ESRC, 2022). Many discussions on ethical research on disaster management are related to studies in the field of health care and

relief efforts (Cariappa and Khanduri, 2003). While there is a need for balance for the ethical obligation of the researcher and interest of the participants while doing research in disaster management, research ethics are not often discussed during educational and training activities in disaster management (Geale, 2012). Although this research is not focused on educating the participants with regards to managing disasters, it takes on a human-centred approach. The research takes its knowledge from people willing to participate in interviews and surveys and share their experiences.

The processes for complying ethical research include submitting the ethics form to the Research Ethics Committee of the University of Reading for ethical clearance.

#### **4.2.1.1. Risk Analysis**

Analysing risks in the research on the built environment are often complex because it involves many characteristics and elements (Ouédraogo, Groso and Meyer, 2011). These elements include the different collaborators, respondents, components, and context that the study that is being investigated. Nonetheless, understanding how people interpret risks is vital in examining strategies on managing disasters (Eiser *et al.*, 2012). The following different risk analysis principally discusses on the possible risks and hazards that individuals and groups might be exposed to during the span of this research.

Perception of threats from health risks, miscommunication from fake news and social inequality are some of the concerns that arise from research during the COVID pandemic (van Bavel *et al.*, 2020). While it is observed that perception can be influenced by social norms, how people perceive the research and the researcher provides significant weight into the content of the research data (Cialdini and Goldstein, 2004). Thus, the research aims to address the different risks that may influence a person's response to the collection of data which are as follows:

##### **a. Medical Risks (COVID Pandemic)**

###### *Working Remotely*

On March 16, 2020, the enhanced community quarantine (ECQ) was implemented in COVID-19 high risk areas in the Philippines which include the region of Metro Manila (See table 4.2.2.). Metro Manila was then placed under the status of modified enhanced community quarantine (MECQ) on May 15, 2020, and finally to general community quarantine (GCQ) on June 1, 2020. Due to some rise in deaths and infections from COVID-19, Metro Manila reverted back to MECQ from August 4 to August 18, 2020. These events have

made the schedule for research data gathering fairly unpredictable in the past few months.

**Table 4.2.2. Phases of transition from ECQ to GCQ.**

	PHASE 1: ECQ	PHASE 2: MODIFIED ECQ	PHASE 3: GCQ
 <b>POPULATION</b>	100% stay at home	100% stay at home	Vulnerable (e.g., elderly) Transmitters (e.g., youth)
 <b>OUTDOOR EXERCISES</b>	Outdoor exercises are not allowed	Limited outdoor exercise allowed (e.g., outdoor walk, jog/run, bike) with safety	Limited contact sports (e.g., golf, tennis)
 <b>GATHERINGS</b>	Gatherings are not allowed	Highly restricted (5 maximum)	Restricted (e.g., max 10)

Source: Presidential Communications Operations Office (2020)

The current COVID pandemic has also limited the capabilities scientific research especially in the social sciences (Jay J. Van Bavel, 2020). While there are still some restrictions as to how people interact with each other, working remotely through electronic devices have been a common tool used in many facets of human activities (Clay, 2020). By using remote communications technology (e.g., zoom, messenger, Google meet, etc.) in research data gathering, the collection ensures a more detailed discussion of interviews with informants without exposing them to risks of viral transmission during this pandemic.

### *Addressing Digital Literacy*

Different segments of the population use different types of technology platforms (e.g., computers, tablets, and phones) in their everyday communication. Due to the context of the case study of having limited resources, the study needs to verify the best platform to be used for data gathering, taking into consideration the cost of the internet in informal settlements. While the Philippines have the second slowest internet connection in Asia (3.64 megabits/second), it is also one of the most expensive at \$18.19 per mbps (Gonzales, 2015). As internet costs are to be taken into account, the researcher would allocate funds to participants to

ensure that communications cost will not burden their participation in the research.

### *Protecting the Participants*

Some institutions have limited the use of face-to-face human research due to the risks involved in the COVID pandemic. The researcher makes use of some stakeholders (e.g., church leaders or government officials) to assist in the communication and dissemination of the survey questionnaires. These are people familiar to the community and are still in constant communication with the participants. Providing safety reminders on how these stakeholders could safely monitor or collect survey forms help ensure the importance of health in the research. While visits of the researcher to the site may be constrained, the importance of social research during this pandemic is critical (Lupton, 2020). Findings in this research may provide information on how people and institutions socially respond to the COVID pandemic and related crisis that it has generated.

Based on the current conditions of the pandemic in Metro Manila, the following points will guide how the data is gathered in this study:

- a) The researcher will request for contact details (emails, mobile numbers, etc.) of key informants for their corresponding interviews to lessen face-to-face exposure time.
- b) The researcher will get the assistance of a local community leader/servant in gathering and disseminating information for the surveys of the participants.
- c) The researcher will make the final personal meetings with the local community leader/servant when the data is ready to be collected.

### **b. Professional or Work-related Risks**

The study has also considered how questions from interviews and surveys might be related to the participant's business interests or occupation. Some participants may seek to protect themselves from divulging information that may be considered confidential to their organization (Israel & Hay, 2006). Thus, the researcher ensures that questions and queries would stay neutral and be guided by the adapted social resilience framework from Saja et al. (2018). In the current pandemic, the challenge of finding employment and a source of living may also influence the eagerness of participants to contribute to the research. Thus, stratified purposive sampling is used in choosing equal

responses from the different layers or categories of the participants (e.g., age, gender, occupation, and other characteristics that are associated with places of worship).

### **c. Personal or Religious Conflicts**

Differing religious beliefs and practices are common among participants who use spaces in places of worship. Although some participants do not identify themselves as religious or spiritual, the concept of religion typically involves associations to a community with shared beliefs and practices (Koenig, 2004). While religious conflicts or negative impressions may arise between participants with different religious principles, the researcher ensures that the questions would abide by universal moral principles (principles common to the majority of religions) so as to prevent bias and preference to the response of the participants (Hammersley, 2013).

A challenge in conducting research in informal settlements is the critic on poverty tourism (Frenzel, 2012). While some local residents of informal settlements may feel indifferent or unintended demeaning emotions, the members of the community are not always homogenous in their reaction to external entities. By doing a participatory approach in dealing with the local residents, the researcher is more responsive to the local concepts of acceptable behaviour and conduct of the community (Outterson & Selinger, 2009).

#### **4.2.1.2. Informed Consent**

##### **Interviewing Key Informants in Semi-structured Interviews**

Among the valuable information required to gather in this research includes the experience and insight of the participants in their use of spaces. These experiences may include personal preferences or historical motivations of their corresponding activities. Thus, it is imperative that the personal information of the participants is to be treated with confidentiality. Personal data obtained from interviews are to be de-identified through creating de-identified data sets (e.g., use of pseudonyms, replacing names with ID tags) (Liu, 2008). Any personal information acquired through interviews will be kept for one year from the time the research has been defended or published. The researcher would also be careful inform the respondent that further research might be further discussed at a later time. While some respondents are willing to participate, some respondents may not want

additional contact for personal reasons. It is recommended to discuss and document this matter in the interview (Kaiser, 2009).

By providing a well-established collaborative activity and consensual process in implementing the research, the researcher would provide clear motivations to receive consent from the key informant (Whyte, Selinger, & Outterson, 2011). These processes ensure that the participants made a voluntary consent to do the interview and sharing their personal experiences. By understanding a background of their religious organizations and local lifestyle, the researcher seeks to minimize the “discomfort” of participants, helping them to freely discuss their knowledge and opinions regarding the research. A challenge of conducting these interviews is to be impartial to opinions and not be influenced by the researcher’s personal viewpoints on politics, religion and culture (Lundälv, 2019).

For individual interviews, selected key informants were chosen from the list of officers and church leaders obtained from the secretary of Barangay San Andres. These informants were chosen based on their experience and organizational authority over different areas in the barangay. These selected interviewees were directly contacted by the researcher and verified their willingness to participate in the research. For group interviews and focus group discussions, participants with the same level of organizational hierarchy were grouped separately from those with a higher level of authority. This segregation provides participants more freedom to express their opinions and sentiments regarding their personal experiences. A challenge encountered in the research is the time availability of many key informants for interview due to the stress and uncertain circumstances caused about by the COVID pandemic.

### Survey participants

The online survey conducted was anonymous as personal data and identifiable information was not collected from the respondents. The survey aims to gather information from at least 10% of the local population (e.g., sitio, purok or barangay), anticipating participation from different age groups and work occupation. This type of data would aim to capture different responses and perceptions to their use of spaces in places of worship. All participants were given a “Research Information Sheet” to provide them the purpose and direction of the research and why they were

chosen. A “Consent form” was also sent individually to verify if they are willing to participate in the online survey.

#### 4.3. Study Area of the Research

The study area is located along the west bank of the Manggahan floodway, a man-made floodway constructed in 1986. The community is under the political jurisdiction of Barangay San Andres, in the municipality of Cainta, province of Rizal, Philippines (See Figure 4.3.1.). The 10-kilometer Manggahan floodway was built to prevent flooding of the Pasig River and divert waters from the Marikina River towards Laguna de Bay (Gilbuena et al., 2013). Despite the capability of the floodway to handle 2,400 cubic meters of water, the 2009 Storm Ketsana cost 448 deaths and \$ 237 million dollars in total damages (Billington, 2009). Despite the current resettlement projects at two sites in Cainta and Tanay, the population of informal settlers continue to increase to almost 9,000 people in 2018 (DPWH, 2018). Poorly maintained sewage systems, illegal settlers and uncollected domestic garbage was attributed for the flooding as they reduced the effective width of the floodway and other rivers in Metro Manila.

In 2010, there are 6,700 informal settler households that occupy the 10-km stretch of the Manggahan floodway (Panares, 2010). This number of households has increased to 9,216 in 2018, an average of an additional 300 families each year. The Japan International Cooperation Agency (JICA) resettlement action plan for the Manggahan Floodway for 2019 is constructing a total of 8,136 units (4,736 in Cainta and 3,400 in Taytay) for the relocation of the informal settlers and is planned to be finished by 2026 (DPWH, 2018b). The JICA resettlement plan was conducted with public consultation, a socio-economic survey (SES) and an income loss survey for the Informal Settler Families (ISF) qualified to be relocated.

At least six (6) physical ocular site visits were done in Barangay San Andres. In an analysis of existing maps of the site, the current situation saw the presence of chapels, schools, and basketball courts, and other social infrastructure to dominate the landscape of these informal settlements. (See Figure 4.3.1.) A listing of the number of places of worship was also done to quantify the presence of these social infrastructure in the area (See table 4.3.1.)

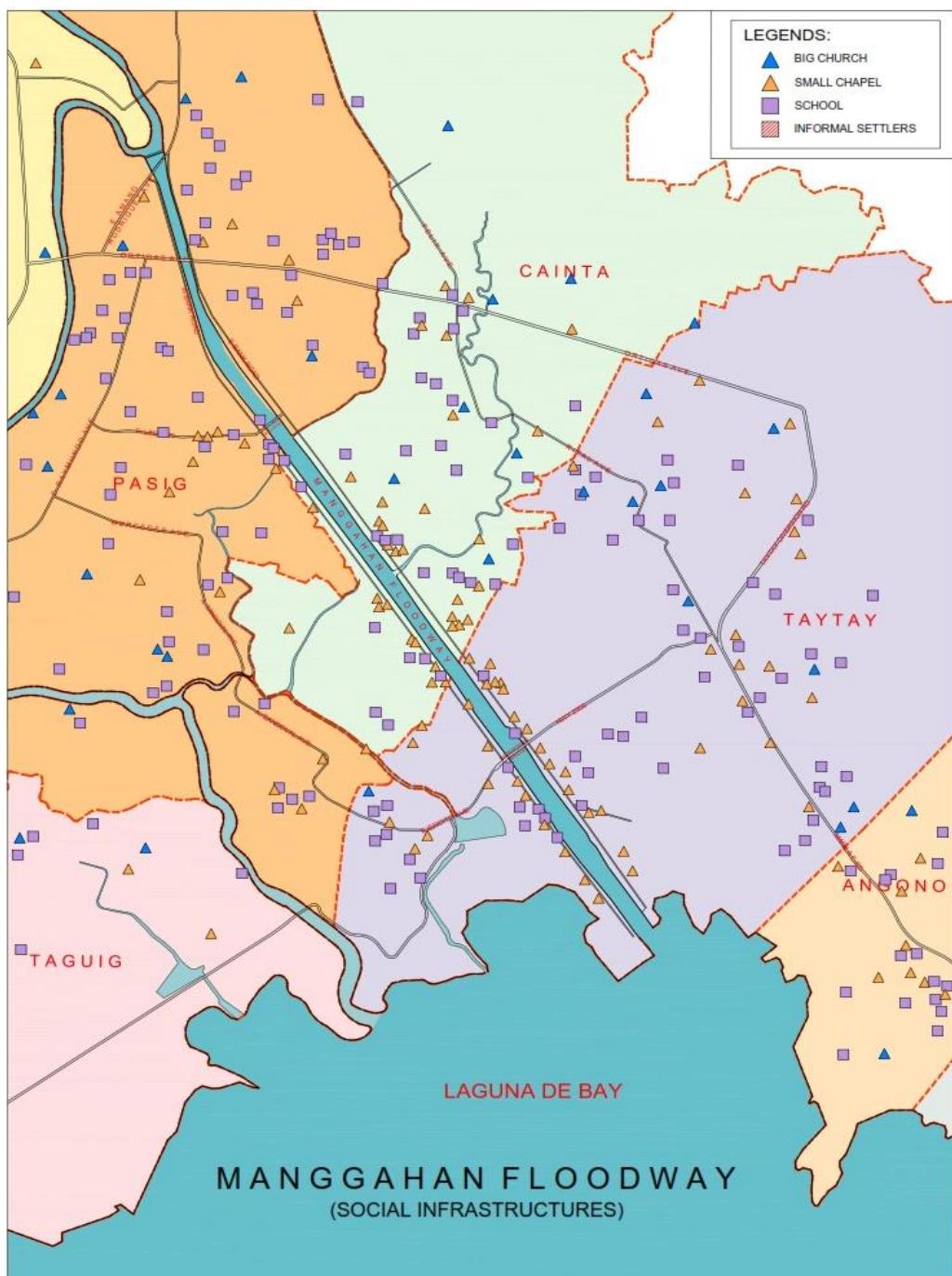


Figure 4.3.1. Locations of Religious and Educational Infrastructure along the Manggahan floodway; red area denotes scope of the study. (by author)

Table 4.3.1. List of places of worship in Barangay San Andres

	HOA (Homeowners Association)	Area (m <sup>2</sup> )	Total Places of worship (PoWt)	Functioning Places of worship (PoWf)	Total Area (m <sup>2</sup> ) for every PoW
East	ENAI	93,438	2	0	46,719
	PFCI	55,718	5	2	11,143
	Kabisig	188,303	9	4	20,922
	<b>TOTAL</b>	<b>337,459</b>	<b>16</b>	<b>6</b>	<b>21,091</b>
West	Lakas Tao	61,680	0	0	0
	Lakas Bisig	51,754	3	2	17,251
	Buklod Maralita	24,912	1	0	0
	Anak Pawis	24,824	0	0	0
	Upper Planters	35,439	9	6	3,937
	Lower Planters	30,189	1	1	30,189
	<b>TOTAL</b>	<b>228,798</b>	<b>14</b>	<b>9</b>	<b>16,342</b>

In exploring the quantity of places of worship in the area, places of worship in the dense informal settlements have separating distances that range from 300 meters to 1,000 meters. The two main places of worship of the community on the west bank, Sacred Heart of Jesus Chapel, and San Labrador Chapel, are approximately 1,500 meters apart. This distance provides a comfortable 750 walking radius for the community. While the St. Francis of Assisi chapel is the main catholic place of worship in the east bank, the farthest distance between the various places of worship in the area is less than 400 meters. In the process of mapping the different HOA sites, the geographical location and form of these areas provide a preliminary basis for determining the characteristic associated with flood risks. In addition, the responsiveness participation of the leaders is also a factor to be considered with which areas the survey is to be conducted.

**HOA areas of Brgy. San Andres:**

East Bank:	West Bank:	
PFCI	Lakas Tao	Anak Pawis
ENAI	Buklod Maralita	Lower Planters
Kabisig	Lakas Bisig	Upper Planters

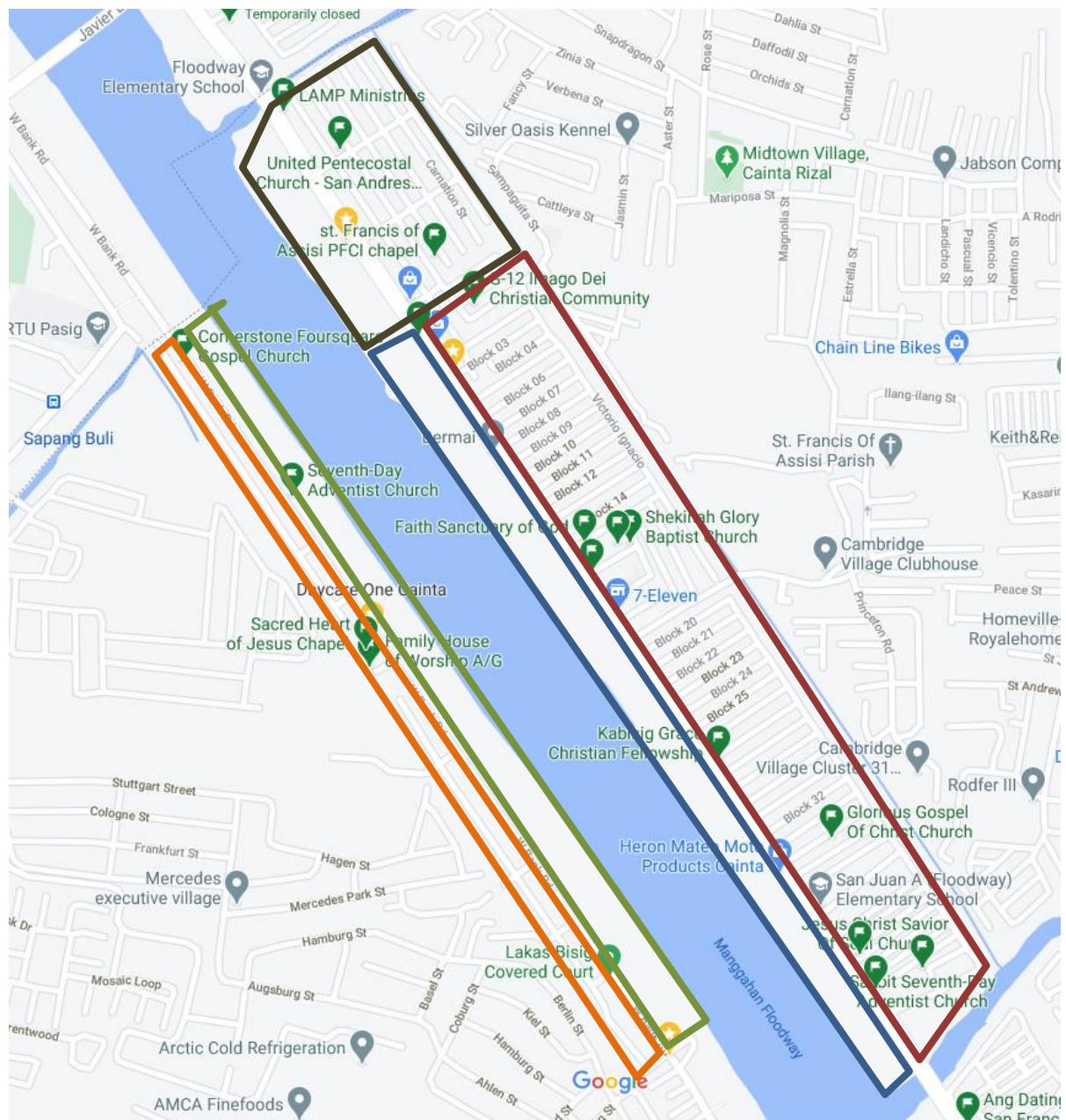


Figure 4.3.2. Upper Map of the different Homeowner associations in Barangay San Andres.

**HOA areas of Brgy. San Andres:**

<b>East Bank:</b>	<b>West Bank:</b>	
PFCI	Lakas Tao	Anak Pawis
ENAI	Buklod Maralita	Lower Planters
Kabisig	Lakas Bisig	Upper Planters

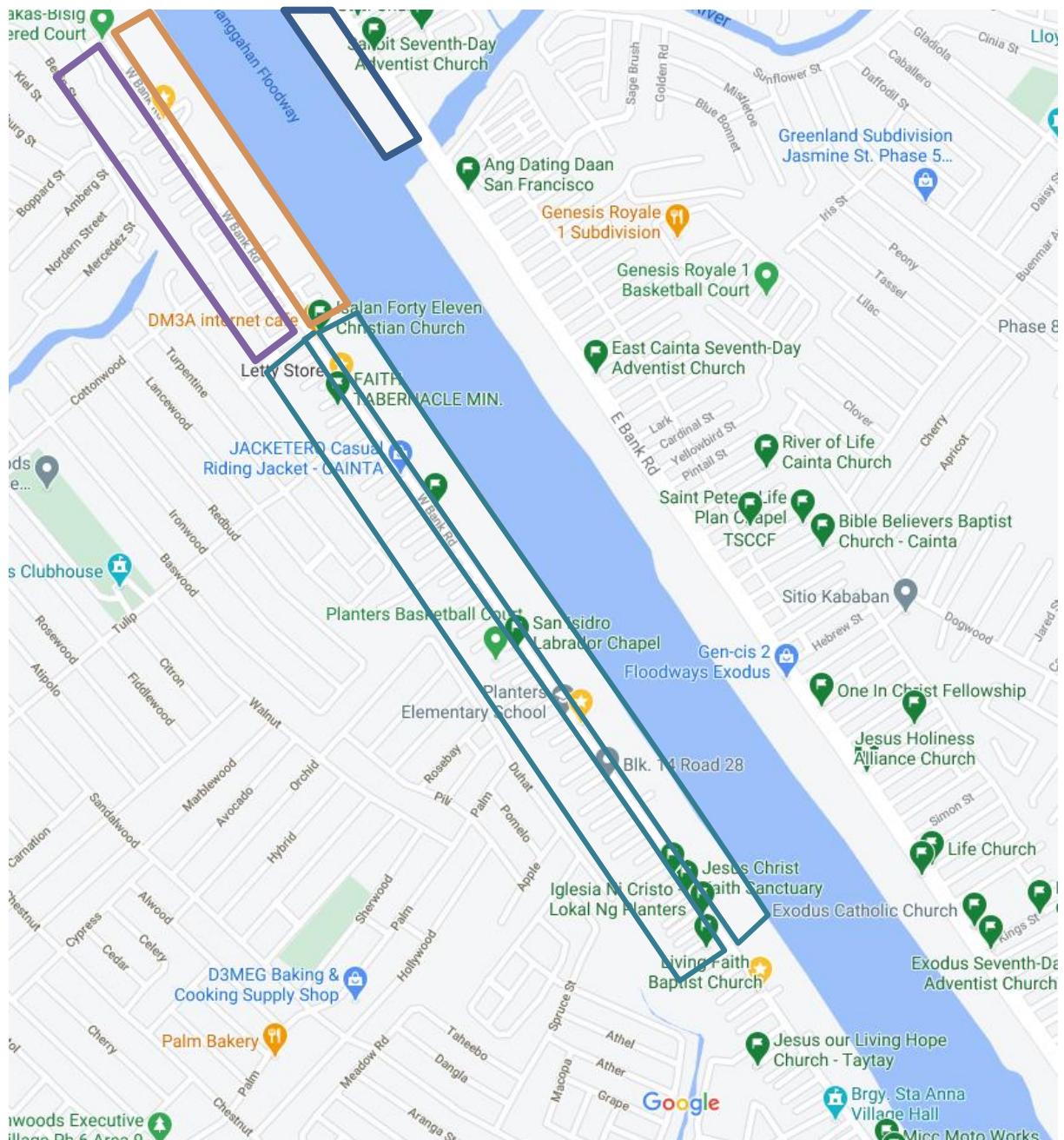


Figure 4.3.3. Lower Map of the different Homeowner associations in Barangay San Andres.

#### **4.3.1. Site Description of the Selected Survey Samples**

##### **The East Bank**

The east bank of Barangay San Andres along the Manggahan floodway is only composed of three homeowner's associations (HOAs). These HOAs include the Progressive Filipino Community, Inc. (PFCI), the Eastside Neighborhood Association, Inc. (ENAI), and Kabisig. The East bank Road, a two-way, four-lane, 20-meter-wide city road, serves as the main artery and access in the area. Most of the structures in the area are only 2-storeys high, with only some structures reaching a maximum of 4-storeys high. 3-meter-wide interior streets serve as access going to the Barangay all located at PFCI. The area can be described as a commercially vibrant community that includes convenience stores, beauty parlours, vulcanizing shops, hardware stores and food vendors. PFCI and ENAI were purposely selected for the survey due to their proximity to the floodway. Since the Kabisig HOA is located on a technically safe area, it was not considered in conducting the study for the survey.

##### *Progressive Filipino Community, Inc. (PFCI)*

PFCI is located northeast of Barangay San Andres along the Manggahan floodway. The importance of PFCI lies in its geographic location of the barangay hall. A vibrant wet market surrounds the barangay hall with a parish church and public basketball court adjacent to it. In comparison to other HOAs in the area, PFCI has the smallest number of households among the four HOAs.

##### *East-side Neighbourhood Association, Inc. (ENAI)*

ENAI is an elongated area that is bounded on the west by Manggahan floodway and the East bank Road on its east. The area is also defined by the Bull creek on its northern side and the Cainta River on its south side. As the setting of this area is considered temporary and hazardous, many structures here are built with wood, corrugated sheets, and concrete. While most structures here are considered makeshift houses, most are made of concrete, and some are built 3-storeys high. Due to its proximity with the barangay hall, no places of worship and barangay outpost exist in this area.

## The West Bank

The west bank of the Barangay San Andres along the floodway is composed of six (6) homeowner's associations (HOAs). These HOA's include Lakas Tao, Lakas Bisig, Buklod Maralita, Anak Pawis, Upper Planters and Lower Planters. The west bank is defined by a narrow two-way and single-lane road measuring 5 to 7 meters. The west bank could be described as denser and more festive with regards to its daily activities. While structures on both sides of the road are made of concrete and wood, many structures built along the no-built zones are built with reinforced concrete and measuring 6-10 meters high. The west bank could be comparatively more vibrant than that of the east bank due to the location of a tricycle terminal on the northern side of Lakas Bisig and Lakas Tao. At least two basketball courts and two places of worship are considered landmarks to the inhabitants of the community.

### *Lakas Tao*

Lakas Tao is located north of all the HOAs along the west bank of the floodway. While most HOAs have their own small commercial centers, a tricycle terminal is located in this area. Being located adjacent to the floodway, one needs to descend at least 3-5 meters from the main road before accessing to their inner roads. Similar with other HOAs located along the floodway, structures located in this area are considered illegal. The barangay outpost, where the HOA leader holds office, is located at the center of the HOA. As no places of worship exist in the area, most residents attend religious activities and assistance in their western neighbour, Lakas Bisig.

### *Buklod Maralita*

Being bounded by Lakas Tao and Lakas Bisig at the north and Lower Planters and Upper Planters in the south, the area is located at the center of the group of informal settlements of Barangay San Andres on the west bank of the floodway. Among the four HOAs in the places to survey, Buklod Maralita has the smallest land area and has the highest population density. Their HOA leader, Girlie Baliwag, serves as the head coordinator of all the HOA leaders in Barangay San Andres. A significant portion of the local population rent their spaces and pays approximately P1,000 – P3,000 pesos per month. While Buklod Maralita has a few places of worship in the area, most of the residents go to the Lower Planters to join various religious services and support from various organizations.

#### **4.3.2. Informal Settlements in the Philippines**

Slum settlements started in the Philippines as early as the 1920s and peaked during the 1980s wherein ‘wet settlements’ spread rapidly along waterways and coastal zones as construction of infrastructure intensified during that time (World Bank, 2017). Despite President Marcos signed a decree making “squatting” on land illegal (Karaos, 1993), the number of informal settlements increased. A factor that encourages Filipinos to ‘squat’ illegally could be attributed to their social or political will. Not only do informal settlements have a strong sense of community, but they consider themselves as citizens who has rights (Berner, 1997; Hunt, 1980; Racelis and Collado, 2008). Unfortunately, informal settlers often use political patronage or clientelism to assert their ‘rights’ to settle in an area (Hutchison, 2007; Kusaka, 2010). Strong community ties, active involvement in politics and some knowledge of the legal processes help informal settler survive and thrive to live in hazardous areas (Jocano, 2002; Porio and Crisol, 2004).

The above context gives us two views about informal settlements in the Philippines. First, they can adapt not only to the physical challenges of the land they occupy but also to its changing political and social environment (Cabalfin, 2016). Second, they are able to build different forms of resources and assets in asserting their rights and privileges. Far from being vulnerable to their environment, they have become its active participants towards improving their lives.

#### **4.3.3. Places of Worship in the Built Environment of the Study Area**

The current condition of the informal settlement is located along the two roads that are confined the boundaries of the floodway – the East Bank Road and the West bank road. Most of the houses are arranged in a grid-type layout, revealing the spaces to be planned for low-cost dwellings. Basic infrastructure is apparently available and accessible to all the residents of the area. Some electrical utility lines and water distribution systems are installed in compliance with legal laws, but many are fixed in a disorderly manner. The proliferation of neighbourhood sundry stores (Sari-sari stores), barber shops, small wet markets (talipapa) , and small food stalls (carinderia) are plentiful and mainly characterize the streetscape along the two roads, especially along the West bank road. Most residential dwellings and buildings are characterized by steel gates, concrete walls, and corrugated galvanized-iron roofing. Most buildings are one to two-storeys high with a few exceptions of poorly built three-storey high buildings.

Places of worship are found quite abundantly in the area with some churches are found to be only 200 meters apart. Currently there are nine (9) places of worship along the west boundary of the floodway, while there are sixteen (16) places of worship on the eastern side. The average density of places of worship along the floodway is approximately one (1) places of worship for every thirty (30) hectares of community space.

The pictures below show the places of worship of the three (3) major community religions, such as Iglesia ni Kristo, Roman Catholic and Seventh Day Adventist, in the selected research study area. (See Figures 4.3.4 to 4.3.6)



Figure 4.3.4. Iglesia ni Kristo church Chapel



Figure 4.3.5. San Isidro Labrador



Figure 4.3.6. Seventh-Day Adventist Church

## 4.4. Phase I – Qualitative Case Study Research

Qualitative research is often associated with interpretive and holistic inquiry of human understanding. Usually consisting of the existence of multiple realities, data are often shaped by the local context and experience of the participants (Henry, 2015). However, clarity of assumptions is needed in defining the issues that the research is to tackle. In demonstrating rigor in qualitative research, data is characterized by credibility and validity of the theories and research design used the study. On the other hand, research data types that is intangible (e.g., how places are being used) may be driven by changing circumstances or transformed by shifting community-related motivations and incentives (Dellinger & Leech, 2007). Thus, in assessing the social dimension of places of worship, the research would initially need to explore the characteristics of how these spaces are being used through a social resilience framework.

### 4.4.1. Phase I - Data Collection

Case-study research requires an in-depth study of the experiences, practices, and activities of a certain context, in this case, social resilience in urban areas. However, a unit of analysis is needed to properly assess and analyse these theories and concepts. **The unit of analysis** to be used in this research is the administrative division called a barangay. While a barangay is the smallest administrative division or local government unit (LGU) in the Philippines, barangays are sometimes further divided into smaller “zones” (or ‘sitiis’ or ‘purok’) for organizational purposes (PSA, 2020). Barangay San Andres is composed of zones such as Lakas Tao, Lakas Bisig and Bagong Silang among the few (see table). In the case of barangay San Andres, its ‘zones’ are designated by homeowner associations or their affiliation to their religious organizations.

The government authorities and community leaders that are involved in managing hazards and disasters in the community were selected for in-depth interviews. These respondents, being involved in a broader perspective of how resources are being used, were determined most appropriate in providing a more detailed insight to the use and management spaces in places of worship.

### Collection of Data from Key Informant Interviews (KII)

An Interview approach was used to explore key issues in the Barangay of San Andres, Cainta Rizal, through examining the use of places of worship in a social resilience framework. As part of this study, the researcher targeted a small group and conducted

personal interviews with barangay and church leaders. As the use of interview is considered both an appropriate and effective method for data gathering, a 30-minute time limit is set to provide precautionary measures during the COVID pandemic.

The study is partially exploratory in approach, where the research tries to explore barriers to the usage of the places of worship space during disasters. The researcher was driven by the interest in exploring an emerging concept of social resilience and doing the interview was an excellent vehicle for generating discussion on the topic. Also, the interviews were supported for understanding the role of places of worship for disaster management responses. The study also employs a partial form of explanatory approach in mixed methods research design with which it applies the six (6) dimensions of Saja et al.'s (2018) social resilience framework in assessing the role of places of worship in the context of disasters. These indicators include the dimensions of social structure, social capital, social values, social equity, social beliefs, and the social innovation of the users in using the spaces of places of worship in the context of disaster management.

### **Sampling Method**

Sampling is the process of selecting a limited number of populations from a large group of population data nonetheless the characteristics of the sample data taken is identical to the population. As challenges arise in selecting a vulnerable site in a disaster-prone country of 7,000 islands, the aim of the sampling is to identify the resilience of the sample towards risks and effects of disasters. By initially selecting a sample site in a densely populated urban area in the National Capital Region of Manila, the study can acquire a sample that is convenient to access for the researcher and provides an intensive and complete form of data collection to the research. Being located along the banks of the Manggahan floodway, the site in Barangay San Andres is able to exhibit how the limited resources and infrastructure in the area are utilized and developed. In conducting the research however, the location requires the researcher to establish adequate rapport with the respondents, especially when the data collection is done during the time of the pandemic.

Through an initial ocular visit and familiarization of the demographics on the study site, it was found that majority of the community leaders are composed of women. Since the reliability of the sample depends on the suitability of the sampling method used, the study uses stratified sampling to include the responses of people from the different stratum of the community. These echelons include the community leaders, religious leaders, government

officials, and the residents of the community. As an imbalance of gender responses could be arise in the gathering of data, this issue will be addressed at the stage of data analysis.

Due to the consequent pandemic situation, it is the purpose of this data collection to make sampling more efficient. Challenges may arise from selecting, estimating, and managing the samples collected from the site. By requesting for the help of community leaders and their assistants from four (4) different areas to disseminate survey questionnaires assists in acquiring faster response rates from the community. However, managing responses such as incomplete answers and repetition of answering survey forms require additional quantities of distribution in attempt to achieve at least 400 valid responses. In addition, the researcher used purposive sampling for the interview and Cochran's formula in determining the sample size of the survey for each of the four sites in Barangay San Andres.

The study discerns purposive sampling as the most appropriate approach in the qualitative research on the use of places of worship. Purposive sampling are used in selecting respondents by getting significant representation by various age groups, gender, and if needed, by religious affinity (Etikan, Musa and Alkassim, 2016). The *profile of the key informants* would be individuals who are familiar, well-experienced and key decision makers to the research phenomenon of disaster management in the community.

By using a *purposive stratified type of sampling*, sample size for phase one is 30 key informants, but with a minimum of 15 considering the pandemic situation. Interviewees include community leaders and church leaders that could provide differing meanings, perceptions, and motivations of the community residents concerning their respective places of worship (See Table 1.). Informants should also include respondents that oversee areas from both sides (i.e., east bank and west bank) of the floodway (See Map of HOAs in Barangay San Andres).

*Group composition and recruitment.* Twelve (12) Barangay leaders in the San Andres, Rizal and four (4) Church leaders were interviewed by the researcher on this study. Each participant was contacted by text message at least one (1) day before the interview to serve as a reminder. As an incentive, participants in this study were treated a pizza after their interviews took place. Home-made perfume and Eng Bee Tin Hopia were given to them as tokens of appreciation. Though incentives were offered, but no coercion of any kind was used to prompt participation, nor were there any costs for participants.

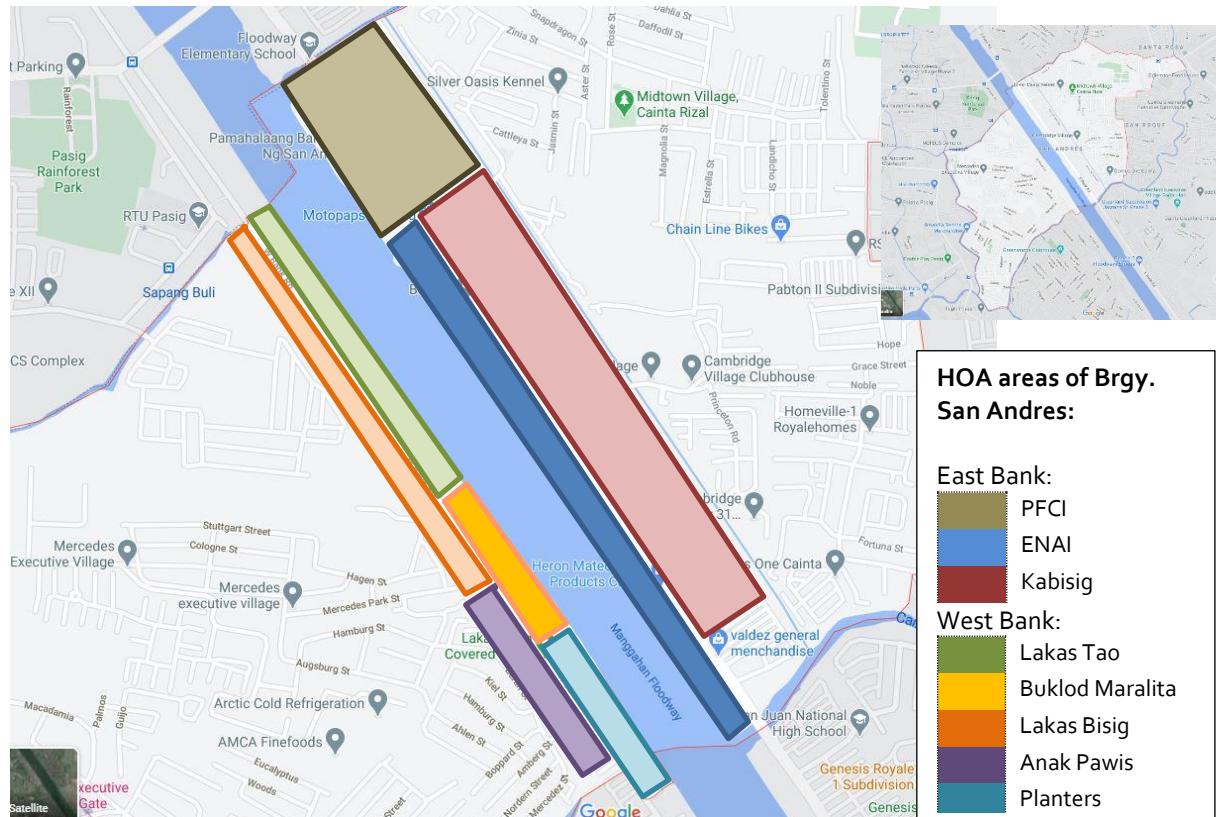


Figure 4.4.1. Location of the different HOAs in Barangay San Andres, Cainta, Rizal, Philippines

*Interview protocol and logistics.* The researcher chose the Barangay office as the site of the interviews because it was considered a neutral place with a minimal number of distractions. The interviewer and interviewees wear face mask and face shields during the interview, following COVID-19 health protocols. At the beginning of the discussion, the participants completed a short registration form that requested information regarding demographic characteristics, including designation, age, gender, and religion.

*Challenges* encountered in finding key informant interviews (KII) include the availability of government officers and community leaders during a pandemic. While some community leaders declined to be interviewed due to their busy schedule, other leaders tend to refer other fellow officers which they deem more authoritative and influential in the aspect of places of worship.

**Table 4.4.1. List of interviewees and their respective positions and characteristics**

Category	Position	Location	Count
Barangay officials	Barangay Administration Aide	East bank	1
	Barangay Disaster Relief Officer (B-HERT)	East bank	2
	Barangay Councilor	East bank	3
	Barangay HOA Coordinator HOA President – Lakas Bisig	West bank	4
Community leaders	HOA President – ENAI	East bank	5
	HOA President – PFCI	East bank	6
	HOA President – Lakas Tao	West Bank	7
	Secretary – Anak Pawis	West Bank	8
	HOA President – Lakas Tao	West Bank	9
	ENAI – Treasurer	East bank	10
	ENAI – Vice-president	East bank	11
	HOA President – Planters	West Bank	12
Church leaders and members	Parish Coordinator	West Bank	13
	Chapel Coordinator	West Bank	14
	Chapel Coordinator	West Bank	15
	Church Worker	East Bank	16

#### **4.4.2. Phase I - Development of Questionnaire**

The development of the questionnaire is largely based on the social resilience dimensions of Saja et al.’s (2018) social resilience framework. However, this section also discusses how the questionnaire is affected by the language, social status, and education. The length of the interview is also highly influenced by the limited time of interaction caused by the COVID-19 pandemic.

#### **Interview Process – How Interviews were Conducted**

Interviews were conducted from October 2020 to December 2020. The conversation of the interview was mostly conducted in Tagalog and then professionally translated from Tagalog to English. Each respondent was initially asked a binary question. Afterwards, each of the seven interview questions was followed up by a “why” question that may provide some insight to some, if not all, of the dimensions of the social resilience framework. They were given ample time to answer each question and expound on their experiences. Each one-on-one interview ranged approximately from thirty (30) minutes to forty-five (45) minutes, whereas group interviews lasted for more than one hour. All interviews were recorded with the permission of the interviewee. These responses were translated and compared side by side for analysis as not to lose any meaning that was originally intended by the respondent. A ‘long table format’ was used to compare the respond to each of the seven (6) main questions and four (4) sub-questions to verify the positive or negative leanings of the respondent (Lange, 2002).

To determine reliability, the researcher used prepared analysis sheets independently to review the transcripts and field notes. The data were analysed initially by looking for major themes, sub-themes, and variations in the comments from participants. Key issues had been previously identified by the researcher. In addition, the participants' comments were analysed for their similarity or disparity with the comments of their barangay and church leaders.

### **Contents of the Questionnaire**

The questions of each interview are based on the 6 different categories listed in table 4.2.2. based on a modified social resilience framework by Saja et al. (2018). Appendix-A lists down the preliminary questions that was intended for the interview but was compressed into a more concise format that can cover all dimensions of the resilience framework and allow shorter periods of interview.

**Table 4.2.2. Social dimensions to be used for the interview questions.**

Indicator	Social Resilience Indicator
Indicator A	Social structure, mobility, access, and transportation facilities
Indicator B	Social trust in disaster preparedness/ response and recovery
Indicator C	Social values and place attachments
Indicator D	Social equity among the community during disasters
Indicator E	Social beliefs and culture that promote or impede disaster resilience
Indicator F	Social innovation

The wording and the intent of each question is simple, direct, and designed for participants with different educational backgrounds. The interview guide is divided into two questions regarding the mode of required answers. The first set of close-ended questions pertains to the discussion of the objectives of the study. Questions 1-2 answers objective #1, questions 3-5 answers objective#2, and question 6-7 answers objective #3. The probing questions (open-ended) of "how" and "why" were asked to reinforce the various dimensions presented and discussed under the questionnaire. Online video conferencing was initially prepared to be conducted due to the current pandemic but limited technological know-how and systems of key informants have required the researcher to do face-to-face interview following safety protocols. Using in-depth interviews are considered suitable in conducting an exploratory approach in the research of places of worship as it delves into various perceptions on how spaces are used from different points of view.

**Table 4.4.2. Final Format of Interview Questions.**

Interview Questions	Legend	Social Indicator
1) Do you think that having a place of worship in a community is important? Why?	Q1	Social structure
2) Do places of worship in your area be used in times of disaster? How?	Q2	Social structure
3) Does the place of worship affect you...How?		
a.) socially	Q3a	Social Mechanism
b.) mentally,	Q3b	Social Mechanism
c.) physically	Q3c	Social Capital
d.) spiritually?	Q3d	Social Beliefs
4) Do places of worship provide assistance in the community to cope with disasters? How?	Q4	Social Capital
5) Do places of worship hold activities that prepare the community in facing disasters? How?	Q5	Social Mechanism
6) Do places of worship conducting virtual place of worship that can help the community in facing disasters? How?	Q6	Social Innovation
7) Do you think there are ways that places of worship can strengthen assistance in times of disasters? How?	Q7	Social Equity

#### **4.4.3. Phase I - Data Analysis**

The analysis of the Interview was discussed based on three phases. The first phase of the analysis includes the contextual thematic analysis of the respondents through the identification of positive and negative inclinations of their responses. The analysis is categorized based on the questions derived from the semi-structured interview. Identification of key words corresponding to their social dimensions were identified using thematic analysis. A thematic analysis is an inductive and qualitative type of data analysis that identifies emerging patterns from the data. Thematic analysis is also more useful for interpretation and creation of latent content (Braun and Clarke, 2014).

A discourse analysis was initially intended to understand the natural conversation of the interview and understanding social interactions of the respondents and the use of places of worship (Barker and Galasinski, 2001). However due the limited amount of time for interaction during the COVID pandemic, data from interviews are maybe inadequate. Wherein the type of language, context and 'thread of language' (Gee, 2004) are important guides to the interpretation of the conversations in the interview, the context of how the respondents are interviewed and their locations are considered in the analysis.

The second phase of the analysis includes the exploration and identification of manifested themes through content analysis using the word frequency capability of NVivo software (Vaismoradi, Turunen and Bondas, 2013). This step facilitated a cross-check on coding accuracy by alphabetizing common phrases such as “church...” (66 times in total) and “disaster...” (25 times in total). Many respondents utilized common terminology in expressing their concerns. Some used singular and plural terms varied slightly, such as “donation” and “donations”. The resulting quantitative data were used to convert comments into “input terms” to generate Word Clouds to increase comprehension and accessibility through visualization of the written responses. Content analysis can be defined into quantitative and qualitative content analysis (QCA). QCA is predominantly descriptive in approach and is discussed in categories, while a more interpretative approach would include themes (Patton, 2015). Types of content in content analysis include manifest and latent. Manifest content is easily recognizable through quantitative word count or codes and is commonly used on communication studies. In contrast, latent content requires more interpretation of the data and is usually associated with thematic analysis (Braun and Clarke, 2006).

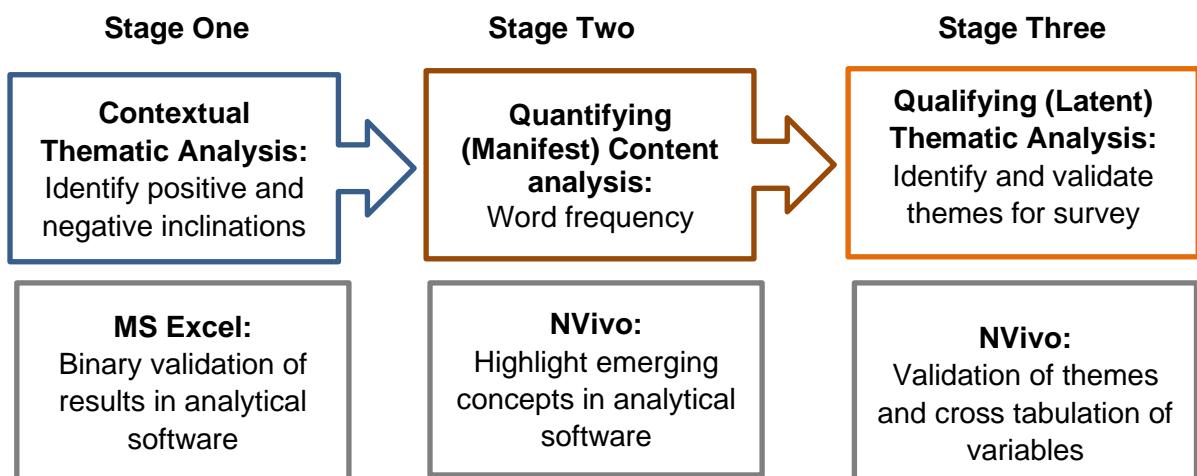


Figure 4.4.3. A Three-phase approach in analysing key informant interviews

The third phase of the interview analysis includes the categorization of validated themes that have emerged from the word frequency in stage two. In addition, another level of word frequency is conducted based on the social resilience conceptual framework. This phase helps to identify significant differences of the responses with regards to independent variables through a ‘concept-driven’ deductive approach in qualitative content analysis (Graneheim, Lindgren and Lundman, 2017). A cross-tabulation of the independent variables (e.g., age, gender, religion) are also presented as to provide additional insight into possible biases that may arise from the interviews. These variables are analysed in contrast to the responses in the various social dimensions.

## 4.5. Phase II – Quantitative Survey

### 4.5.1. Location and Sampling

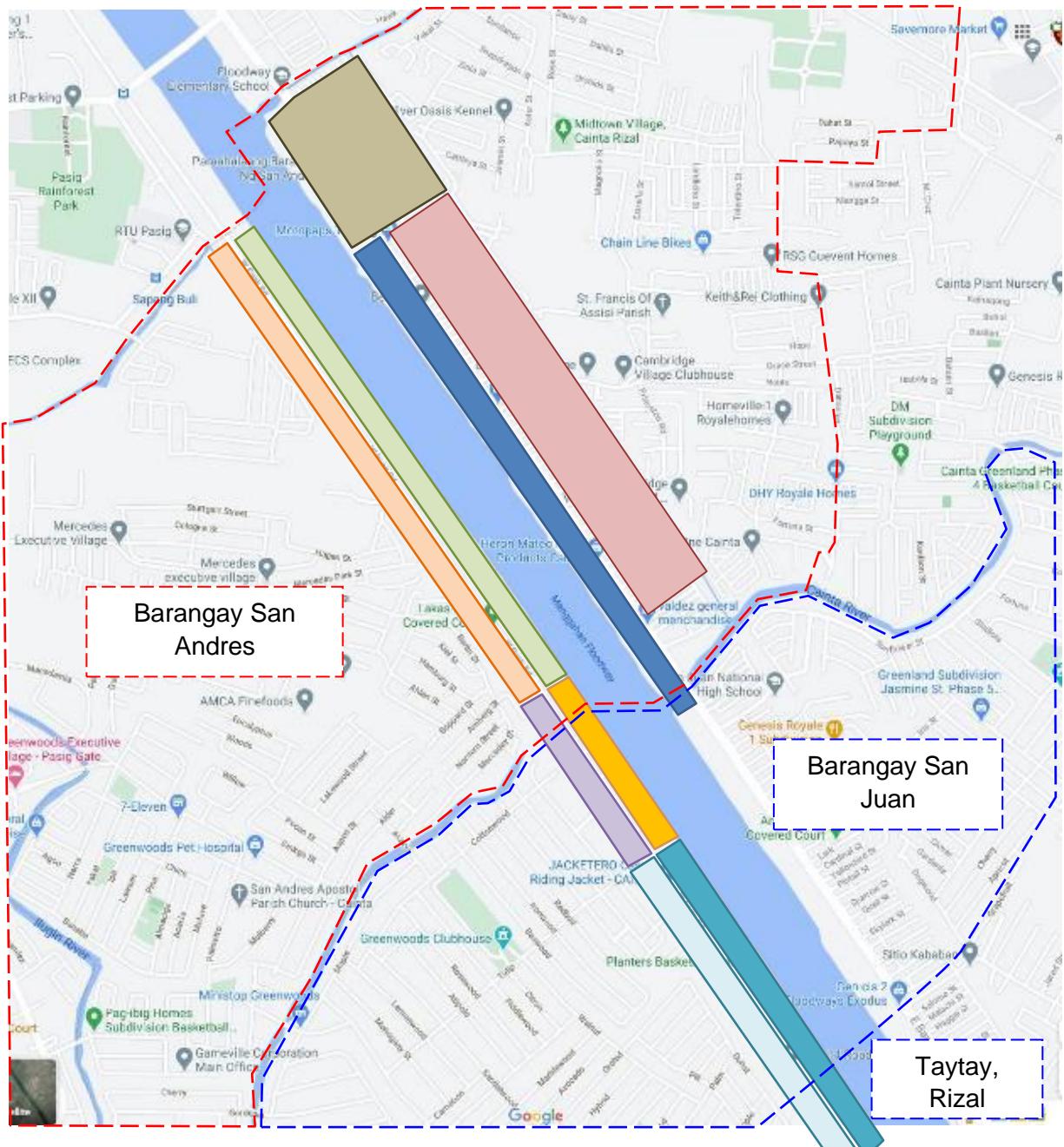
After the qualitative data collection, another sample for Barangay leaders was selected by purposive sampling techniques. Purposive sampling of the Barangay leaders was necessary to ensure that respondents had adequate knowledge of their area, as mentioned by Creswell (2009). Samples for the survey were distributed separately to include both sides of the floodway to provide a balanced understanding of different uses of spaces in places of worship.

The Homeowners Association (HOA), under the control of Brgy. San Andres Cainta, Rizal, is divided into nine areas that are located on both sides of the floodway, the East and the West Bank. It is noteworthy that the scope of the HOAs overlaps into the territories of other political areas in the nearby areas, extending to Brgy. San Juan and to the municipality of Taytay, Rizal. Currently there is no recorded official HOA boundary maps at the Barangay Hall, thus the researcher has to create one based on the existing landmarks and the unified explanation of the barangay officials and HOA leaders. In addition to designation of areas, HOA areas are also defined by the names of the alleys and streets that they govern (See Table 4.5.1.).

**Table 4.5.1. List of Homeowner associations under the jurisdiction of Barangay San Andres. (2021)**

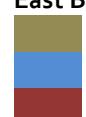
	HOA (Homeowners Association)	Area (km <sup>2</sup> )	Street names	Leader	HH (Household s)	Density (HH/km <sup>2</sup> )*
East	ENAI (Eastside Neighbourhood Association, Inc.)	0.093	Blocks	TS	2,750	29,569
	PFCI (Progressive Filipino Community, Inc.)	0.055	Flowers	RN	550	10,000
	Kabisig	0.188	Blocks	MM	4,200	22,340
West	Lakas Tao	0.061	Alleys 1-85	LS	1,800	29,508
	Lakas Bisig	0.051	Names	JN	2,870	56,274
	Buklod Maralita	0.025	Fruits	GB	1,000	40,000
	Anak Pawis	0.025	Flowers	BD	NA	NA
	Upper Planters	0.035	Vegetables	RS	2,000	57,142
	Lower Planters (BERMAI)	0.030	Roads	VB	2,226	74,200
<b>TOTAL</b>		<b>566,257</b>			<b>4,226</b>	

\*Number of household per square kilometer; To provide a perspective, the average population of the region of Macau is at 21,339 persons/ km<sup>2</sup>.



Source: [www.googlemaps.com](http://www.googlemaps.com)

HOA areas of Brgy. San Andres:

**East Bank:**  
  
 PFCI  
 ENAI  
 Kabisig

**West Bank:**  
  
 Lakas Tao  
 Buklod Maralita  
 Lakas Bisig  
 Anak Pawis  
 Lower Planters  
 Upper Planters

Figure 4.5.1. Location of areas where the survey questionnaire was conducted.

### Sampling Method

The four (4) Homeowners Association (HOA) of Barangay San Andres Cainta, Rizal has a total population of 6,100. It is divided into East Bank and West Bank. East Bank has 3,300 members from PCFI and ENAI while West Bank has 2,800 members from Buklod Maralita and Lakas Tao. The following table summarizes the computed distribution of the survey questionnaire in each HOA. Of the 481 questionnaires distributed, 409 were collected making for 85.0% response rate.

**Table 4.5.2.: Survey Form Distribution computation**

HOA		Leader	Members	Proportion	Percentage	Distribution
East	ENAI	TS	2,800.00	0.4590	45.9%	221
	PCFI	RM	500.00	0.0820	8.2%	39
West	Buklod Maralita	GB	1,000.00	0.1639	16.4%	79
	Lakas Tao	LS	1,800.00	0.2951	29.5%	142
	<b>TOTAL</b>		<b>6,100.00</b>	<b>1.00</b>	<b>100%</b>	<b>481.00</b>

The Cochran formula allows the researcher to calculate an ideal sample size given a desired level of precision, desired confidence level, and the estimated proportion of the attribute present in the population. This formula is considered in situation with a large population such as Barangay San Andres of Cainta Rizal. The Cochran formula is:  $n_0 = (Z^2 \times pq/e^2)$

Where:

- $e$  is the desired level of precision (i.e., the margin of error),
- $p$  is the (estimated) proportion of the population which has the attribute in question,
- $q$  is  $1 - p$ .
- The z-value is found in a Z table.

If the population being studied is small, the researcher can change the sample size calculated in the above formula by using this equation:  $n = [n_0/(1+((n_0-1)/N))]$ .

The sample size formula is derived from Cochran's statistic. The respondents who will represent the San Andres Barangay who may consider that the places of worship contribute either in enhancing or impeding social resilience and the use of places of worship space in times of disasters. Also, the initial computation for the retrieval rate was 95% ( $n=405$ ) but there may be challenges due to Covid-19, so the sample size ( $n=485$ ) was adjusted to consider the 80% retrieval rate in answering the survey. The probability proportional to size (PPS) sampling was used to compute the number of respondents per HOA.

To estimate the sample size, three issues need to be studied such as (1) the level of precisions, (2) confidence or risk level and (3) the variability. The more heterogeneous a population, the larger the sample size required to obtain a given level of precision. The less variable (more homogeneous) a population, the smaller the sample size. Note that a proportion of 50% indicates a greater level of variability than either 20% or 80%. This is because 20% and 80% indicate that a large majority do not or do, respectively, have the attribute of interest.

Detailed findings are followed by a full methodology and an appendix containing a survey questionnaire with response totals. On this questionnaire the researcher asks number of different questions in order to produce both qualitative and quantitative data. Tables included in the text of this report highlight selected relevant survey findings and are expressed in percentages. The base for each table is all respondents (N=409) unless otherwise noted. Survey questions require the participation to select one answer from a predefined list of 5 options- strongly agree to strongly disagree.

**Table 4.5.3. Survey Form Distributions and Collections**

	HOA	Members	Proportion	Percent	Distribution	Collection	Variance	Percent
<b>East</b>	ENAI	2,800.00	0.4590	45.9%	221	196	88.77%	47.9%
	PFCI	500.00	0.0820	8.2%	39	36	91.31%	8.8%
<b>West</b>	Buklod Maralita	1,000.00	0.1639	16.4%	79	58	73.56%	14.2%
	Lakas Tao	1,800.00	0.2951	29.5%	142	119	83.84%	29.1%
	<b>TOTAL</b>	<b>6,100.00</b>	<b>1.00</b>	<b>100%</b>	<b>481.00</b>	<b>409.00</b>		<b>100%</b>

#### **4.5.2. Development of Survey Questionnaire**

In conducting the survey in the specified four areas along the Manggahan floodway, creating fast and simple questionnaires is important in conducting surveys during the COVID-19 pandemic. While many methods of scaling questionnaires are available, the way questions are worded is important so as not to overwhelm the respondents (Punch, 2013). Using the Likert scale provides easy to understand questions to the respondents in informal settlements. While a 7-point scale is slightly more accurate than the 5-point system, the benefits is realized in few response items and very large sample sizes (Saur, 2010). While some studies have criticized the use of Likert scales in statistical tests because the space between each option cannot be equal to the same value. Thus, it fails to measure the true attitude of the respondents. However, Norman (2010) found ordinal tests can still be reliable and valid since it does not force the participant to stand on a particular topic but allows them

to respond to a level of agreement. A 1 to 5-point Likert scale is used to measure the use of places of worship in Barangay San Andres against the six (6) dimensions of social resilience. Appendix E shows the sample questionnaire given to the participants of the survey. The survey questionnaire contains both qualitative and quantitative data. The questionnaire is composed of three (3) parts: the first part is composed of nine (9) profile questions of the participants to ensure uniqueness of each response, the second part has 16 questions, and the third part is an open-ended question for the respondents to expound on other issues not mentioned in the questionnaire. It is estimated to take 10-15 minutes to complete the survey.

**Table 4.5.2. Five-point Likert scale segregated into 5 areas.**

Criteria for evaluation	Five-point scale				
	1	2	3	4	5
1. Infrastructure	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
2. Supports					
3. Provisions					
4. Innovations					
5. Open-ended question					

#### **4.5.3. Survey Data Analysis**

After conducting the survey from the four locations of Barangay San Andres, the study uses a three-stage approach in analysing the social resilience survey. The three stages comprise of the following: (1) Raw results, (2) Descriptive and inferential statistics, and (3) Structural Equation modelling (SEM). Survey data was be encoded manually through google sheets and compiled in MS Excel and encoded in IBM SPSS.

##### **4.5.3.1. Quantitative Analysis Stage I – Survey Results**

In the first stage of the quantitative analysis, analysis was carried out on respondent characteristics. Statistical analysis is a useful strategy that allows us to reduce the data collected from participants into a summary number, thus allowing us to make meaning from the results. (Fisher and Marshall, 2009, p. 97) Respondent characteristics include age, gender, religion, and their geographic location along the Manggahan floodway. By initially describing how these characteristics can represent the results of the survey, the succeeding stages would help verify possible questions that may arise from the initial results of the survey, such as the difference of response from different gender or religion. Stage one of the quantitative analyses concludes with a heat map to summarize the results of the survey. Heat maps help visualize which areas, or dimensions of social resilience, that describe the

inclination of the respondents towards their use of places of worship during a disaster. As the questionnaire is designed for easier comprehension, each question is then coded and reorganize according to their respective social dimension for the next stages of quantitative analysis.

#### 4.5.3.2. Quantitative Analysis Stage II – Descriptive Statistics and Inferential Statistics

Descriptive statistics and inferential statistics are used for the second stage of the study's quantitative analysis. This section discusses the aims and the processes of descriptive and inferential statistics. Afterwards, the application and suitability of parametric and non-parametric tests to the study are discussed.

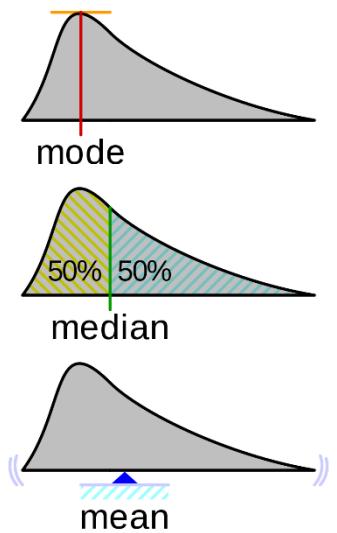
**Table 4.5.3.2.1. Comparison table of Descriptive and Inferential Statistics.**

Basis for Comparison	Descriptive Statistics	Inferential Statistics
Definition	Descriptive Statistics is that branch of statistics which is concerned with describing the population under study.	Inferential Statistics is a type of statistics, that focuses on drawing conclusions about the population, based on sample analysis and observation.
Purpose	Organize, analyze, and present data in a meaningful way.	Compares, tests, and predicts data.
Result	Charts, Graphs and Tables	Probability
Usage	To describe a situation.	To explain the chances of occurrence of an event.
Function	It explains the data, which is already known, to summarize sample.	It attempts to reach the conclusion to learn about the population that extends beyond the data available.

#### Descriptive Statistics

Descriptive statistics are used to describe the basic features of the data in a study. These figures provide simple summaries about the sample and the measures. Along with simple graphical analysis, these form the basis of every quantitative data analysis.(Acquaye, 2017). Descriptive statistics provide a summary about the sample data by analysing three main types: the distribution, the central tendency, and the dispersion. The distribution is related to the frequency of each value. The data set consists of a distribution of values or scores. Tables or graphs summarize the frequency of each possible value of a variable in numbers or percentages.

In the second type of descriptive statistics, **the measure of central tendency** is understanding the values at the centre of the distribution represented by a single value. These values include the mode, the median, and the mean. By measuring the central tendency of the data, the study can verify whether the bell-shape of the data is normally distributed or skewed. By identifying the bell-shape of the distribution curve, the study can deliver an image of the population's 'disposition' in the use of places of worship in disaster management.



In discussing data dispersion, this describes how spread out the response values in the central tendency. The range, standard deviation and variance reflect different aspects of the spread. The range is used to get the idea of the spread or extent of data collected in informal settlements, standard deviation defines where the bulk of the responses lie in the population (e.g., gender, age, location). The purpose of describing the data dispersion is to verify whether the variability of the survey data is a characteristic of the scope of the study or due to observational error. By discussing the characteristics of data dispersion, the study verifies the parameters used in assessing social resilience in urban areas and informal settlements whether they may differ from other members of a population of a different social status, income, or religion.

Figure 4.5.2. The mode, median and the mean.  
(Source: Cmglee - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=38969094>

## Inferential Statistics

The study also uses inferential statistics with an aim to discover a general pattern about the usage of places of worship of residents in informal settlements in the municipality of Cainta, Philippines. Inferential statistics enables the researcher to make data descriptions, derive estimates and draw inferences and conclusions from the respective data. Through inferential statistics, it is possible to conclude what the population may think or how it's been affected by taking sample data. Generally, the methods of inferential statistics are (1) the estimation of parameter(s) and (2) testing of statistical hypotheses. The following types of inferential statistics are extensively used and relatively easy to interpret such as: Confidence Interval, Chi Square Statistic, T-test or Anova, Pearson Correlation and Regression.

As the goal of inferential statistics is to draw certain conclusions from the population, the study provides a 95% confidence interval computed at the 95% confidence level, with

409 valid responses, to accurately reflect the characteristics of the population. The main types of inferential statistics used in this study are hypothesis testing and confidence intervals. While statistical inferences are about making propositions about a population, the degree of assumption (e.g., parametric, non-parametric) needs to be distinguished as this would define the type of statistical process the study will use.

### **Using Parametric and Non-parametric Tests**

Based on stage I of the quantitative study, some of the social dimensions exhibited skewed distribution in the responses such as those in social equity. (Norman, 2010) suggests the use parametric tests on skewed and non-normal distributions. One reason for using parametric tests is its ability to have a higher statistical power, the probability of a test to find significant difference in the sample. However, inferences about population parameters are may not valid if not all assumptions of a parametric data set are not met. In addition, reasons to use non-parametric tests emerge when the research does not need to assume that the data or population have any characteristic structure. Ordinal data and ranked data are also best analysed through non-parametric methods, especially when the research cannot remove the outliers in the data (Campbell and Swinscow, 2010) . As the data from the study was derived using a Likert scale, the use of non-parametric tests is more applicable for the study. Likert scale is a non-parametric data, or ordinal data, data that is based on categories. Campbell and Shantikumar (2016) suggests the use of the Wilcoxon rank sum test and the Kruskal Wallis test for non-parametric data (See Table 4.5.3.2.2.).

**Table 4.5.3.2.2. Parametric and non-parametric test for comparing two or more groups**  
(Campbell and Shantikumar, 2016)

Parametric test	Non-parametric test	Number of variables
Paired t-test	Wilcoxon signed rank test	Two
Unpaired t-test	Mann-Whitney U-test	Two
Pearson correlation	Spearman correlation	Two
One -way analysis of variance (ANOVA)	Kruskal Wallis H-Test	More than two

### **Defining the Hypothesis**

Hypothesis testing is used in a survey to assess whether the results are valid by determining the plausibility of a hypothesis. The first step in formulating the hypothesis starts with the verifying the significance of the responses by validating the influence of their

independent variables such as age, gender, and location. Would these variables significantly influence how the interview questions are answered and discussed? The second step in defining the hypothesis involves in preliminary understanding the context that the research is being conducted. Would the dominantly female community leaders influence how they respond to their use of places of worship? Does their age and location affect how they perceive the disasters risks that are present in their community?

The third step involves specifying the specific population parameters that would be conducted in the research. These parameters include understanding the variance, standard deviation, and median of the specific population in the four (4) different informal settlement sites in Barangay San Andres, Cainta, Philippines. Thus, hypothesis testing is used to calculate the coefficient of variation and determine if the regression relationship and the correlation coefficient are statistically significant. The fourth step involves the development of a null hypothesis and then performing several tests that accept or reject the null hypothesis. Developing the hypothesis includes (1) defining the independent variable (If) and the dependent variable (then) and (2) stating the correlation and effect of the hypothesis. This study uses a null hypothesis statement, which assumes that the independent variable has no effect on the dependent variables.

After defining the type of statistical tests to be used, it is important to define the hypotheses that the statistical tests would need to verify. Prior to conducting the analysis, a set of problems are identified below to clarify the position and context of the survey results. These problems are indicated as follows:

1. To identify existing differences in the use of respondents in places of worship (PoW) on all social dimensions based on **location** (east bank and west bank).
2. To identify existing differences in perception in the use of respondents in PoW on all Social dimensions based on **religious affiliation** (i.e., Roman Catholic, and others)
3. To identify if there exists a difference in perception of PoW on all Social dimensions between respondents based on **gender** (i.e., male or female)
4. To identify if there exists a difference in perception of Places of Worship on all Social dimensions between respondents based on **age group** (i.e., 18-39, 40-59 and above 60)

The non-parametric tests, namely the Wilcoxon signed rank test and the Kruskal Wallis test, will be used to calculate the P-value of two or more variables. The P-value is used to accept or reject the set of assumptions, often called the null hypothesis ( $H_0$ ). A P-value of less than 0.05 shows that there is a significant difference in the said hypothesis, in effect rejecting

a null hypothesis. The following hypothesis are developed in corresponding to the problem previously mentioned as follows:

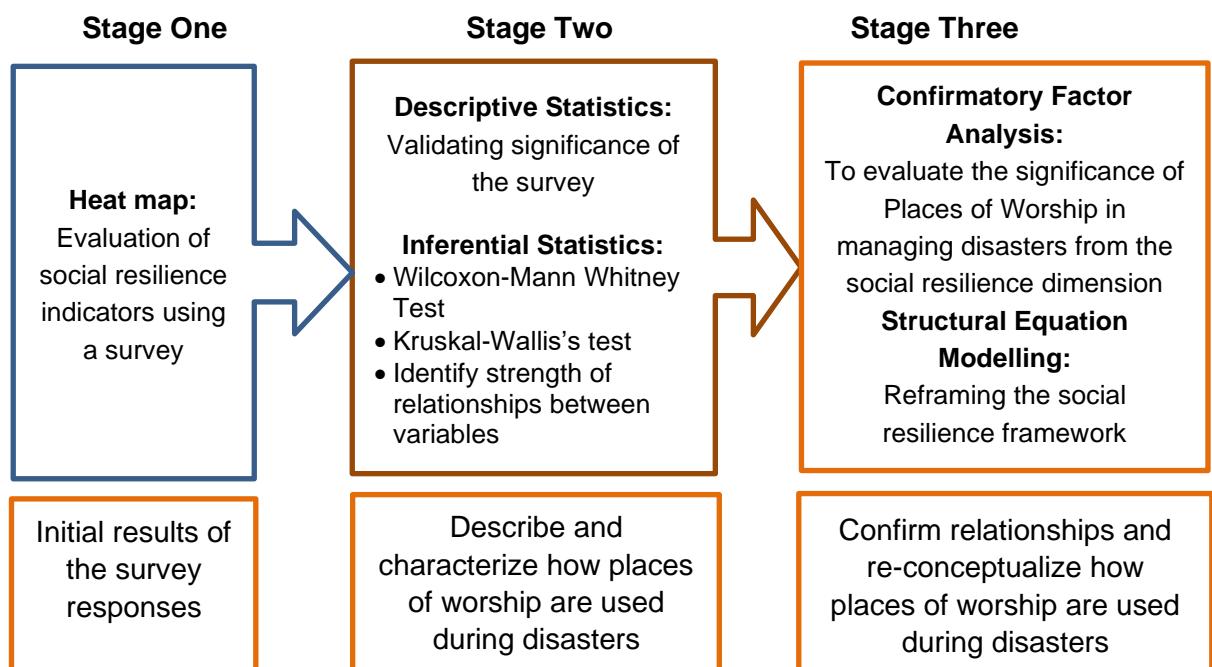
**H1:** There is no significant difference in perception of respondents on their use of PoW on all social dimensions on **location** (i.e., east, or west bank)

**H2:** There is no significant difference in perception of respondents on their use of PoW on all Social dimensions based on **religious affiliation** (i.e., Roman Catholic, and others).

**H3:** There is no significant difference in perception of respondents on their use of Places of Worship on all social dimensions based on **gender**.

**H4:** There is no significant difference in perception of respondents on their use of PoW on all Social dimensions based on **age group** (i.e., 18-39, 40-59 and above 60)

On stage three (III) of the quantitative analysis phase, the study aims to confirm the inferences of stage two (II) through using confirmatory factor analysis and structural equation modeling. The study uses SPSS Amos is creating a structural concept of these analyses and provide a holistic measurement of the relationships of the variables to their contribution to social resilience.

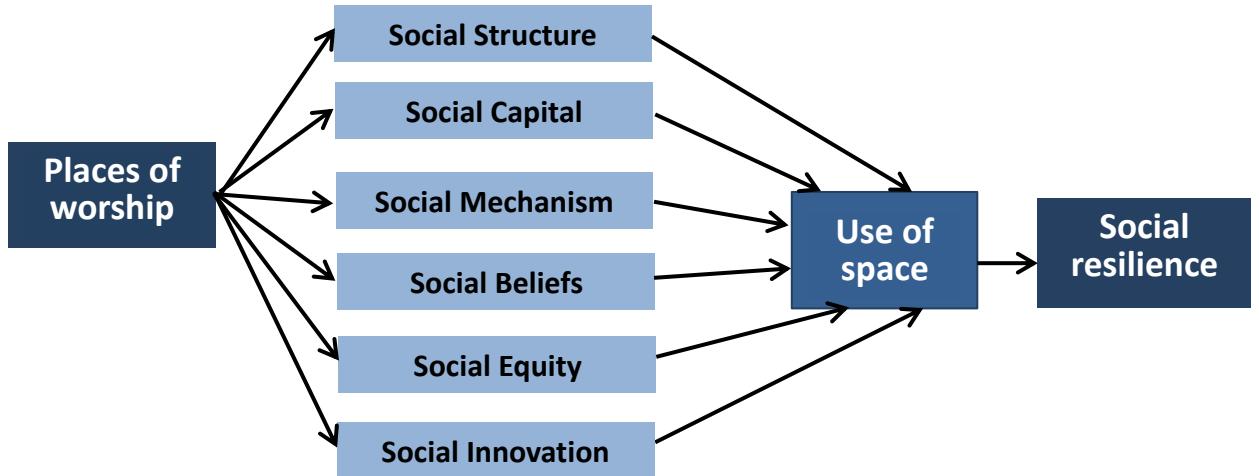


**Figure 4.5.3. A Three-stage approach in analysing the social resilience survey.**

#### 4.5.3.3. Quantitative Analysis Stage III – Confirmatory Factor Analysis and Structural Equation modelling

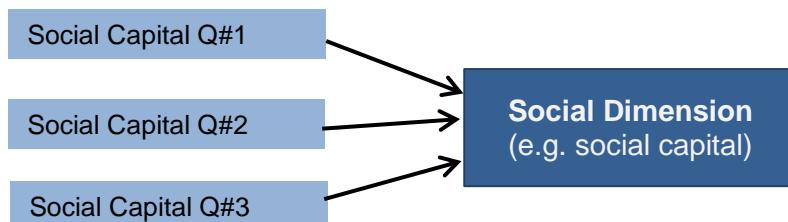
This study aims to explore and describe how these spaces in places of worship are being used. Due to the social nature of the social resilience framework, much of the data

in this study is related to latent variables, variables that are not directly observed but are rather inferred through other means. Thus, this section discusses the application of confirmatory factor analysis (CFA) and structural equation modelling (SEM) in assessing the use of places of worship.



**Figure 4.5.4. The initial framework explores how social resilience and DRR are linked through the utilization of spaces in places of worship in informal settlements.**

Prior to analysing the data, a conceptual structure was created to preliminarily identify the relationships of the six social dimensions against how places of worship are used to the production or eradication of social resilience (see Figure 4.5.4.). While the results of the previous inferential analysis provided significant relationships between the questions and the social resilience dimensions, CFA is used to recalculate their significance per dimension (see Figure 4.5.5.). CFA is also used to revalidate the significance of all dimensions as one entity.



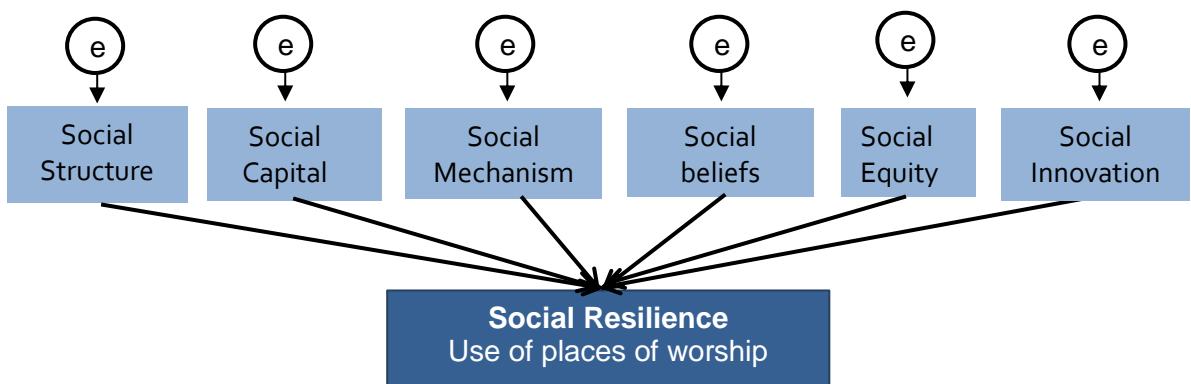
**Figure 4.5.5. A social dimension is defined and validated by the appropriate survey questionnaire through confirmatory factor analysis.**

### Confirmatory Factor Analysis

Factor analysis is a data reduction technique that is used to identify the relationship between variables. As some studies may provide multiple variables in assessing a certain theory, factor analysis determines the commonality of these variables in validating the

mentioned theory, in this case is the social resilience theory. Commonly used in social research, confirmatory factor analysis (CFA) is used to test whether measures of constructs in social resilience are consistent with the actual understanding of the nature of the constructs by the residents of Barangay San Andres. It is posited that these constructs (or factors) are unrelated to one another, and the study is forcing the model to be consistent with the theory of Saja et al.'s (2018) social resilience framework. This confirmatory factor analysis of the six dimensions of the social resilience framework aims to validate whether these dimensions are related to each other. CFA is calculated using SPSS Amos software due to the simplicity and the graphical presentation that the software provides.

The first step of CFA is to verify the validity and reliability of the variables. According to Amora (2021), a research instrument has strong convergent validity if the respondents understand the indicators (questionnaire items) linked with each latent variable in the same way as the inventors of the indicators intended (Amora, 2021). Each observed variables are also associated to a measurement error, taking into consideration some unmeasured influence that results in the correlations or variances of the model. In completing the model of the CFA, the study has created a structural model in SPSS Amos wherein the observed variables (questions from the survey) are used to validate a single latent construct (social resilience) through defining the paths (signified by arrows) (See Figure 4.5.6.).



**Figure 4.5.6. A confirmatory factor analysis conceptual model of social resilience validated by the six dimensions of social resilience.**

This factor model verifies the ability of these dimensions to measure similarly the production of social resilience using places of worship in informal settlements. The regression weights between the dimensions and variables all show factor weights of more than 0.08, which shows all to have significant influence on social resilience. However, the calculations of SPSS Amos show that the six dimensions have similar factor weights, often measured as the eigenvalue. Through an explorative factor analysis (EFA) done in JASP 0.14, only two (2) distinct factors were exhibited thru the eigenvalues instead of six (6)

different dimensions that was initially proposed by Saja et al. (2018). As the survey is done during the COVID pandemic, the limited time to gather for a significant number of observable variables are likewise limited. Thus, the study would not include the process of reducing dimensions through exploratory factor analysis (EFA) but has focused only on the causal relationships between the six (6) social dimensions through structural equation modelling (SEM).

### **Using Sequential Equation Modelling (SEM) in Assessing Places of Worship**

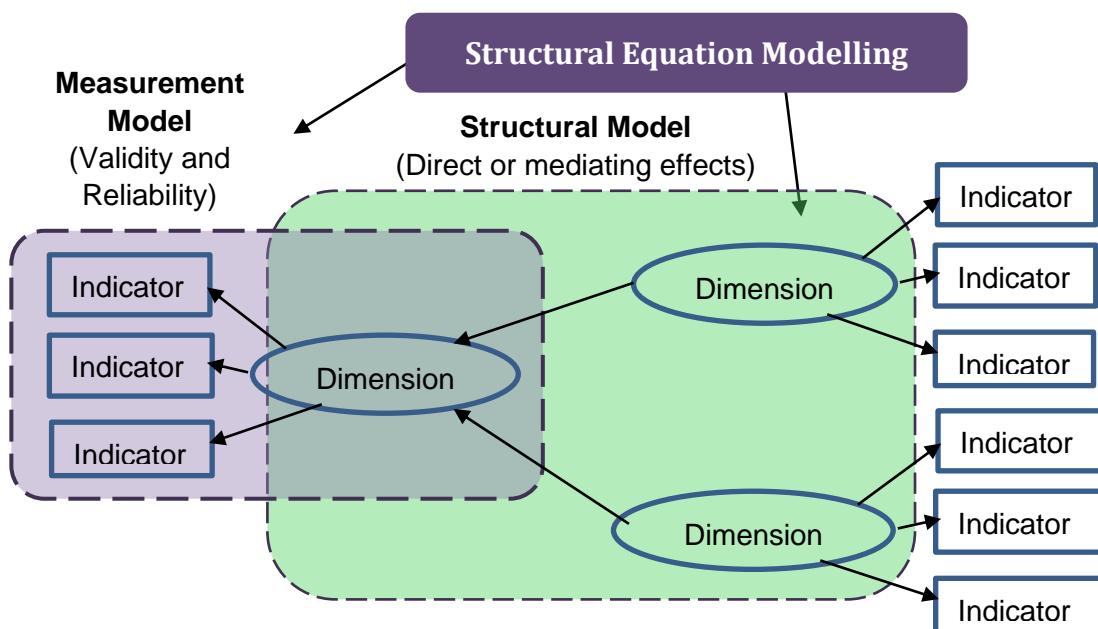
As this study has used Saja et al.'s (2018) context-based '5S framework' in assessing Places of worship, the SEM model have used observable variables based on the different social dimensions. The main reason for using Structural Equation modelling (SEM) on research is based on the process of testing or developing a certain theory. SEM has been used in explaining human behaviour, such as in the use of information technology (Legris, Ingham and Collerette, 2003) and predicting academic performance (Amora et al., 2016). SEM allows researchers to test different items or concepts (also called variables) in a single study (Weston and Gore, 2006), and at the same time minimizes measurement errors (Nachtigall et al., 2003).

This study on social resilience finds SEM effective in interpreting data because much of the data to be collected are related to latent variables. Latent variables are indicators of a certain characteristic, such as resilience, that cannot be directly observed but are rather inferred through other means. SEM also differs from first-generation statistical techniques (i.e., linear regression model) in allowing the simultaneous modelling of relationships among multiple independent and dependent constructs (Gefen, Straub & Boudreau, 2000).

Structural equation model (SEM) is a modelling technique in assessing relationships among observed and unobservable variables (Beran & Violato, 2010). As previously mentioned, SEM allows the testing different social resilience variables in a single unified model that can identify possible biases or weaknesses in a holistic approach (Tarka, 2017). In addition, SEM requires the simultaneous analysis of two types of models, the measurement model, and the structural model.

One of the initial steps of SEM is to specify the model through a structural model which helps set the relationships between the variables, dependencies, and indicators. As with all statistical tests, the model is based on the existence of a substantial number of relevant literature and theories that define these relationships or "paths". SEM uses the concept of exogenous variables (independent variable in ANOVA) and endogenous variables

(dependent variable). As every endogenous variable has a 'disturbance', 'error terms' are applied on the observed variables and latent variables. These 'error terms' allow us to compute a percent variance explained for each endogenous variable. Then again, attention is needed identifying correlation of between latent variables as it affects the type of theoretical construct the model is to be analysed. Highly correlated items demonstrate a 'reflective type' of construct while the model between not highly correlated items is considered as a 'formative type' of construct. Consequently, the measurement model helps in clearly identifying the relationships of these elements.



**Figure 4.5.7. Components of a Structural Equation Model.**

The measurement model on the other hand is used to validate the relationship between the latent variables and their indicators. While this model should be based on well-founded theories or studies, the objective of SEM analysis is to test whether the data 'fits' the hypothesized measurement model (Cudeck *et al.*, 2001). In identifying the 'fit' of the model, there should be enough indicators per construct (or variable) and have strong factors loadings greater than 0.60 but not less than 0.40 (Garson, 2010). Conversely, having load factors of greater than one (1) indicates that the variables to be highly correlated. Reflective constructs means that two indicators are measuring the same type of characteristic or dimension. Reflective constructs are also seen when the indicators are caused by the latent variable instead of being an effect of it (Kenny, 2012). Due to these parameters, a modification (or re-specification) of the model is done to improve the validity of the model.

Modifications are often based on adjusting various indices such as the chi-square, comparative fit index (CFI), root means square error of approximation (RMSEA) and other

indices to their most ideal values. In addition, modifications must also make sense from literature reviews and can be acknowledged as a limitation of certain theories. While the modifications of the model based on indices has been done for many decades, recent studies have argued against this practice. Barrett (2008) recommended 'banning all such indices as an indicative of 'model acceptability', although Prudon (2015) suggests that a goodness of fit and estimation fit (statistical significance) 'might be all the researcher needs' to make a good model fit (Barrett and Lanman, 2008). In analysing computation of fit and other statistics, this research uses SPSS Amos (Analysis of Moment Structures) software in using graphical language for the interpretation of the hypothesized models.

The purpose of SEM in this study is to understand the patterns of correlation or covariance among the set of social resilience variables that characterize how places of worship are used through the social resilience framework (suhr, 2000). For example, SEM is able to provide the pattern of relationship between "social capital" and "social equity" while taking into consideration all the other dimensions that contribute to social resilience. While SEM can be flexible in testing hypotheses about relationships between variables, the limitation of SEM is that it is not a test of causal hypotheses from correlational data. For example, the SEM diagram cannot prove that "social capital" is a cause of "social resilience". SEM is appropriate in analysing the characteristics and relationships of the different dimensions due to the study's disposition as a primary exploration on places of worship on the social resilience framework.

Due to the diversity and complexity concepts of social resilience in many literatures, SEM can address the empirical nature of studies in social resilience. SEM can explicitly specify errors in its model allows researchers to recognize the imperfect nature of their measures or studies (Abu-Alhaija, 2019). However, SEM models would require researchers to support their model theories with relevant literature *a priori*. On the ontological aspect of the study, SEM can explore the core factors from empirical data and estimate their relationships between these factors (PHIAKOKSONG, NIWATTANAKUL and ANGSKUN, 2013).

## **Research Outline**

- 1. Introduction and Aims**
- 2. Review of Related Literature**
- 3. Theoretical Framework**
- 4. Research Methods**
- 5. Interview Results/Analysis**
  - 5.1. Stage 1: Contextual thematic analysis**
  - 5.2. Stage 2: Quantifying Content Analysis (manifest) (Nvivo)**
  - 5.3. Stage 3: Qualifying thematic analysis (latent) (#1)**
  - 5.4. Summary of results from qualitative research**
- 6. Survey Results/Analysis**
- 7. Synthesis of key findings**
- 8. Discussion/recommendations for future research**

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## **Chapter 5: Interview Results and Analysis**

Section 5 sets the results of the interviews into three phases of analysis. Section 5.1. initiates the analysis through a contextual thematic analysis that provides important demographic profiles of the interviewees that could influence the biases and responses of the collected data. Section 5.2. then quantifies the contents of the interviews through the emergent activities and mechanisms on how places of worship are used based on the social resilience dimensions. Finally, Section 5.3. qualifies significant concepts and questions that are be formulated in the design of the survey questionnaire.

## 5.1. Phase I: Stage 1 – Contextual Thematic Analysis

Stage One of the qualitative analyses intends to verify whether the different social resilience dimensions are still relevant to the survey questions to be conducted to the stakeholders of Barangay San Andres. While a deductive analysis of the interview was done through a predetermined approach of the social resilience framework, data from the interviews have also highlighted some themes not mentioned in the framework. While such certain themes (i.e., conflict, political prejudice, transportation lending) arose from the discussions, such notions were not included in the survey as it would slightly deviate the research from its focus on assessing how spaces are used in disaster management.

Table 5.1.1. A simplified format of the preliminary analysis of individual interviews of key informants basing on the 6 social resilience dimensions

	Person	Question 1: Are places of worship important to the community?		Raw answer	Translated answer	Social Structure	Social values	Social equity	
		Yes	No			Positive	Positive	P	N
1	EE	1		“unang una, importanteng-importante talaga na magkaroon ng ganitong place of worship kasi unang-una ang mga tao ay hindi kaniya-kaniyang paniniwala o religious rights yung kanilang mga sekta na inaanibant.”	First of all, having such places of worship is very important because everyone has their own beliefs, ... is unlikely to offer it as evacuation center, unless... it is their member...	Members only are allowed	Enables people to reaffirm their own beliefs		
						Negative	Negative		
						Not offered as an evacuation center			
2	RE	1		“...then ito pa kasi yung mga bagay na pwede nating gawin na mag bigay sila ng mga moral lesson habang andun sila sa facility na iyon”	Then they could give people moral lesson while in there; how they could start over, not just go there and gain nothing.	Positive	Positive		
						Can be used during disasters	Provides moral lessons to the community		
						Negative	Negative		

### 5.1.1. Demographic Profile of Interviewees

Respondents were given a questionnaire for their guidance and were given the opportunity to ask any questions. The researchers maintained the flow of discussion and encourage their participation. Table 5.1.10. shows the demographic profile of the respondents such as name, designation, gender, age, and religion. Interviews were conducted in 12 barangay officials and 4 church leaders. Also, the chart below shows that there are 5 male and 11 female respondents from 38 to 77 years old; most of them are Roman Catholic.

Table 5.1.2. Interview with Barangay and Church Leaders of San Andres Cainta, Rizal

Code	Respondent	Designation	Religion	Gender	Age
A	EE	San Andres – Brgy Admin Assistant	Catholic	M	67
B	RE	San Andres – Brgy Disaster Relief Officer	Catholic	M	38
C	JR	San Andres – Councilor	Catholic	F	67
D	WA	Anak Pawis – Secretary	Catholic	F	63
E	BA	Sto. Nino Chapel - Chapel Coordinator	Catholic	F	77
F	GF	San Lorenzo Parish – Head Coordinator	Catholic	F	57
G	ES	PFCI Chapel – Church Volunteer	Catholic	F	58
H	TS	ENAI – HOA President	Catholic	M	65
I	RN	PFCI – HOA President	Catholic	M	67
J	LS	Lakas Tao – HOA President	Catholic	F	59
K	VB	Lower Planters – HOA President	Catholic	F	61
L	AD	Sacred Heart Chapel – Chapel Coordinator	Catholic	F	59
M	JN	Lakas Bisig – HOA President	Catholic	M	52
N	GB	Buklod Maralita – HOA President	Catholic	F	50
O	GL	ENAI – Vice-President	Catholic	F	50
P	NG	EMAI – Treasurer	Catholic	F	51

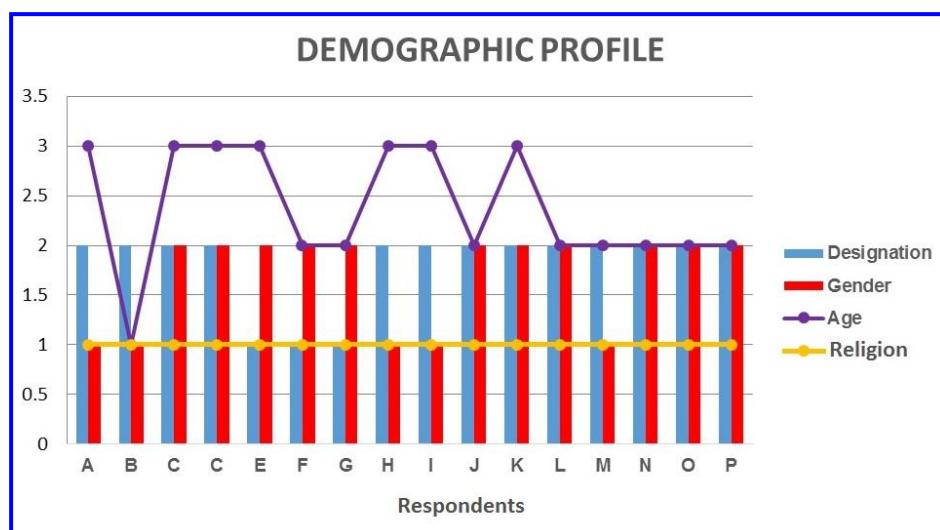


Figure 5.1.1. Demographic Profile of the Barangay and Church Leaders of San Andres, Cainta Rizal

### 5.1.2. Discussion of Interview Analysis

A summary of each main question is translated into a table that highlights the number of responses each question was given and a brief discussion on the reasons for alternate responses. Also included in the table are exact quotations that the researcher deems important in understanding the context of how the question was generally answered by the respondents. Keywords are then noted to identify themes that may emerge that appropriately corresponds to the social resilience dimension being used.

Table 5.1.3. Interview Question # 1

Interview Question	Response			Discussion
	y	neut	n	
1. Do you think that having a place of worship in a <b>community is important?</b> Why?	14	2		<p>Most of the respondents agreed that having a place of worship in a community is important. While most respondents are provided clear binary answers to the questions, some answered "50/50". Some respondents indicated the negative aspects of how these spaces are being used by the community, such as the favored use of these spaces only to its members.</p> <p>While the question is focused on the physical places of worship, majority of the respondents cite the importance of the programs and activities done by religious organizations.</p>
<b>Highlighted quotation</b>	"It's one of the places we could use as home... give people moral lessons... on how they could start over, not just go there and let it be." – RE			
<b>Keywords</b>				
Social structure	Evacuation center, home, meetings,			
Social capital	Meetings, togetherness, relief goods, announcements			
Social values	Morals, values, prayer			
Social equity	Members, exclusively, permission			

Table 5.1.4. Interview Question # 2

Interview Question	Response			Discussion
	y	neut	n	
2. Do places of worship in your area be <b>used in times of disaster?</b> How?	13	2	1	<p>All of the respondents recognize that places of worship in their area can be used in times of disaster, except for one. Since structures in ENAI are in a flood-prone area, churches built in this location are not used during floods. Places of worship are often mentioned as a distribution center of relief goods and medical missions rather than as an evacuation center. However, GB of Lakas Tao mentioned that "31 individuals have used the chapel as a temporary evacuation center" during the typhoon "Ulysses" in November 2020.</p>
<b>Highlighted quotation</b>	"Places of worship here are many... but honestly in extreme cases, they are not able to cover the needs of the place." – EE			
<b>Keywords</b>				
Social structure	Cover (physical protection), functional, evacuate,			
Social capital	Distribution, relief goods, medical mission			
Social values	Respect (of place), counseling			

Social equity	Politics,
Social innovation	Roads

Table 5.1.5. Interview Question # 3

Interview Question	Response			Discussion
	y	neut	n	
3. Does the place of worship affect you socially, mentally, physically, and spiritually? How?	social			Many of the respondents said that the places of worship can affect them in a social aspect.
	13	1	2	
	Mental			While many respondents also agreed that the places of worship can affect them mentally, mental issues were often associated with depression, crime, and civil disorder in the community.
	10	4	2	
	Physical			Most respondents agreed that the places of worship can affect them physically; however, some are quite aware of the limitations of using such spaces in emergency situations.
	12	3	1	
Highlighted quotation	spiritual			All of the respondents answered "yes" that the places of worship can affect them spiritually.
	15	1		
Keywords				
Social structure				
Social capital	Drug campaign, juvenile delinquency, friends, training, service, coordination, assistance, service			
Social values	Patience, depression			
Social equity	Different faith			
Social beliefs	Religious processions, fiestas,			
Social innovation				

Table 5.1.6. Interview Question # 4

Interview Question	Response			Discussion
	y	neut	n	
4. Do places of worship provide assistance in the community to cope with disasters? How?	13		3	While most of the respondents agreed that places of worship assist their community to cope with disasters, some respondents mentioned that the current aid and assistance are not enough.
Highlighted quotation	"... They too are able to give, only donations... But it is not enough." – TS			
Keywords				
Social structure				
Social capital	Feeding program, assistance, cooperation, lending of transportation, catechism, prayer, relief goods, training, drills,			
Social values	Friendship, generosity			
Social equity				
Social beliefs	prayer			
Social innovation				

Table 5.1.7. Interview Question # 5

Interview Question	Response			Discussion
	y	neut	n	
5. Do places of worship hold activities that prepare the community in facing disasters? How?	11	1	4	Many have attributed the preparation for disasters to include information dissemination, drills, seminars, and training held by both the local government and religious organizations. Both male respondents were not familiar with any of the activities being made while some responded based on the context of the current pandemic situation.
<b>Highlighted quotation</b>	“For example, this pandemic, our parishioners announced ... to take care, and ... have prayers for the COVID-19 pandemic. So even my grandchildren pray for it every night.” – WA			
<b>Keywords</b>				
Social structure				
Social capital	information dissemination, drills, seminars, training, livelihood, first aid, Christmas parties, counseling			
Social values	Celebrations, practices, generosity			
Social equity	Fair treatment			
Social beliefs	prayer			
Social innovation				

Table 5.1.8. Interview Question # 6

Interview Question	Response			Discussion
	y	neut	n	
6. Do you think there are ways that places of worship can strengthen assistance in times of disasters? How?	14	1	1	Most of the respondents have proposed many ways how places of worship are able to strengthen their support to the community through many areas. Such areas include additional structures, increased financial support, additional volunteers, early warning systems and a more cooperative way of giving hope to the community. Church workers often mention of the activities their 'social services ministry' in continuing to provide help to all despite their limited capacities. It was also mentioned that catechism work should continue as it helped lessen drunkards, riots and juvenile delinquency in the streets before the pandemic.
<b>Highlighted quotation</b>	“... It is important that these activities (religious) continue to spread... because that is what youths today need... or else they will go astray.” – NG			
<b>Keywords</b>				
Social structure	Additional physical places of worship			
Social capital	Information dissemination, early warning, guidance, sponsorship, request for external help, advise, volunteers, bible study, counseling			
Social values	Cooperation			
Social equity	fair treatment			
Social beliefs	Finding hope			
Social innovation	Selling food			

Table 5.1.9. Interview Question # 7

Interview Question	Response			Discussion
	y	neut	n	
7. Does your organization conduct virtual places of worship that can help the community in facing disasters? How?	13	2	1	Since the barangay follows the GCQ (general community quarantine) for the COVID-19 Pandemic, most of the respondents watched on television and Facebook live as a (virtual) place of worship in helping them cope during this pandemic. Some were not aware of how the community attends religious activities aside from the small gatherings made during the Christmas season. Also noteworthy is that none of the respondents mentioned online video conferencing (i.e., zoom, teams) as a form of place of worship.
Highlighted quotation	“... there is in FB live, but we prefer to go to church physically.” – AD			
<b>Keywords</b>				
Social structure				
Social capital				
Social values				
Social equity				
Social beliefs				
Social innovation	Television, social media			

### Preliminary Overview of Results

From the analysis, clear themes emerged, and areas of agreement between barangay leaders and church leaders were identifiable. Many of these themes are significant to mention but was not because here, as the current research is focused on how places of worship are used during disasters to enhance social resilience. Most of the respondents do indicate that they had no problem using the places of worship space during the disasters. In addition, most of the participants reported that religious activities and assistance help them to developed social reliance in facing disasters. From the limited scope of this approach, a larger study will be needed to serve as a basis for policy recommendations and social frameworks concerning the disaster management responses

#### 5.1.3. Results and Findings

Based on the analysis of defining the positive and negative notions on the use of spaces in places of worship, the qualitative data from the interviews do suggest a common positive perception on the use of spaces in places of worship before, during and after a disaster. The results on table 5.1.2. are based not only on the response of the interviewees themselves but also the equivalent personal expressions exhibited by the respondents. While these ‘personal expressions’ could be translated into a systematic form of analysis, this is not

included in the scope of the current research design. Interestingly, the table exhibits how male respondents provide a more negative perception to the use of places of worship.

In providing a quantitative approach in understanding the responses, Table 5.1.11 and Table 5.1.12. shows the percentage of responses that show positive and negative inclinations towards the use of places of worship. The answers from the interviews resulted in 59% answering 'yes' from female respondents while 21% are from male respondents. The age range of 58-67 got a 44% 'yes' answer and 24% from the age group 48-57. Data show that gender and age may affect the understanding or perception of the respondents on how place of worship are being used.

**Table 5.1.10. Preliminary Overview of Responses from Interviews on Places of Worship.**

		Barangay San Andres Interview preliminary analysis																										
	Respondent	Stat	Loc	G	Age	Social Structure		Social capital		Social values		Social equity		Social beliefs		Social innovation												
						P	N	P	N	P	N	P	N	P	N	P	N	P	N									
1	RE	BL	E	M	38																							
2	TS	BL	E	M	65																							
3	AD	CL	W	F	59																							
4	LS	BL	W	F	59																							
5	JN	BL	W	M	52																							
6	EE	BL	E	M	67																							
7	GB	BL	W	F	50																							
8	RN	BL	E	M	67																							
9	ES	CL	E	F	58																							
10	WA	BL	W	F	63																							
11	JR	BL	W	F	67																							
12	NG	BL	E	F	51																							
13	GL	BL	E	F	50																							
14	VB	BL	W	F	61																							
15	GF	CL	W	F	57																							
16	BA	CL	W	F	79																							
<b>Legend:</b> BL – Barangay leader CL – Church leader/worker E – East bank W – West bank						<b>Color coding:</b> <table border="1"> <tr> <td>Strongly positive</td> </tr> <tr> <td>Slightly positive</td> </tr> <tr> <td>Neutral</td> </tr> <tr> <td>Slightly negative</td> </tr> <tr> <td>Strongly Negative</td> </tr> </table>																		Strongly positive	Slightly positive	Neutral	Slightly negative	Strongly Negative
Strongly positive																												
Slightly positive																												
Neutral																												
Slightly negative																												
Strongly Negative																												

Table 5.1.11. Age and Gender Respondents Answer Cross Tabulation

Category	Yes	Neutral	No	Total	Percentage (yes)
<b>Age</b>					
38-47	10			10	6%
48-57	38	7	5	50	24%
58-67	71	10	9	90	44%
68-77	8		2	10	5%
<b>Gender</b>					
Male	33	7	10	50	21%
Female	94	10	6	110	59%

Table 5.1.12. Interview response table with Barangay and Church Leaders of San Andres Cainta, Rizal

	Interview Questions	In percentage		
		Yes	Neutral	No
1	... important in a community	88%	13%	0%
2	... could be used in times of disaster	81%	13%	6%
3a	... could affect them socially	75%	19%	6%
3b	... could affect them mentally	63%	25%	13%
3c	... could affect them physically	75%	19%	6%
3d	... could affect them spiritually	94%	6%	0%
4	... assisted their community to cope with disasters.	81%	0%	19%
5	... activities prepared the community to face the disasters	69%	6%	25%
6	... watched the television for the virtual place of worship which helps them in facing the disasters. *	81%	13%	6%
7	... strengthen their assistance in times of disasters.	88%	6%	6%

\* the community generally complies with GCQ (general community quarantine) for the COVID-19 Pandemic.

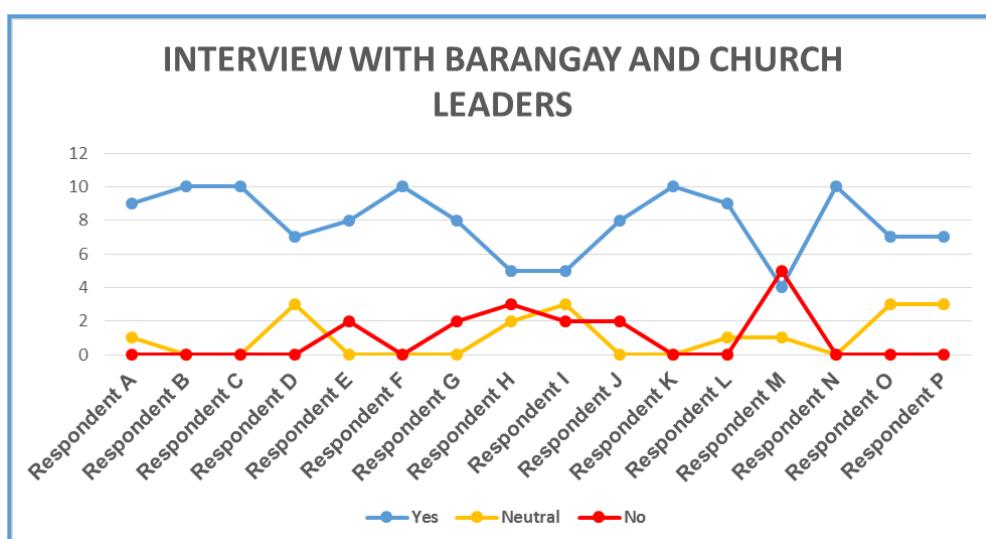


Figure 5.1.1. A visual representation (in percentage) of the responses of the interviewees towards the use of places of worship in attaining social resilience.

## 5.2. Phase I: Stage 2 – Quantifying Content Analysis

In stage two of the qualitative phase of the research, the contents of the interviews are based on the experiences and thoughts of the interviewees. While the interview questions are based on the social resilience framework, analysis of interview content is initially based largely upon the question asked. Phrases from the answers are presented so as not to lose their respective contexts and then contrast it to the frequency of words used during the interviews.

### 5.2.1. Social Structure: Content Analysis

Social structure includes the demographic profile that affects the enhancement of social resilience in the community, whereas the physical structures include the roads, networks, and shelter they have (Saja et al., 2018). Based on the findings (Q1 and Q2) places of worship are considered as social structure in which 88% of the respondents agreed that having a place of worship in a community is important and among those who responded 81% recognized that places of worship in their area could be used in times of disaster.

The dimension of the social structure was highlighted through the importance of the places of worship through the following responses such as the following: (1) can be used when disaster strikes, (2) place of worship is a safe place, and (3) places of worship serve as openers of the mind. Some of the responses also include that “it feels different when going to church when just (doing it) online.” Places of worship were mentioned to be of “great help in times of disaster”, “gives morality” and make “people are enlightened”. These places were also said to be a “need in our community” and “helps us a lot” when disaster strikes. While churches are mentioned as an “alternate relocation: site, there were contradicting statements on about how places of worship are being used as emergency facilities. Some responses regarding the use of places of worship as an emergency facility include:

- extreme cases can cover the need for shelter
- 6-7 big churches are functional
- church used when there is relief goods distribution
- caritas donations are coming from parish church
- used for 17 families during the typhoon; 31 stayed in the chapel for shelter
- but some churches were also flooded
- church paid 15,000 pesos for water and electricity bill

Basing on the question - ***“Do you think that having a place of worship in a community is important? Why?”***, a word cloud was generated in Figure 1. Key words such as ‘go’, ‘church’, ‘help’, ‘worship’ and ‘calamity’. This result preliminary acknowledges that most respondents consider the importance of places of worship in their area.

The mention of the use of places of worship during the event of a disaster was considered important because it serves as a safe place, reinforces morality, and provides enlightenment. In addition to its accessibility to its members; it can be used as a shelter, evacuation center, and as storage for relief goods. It is also worth noting that some churches do get flooded and should neither be used during disasters nor even be built in that area. While churches were sometimes used as an evacuation center, it was previously forbidden by the municipality because relief goods were not properly distributed at this venue. One of the barangay officials also considered the church as a sacred place and should not be used for evacuation as some valuables are prone to theft.

In Figure 2, the responses of the participants are based on the question ***“Do places of worship in your area be used in times of disaster? How?”*** How places of worship are used in times of disaster are evidently displayed in the word cloud. Note that the most commonly words mentioned by the respondents include “church”, “used”, “place” and “chapel”. Hence, the use of places of worship space during the disaster is significant to them because it gives them the provisions they need.

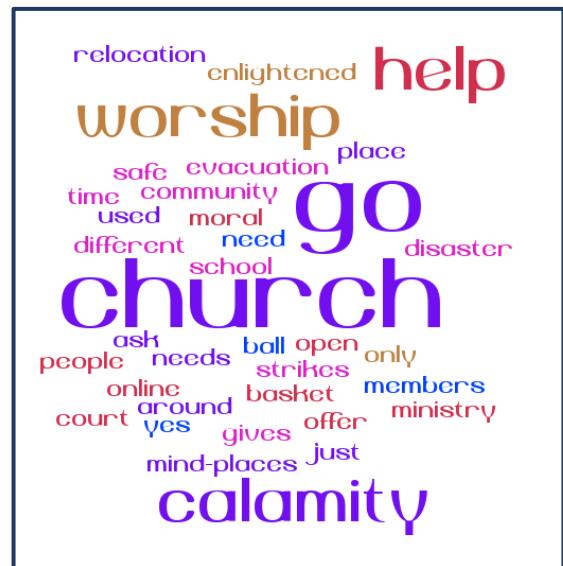


Figure 5.2.1: Participant responses to the question, “Do you think that having a place of worship in a community is important? Why?”

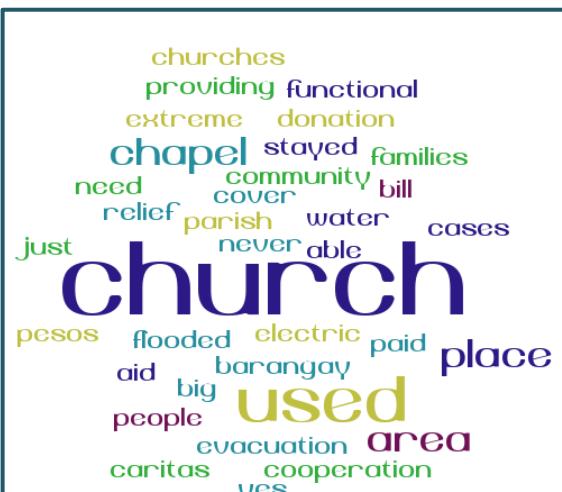


Figure 5.2.2.: Respondents feedback about places of worship in their area how are being used in times of disaster?

### 5.2.2. Social Capital: Content Analysis

Social Capital is defined in this study as the network of relationships among people who live and work in a particular society, enabling society to function effectively. Based on the findings on Q3a and Q3c, places of worship are considered as a social Capital where 75% of respondents said places of worship could affect them socially and physically, while 6% disagreed and 19% remained neutral. Indicated below are some of the following responses based on their categories:

Table 5.2.1. Thematic Responses on Question 3.

Socially	Physically
meet new friends	pastor's donation
get more friends	sponsors gave help
have family days and social activities	donations for those in need
trusted friends can help	donation campaign
more friends more help	distribute relief goods
gain popularity for their group	cash from the government and goods
church activities (feeding program	caritas donation /NGOs donating relief goods
Zumba exercise	sponsors for Zumba and feeding programs
	church gives medical assistance
	seminars/ meeting held but sometimes used by politicians

Considering the responses, places of worship have affected them socially wherein it improves their social life through meeting new friends and getting help. Places of worship also help them physically through providing and obtaining support, help and donation campaigns. Various church activities, such as family day, “zumba” exercise and feeding programs, also allow them to develop social skills, consequently helping them prepare for disaster. The interview has also noted how the Local government Units (LGU), the church, and community leaders work together to provide donations, relief goods and medical assistance during disasters in their respective communities. Nonetheless, religious activities are sometimes mentioned to have been used by politicians for their personal interests and gain popularity.

The question “**Does the place of worship affect you a.) socially, b.) mentally, c.) physically and d.) spiritually? How?**” resulted in a word cloud found in in Figure 3. Key words like “counseling”, “church”, “help”, “donation” and “seminars” appear in the data. This consequent data reinforces that most of the respondents consider places of worship to affect them socially, mentally, physically, and spiritually.



Figure 5.2.3.: Participant responses to the question, “Does the place of worship affect you a.) socially, b.) mentally, c.) physically and d.) spiritually? How?

### 5.2.3. Social Mechanism: Content Analysis

Social Mechanism is defined as the social activities, engagements, values, attitudes that are shared by the community that help them to be resilient. Based on the findings on Q3b, Q3d, and Q4, places of worship are considered as social mechanisms where 63% of respondents said places of worship can affect them mentally, while 94% of respondents acknowledged that it affects them spiritually. Also, 81% of respondents agreed that places of worship assisted their community to cope with disasters. The following responses explain how the respondents are affected by places of worship mentally and spiritually:

Table 5.2.2. Thematic Responses on Question 3 and 4.

Mentally	Spiritually	Assistance
counseling after the disaster/ teaching unity	worship weekly and ministry	church assists during the disaster
barangay official seminars	attend worship every Sunday	gift from Caritas (church of the poor)
church intervention/ counseling	catechist and seminarian	rescue volunteers
send juvenile delinquents for Family & Life counseling	assist those in need and support their spiritual needs	churches provide gasoline, equipment, transportation
monthly seminars for all the leaders and coordinators	help victim of calamities/help distributes goods	coordinate with the barangay and community members
weekly worship meeting	monthly Bible study seminars	task force volunteers
summer vacation worship program for children	church provide activities that strengthen our spirituality	collects funds to give gifts, groceries, old clothes
conduct training i.e., fire safety, first aid/ basic life support	help build characters/ anti-depression/ encouragement	have a warehouse for relief goods
seminars for councilors and committees	reformation/Bible study	cook food, rice pack, feeding program
information dissemination (pandemic protocol)	I don't read the Bible and go to church	implementation of color coding to follow the pandemic protocol
earthquake drill, fire drill	parishioners offer community prayers	give one time donation-not enough

Looking at the responses, the places of worship can affect them mentally and spiritually as it gives a sense of belonging and attachment to the community such as having a seminar, training, and workshop to prepare them for disasters, i.e., earthquake and fire drill, basic life support training, dissemination of information on the pandemic protocol. In addition, the parish (or church?) provides activities that strengthen their spirituality, includes talks on how to build characters, overcome depression, and biblical encouragement. Also, there are catechists and seminarians who support their spiritual needs therefore there is bible study and reformation program weekly.

Furthermore, places of worship assisted the community to cope with disasters by providing transportation, fuel, equipment, and food. Parishioners offer community prayers, raise funds to give gifts, groceries, rice packs and old clothes to disaster victims. The community also has a warehouse for relief goods and volunteers for the use of rescue teams and task forces of the government. Church leaders are often mentioned to coordinate with the barangay and community members for the implementation of food distribution and feeding programs. However, due to limited resources, some programs are implemented inconsistently and seem inadequate to meet the total needs of the community. Thus, the importance of collaboration and cooperation between church leaders and LGUs is highlighted for funding and make disaster planning to be achieved.

In Figure 5.2.4, the responses of the participants on places of worship helping in the community to cope with disasters was clearly shown. Note that the most commonly used words are “community”, “help”, “give”, “food”, “drill”, and “fire”. Therefore, this result confirms that most respondents agree that places of worship aided in the community to cope with disaster.



Figure 5.2.4.: Respondents commented on how the places of worship assisted the community to cope with disasters.

#### 5.2.4. Social Beliefs: Content Analysis

Social Beliefs are defined in this study as the religious beliefs that help people have to cope with disasters. Places of worship are considered to be a place where social beliefs are practiced and performed. It is also here that disaster-related activities and religious practices of the community are done and consequently enhance their coping skills in facing disasters. Based on the findings on Q1 and Q5, 69% of the respondents acknowledged that religious activities help prepare the community to face disasters. They claimed that the places of worship are important and prepare the community to face the disaster. Some of the responses include the following:

- there is Christmas party, holy week, fiesta, mass, christening
- have black Nazarene procession
- holy week, All saint's day, Palm Sunday, rosary crusade
- “simbang gabi” (9-day series of masses for Christmas), procession, mass
- church intervention and counseling
- reformation and Bible study

In response to the question, ***“Do places of worship hold activities that prepare the community in facing disasters? How?”***, the result of the word cloud in is shown in Figure 5. Despite being not totally associated to activities of disaster management and recovery, key words like “procession”, “fiesta”, “black Nazarene”, “Christmas party”, “holy week”, and “mass” have highlighted the relationship of these activities to disaster resilience.



**Figure 5.2. 5.**  
**Participant**  
**responses to the**  
**question, “Do places**  
**of worship hold**  
**activities that**  
**prepare the**  
**community in facing**  
**disasters? How?”**

Religious activities that are related to coping with disasters include events such as Christmas parties, the Holy week, fiestas, baptisms or christening, processions of the black Nazarene, "simbang-gabi" (9-day series of masses for Christmas), and the mass proceedings held on the weekends. These religious activities are said to help and strengthen

the community to face the challenges of life during and after disasters. Other topics that were mentioned in this aspect include the “respect for the places of worship”, “stay(ing) away from doing bad things” and providing “activities that strengthen our spirituality”. Bible studies and counseling are also conducted for the community to encourage and strengthen their spirituality.

To satisfy the spiritual needs of the community, one of the multi-purpose halls was built to be the outpost of the barangay and half of it was built to be a chapel. However, one of the respondents mentioned that the barangay hall should not be used for religious purposes because worship should be sacred. Nonetheless, practicing these beliefs has proved to help them become more resilient and positive despite the problems and hardships they face during and after disasters.

#### **5.2.5. Social Innovation: Content Analysis**

Social Innovation measures the innovativeness and adaptive use of places of worship after a disaster thus helping the communities become more resilient through ingenuity and resourcefulness. Based on the findings on Q6 and Q7, places of worship are considered to be socially innovated in which, 81% of respondents watched television for virtual places of worship that can help them face the disasters especially at this time where the barangay complies with the GCQ (general community quarantine) for the COVID-19 Pandemic and 88% of the respondents think that there are ways for places of worship to strengthen assistance in times of disasters, as the following responses show:

**Table 5.2.4. Thematic Responses on Question 6 and 7.**

Virtual Places of Worship	Innovation
Mass Live on TV	use Facebook to raise funds
TV Live for the Black Nazarene Procession	basketball court used as place of worship
Watched Holy mass on Facebook	use house or barangay hall as a place of worship
Television mass every Sunday	train the disaster response team through church leaders

Considering the responses in table 5.2.4., different religious organizations have conducted virtual places of worship in helping the community together. This includes keeping various communication channels open through on-line streaming (Facebook live) and television. Other ways in which these innovations are used to strengthen assistance in times of disasters include raising funds, and making the covered court, barangay hall and some individual houses as a temporary place of worship. Moreover, church leaders and volunteers are being tapped by the government in disseminating additional trainings for the disaster response team. Additionally, church volunteers highlight the importance of catechist

teachings in helping the community cope with disasters. However, community and church leaders both agree that responding to the needs of the community would largely depend on the leadership that manages donations.



Figure 5.2.6: Participant responses to the question, “Do places of worship conducting virtual place of worship that can help the community in facing disasters? How?”

In Figure 5.2.6., the responses of the participants conducting virtual place of worship are evidently displayed. Note that the most commonly used words are “TV”, “Facebook”, “Mass” and “Live”. Hence, conducting virtual place of worship like television and social media helps the community in facing disasters.

With regards to question number 7, **“Do you think there are ways that places of worship can strengthen assistance in times of disasters? How?”**, the result of the word cloud is seen in Figure 7. Key words such as “donation”, “church”, “teach”, “support” and “drill” arose from the interviews. This data provides additional insight as to how most of the respondents consider different ways how places of worship can strengthen the community in times of disasters.

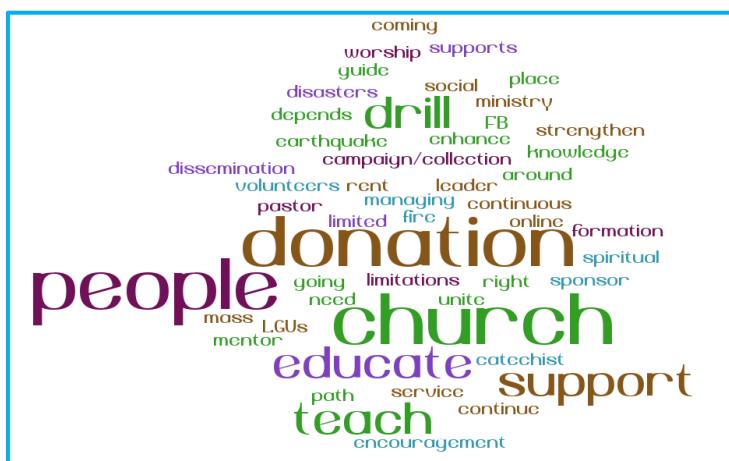


Figure 5.2.7. Respondents commented on how the places of worship can strengthen assistance in

### **5.2.6. Social Equity: Content Analysis**

Social Equity identifies whether there are prejudices in the community or equality which would contribute or impede resilience. Based on the findings (Q3 and Q4) places of worship are considered with Social Equity where 81% of respondents agreed that places of worship assisted their community to cope with disasters specifically with the following responses:

- donations are given for all religion
- did not prioritize specific people
- to be given to all who really needs help
- sponsorship is for everyone even other religions
- focus to teach all teenagers and out-of-school youth
- to bring back those who had rehabilitated drugs to society
- all people need to be guided inside the places of worship
- they will save it just for the sake of their members

The use of the places of worship during the disaster can be a place to seek information and assistance because there is supposed to have fair access to basic needs to the community. For example, donations are given to all individuals regardless of religious affiliation. Also, donations were mentioned not take precedence over specific people but will be given to everyone who really needs help. It is also mentioned that there is a rehabilitation program for young people who are out of school and for those who are addicted to drugs so that they can return to society without being judged. However, there are instances where some of the coordinators have saved some in-kind donations for the sake of their own group members.

In summary, the themes that were highlighted from the interviews show that places of worship do play a significant role in the enhancement of social resilience in the community. It is also interesting to note that while some religious activities (i.e., parades, fiestas, and parties) do not have a direct association with programs in disaster and risk management, these seem to play a vital role in the perception of resilience from the community. The importance of these activities is seen in the willingness of the community to innovate and do extra effort to fulfil the needs that the community needs. In the next phase of this research, the survey will attempt to validate the response of the various community and church leaders on how the community is able to use their places of worship in enhancing their resilience to disasters.

### 5.3. Phase I: Stage 3 – Qualifying Thematic Analysis

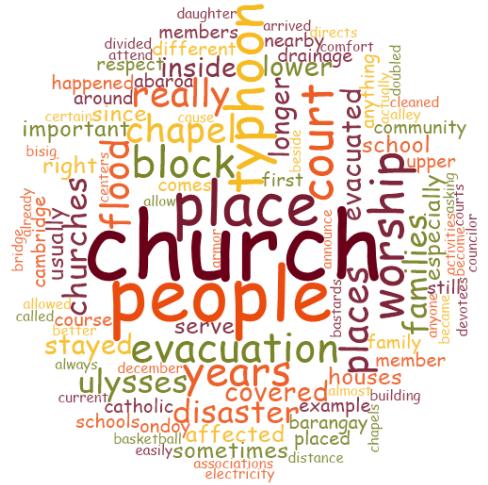
### 5.3.1. Assessing Places of Worship as a Social Structure in a Disaster Context

The first social dimension to be assessed is the social structure. This measure involves providing the community easy access to a protective shelter or an emergency facility. Being in a hazard-prone area of the floodway, easy access to various facilities is important in enhancing the resilience of the community. PoW, such as churches, has been associated with the place and people that provides the respondents the concept of resilience. While often used during floods and typhoons, its function as an evacuation center has not been its most significant contribution.

One aspect on how community leaders and church leaders define as a contribution to the resilience of the community is the *accessibility of places of worship* in their respective areas. While a community leader on the West bank complains of other community members using their own places of worship, other community leaders can only wish for their own due to the physical limitations of their current location. Another factor mentioned by the respondents is the ability of PoW to serve as an *emergency facility* for evacuation during typhoons and floods. While community leaders acknowledge the limitations of PoW as an adequate evacuation facility, these spaces still serve as valuable support during extenuating circumstances. In the long term, affected members of the community need areas that could serve as a *protective shelter* as they cope with their current and future adversities. Church leaders also mention aside from the need for physical protection, emotional and spiritual needs is important to those affected from the calamity.

## **Survey Items for Social Structure:**

1. Places of worships as an emergency facility (maging dagliang lugar para sa kalamidad)
2. Accessibility of places of worship (malapit sa aming tahana at madaling puntahan)
3. Places of worship as a protective shelter (protekson mula sa mga kalamidad)



**Figure 5.3.1. Word cloud from themes of social structure.**

### 5.3.2. Assessing Places of Worship as a Social Capital in a Disaster Context



**Figure 5.3.2. Word cloud from themes of social capital.**

In this second dimension, the social resilience framework was operationalized to identify potential measures in assessing resilience that involves the use of places of worship as social capital. While social capital can be referred to as the resources within the communities that promotes mutual support and trust (Commonwealth of Australia 2004, no date)), it also pertains to the networking abilities of the families and the locality (Saja *et al.*, 2018).

Almost all the interviewees mentioned how they provide and receive support (help) from the community (e.g., **people, friends**). One of the church leaders from the parish community, as well as other coordinators of the local chapels, discuss how friends and various programs often provide the community a sense of resilience (Partelow, 2021). The Church leaders also highlighted how their various organizations provide **seminars, training, and counselling to the community**. These activities continue to provide sources of social services for the needy and support the administrative mechanisms of the local government units (Wuthnow, 2002). Community leaders have also mentioned of providing **donations**, relief, rice and other resources in creating social capital, especially in places of worship.

### **Survey Items for Social Capital:**

1. Socially (friends/people) pakiki-pagkapwa (kaibigan/mga tao)
2. Physically (donations/assistance) pisikal (mga donasyon/tulong)
3. Healthy relationship with others (maayos na relasyon sa iba)

### 5.3.3. Assessing places of worship as a social mechanism in a disaster context

In this section, the social resilience framework was operationalized to identify potential measures in assessing resilience that involves the use of places of worship as social mechanism. As social mechanism is defined as a 'collective attitude and shared values' (Saja et al., 2018), this dimension is characterized by social interactions between the members of the community in coping and adapting to disasters.

Community leaders, like the head of the BHERT/DRM<sup>8</sup> unit, often highlight how government programs are being coordinated with religious organizations during disasters. One of the church leaders who also serves as VAWC<sup>9</sup> counsellor and secretary of their local parish, reiterates the importance of cooperation between the two administrative bodies. Church leaders on the other hand discuss in detail when, where and how they conduct trainings, seminars, counselling, and outreach programs to their members in preparing for the interviews were conducted during the use of TVs, radios, and especially the internet in the community. This includes the use of Facebook and TV programs for those who would join



**Figure 5.3.3. Word cloud from themes of social mechanism.**

## **Survey Items for Social Mechanism:**

1. Use of places of worship for enhanced resilience (napapahusay ang pagiging matatag)
2. Provision for emotional and mental support (counselling/seminar) pang-kaisipan (pagpapayo/seminar)
3. Provision of healthy relationship with others (maayos na relasyon sa iba)
4. Use of social media platform for fund-raising/donations (paggamit ng social media para makalikom nq pondo / mqa donasyon)

<sup>8</sup> BBHERT is defined as the Barangay Health Emergency Response Team while DRM is the Disaster Risk Management Unit.

<sup>9</sup> VAWC (Violence Against Women and their Children) is required by the Republic Act 9262 in all local government units in assisting support to women and children in their community.

### 5.3.4. Assessing places of worship in providing social equity in a disaster context

While the community has shown evidence of cooperation, it is also important to use social equity to identify potential measures in assessing resilience that involves the use of places of worship. Social equity verifies the equal access of the resources, skills and services that places of worship may provide to the community (Saja et al., 2018).

Most of the community leaders, express personal involvement in their community to continue to create connections with the government leaders and the members of the community (Lee and Robbins, 1995). This type of companionship and affiliation is also expressed by church leaders on how they take care of their church members. While a sense of belongingness is promoted within and to accommodate all types (e.g., religion) of people is important.

While some community leaders appreciate the use facilities of other communities, others complain the lack of resources and facilities to accommodate the needs of everyone in the community. Thus, interview respondents often mention the capacity and ability of local government units and religious organizations in aiding the community during disasters. This approach is augmented by leaders providing information and promoting aware to the community. This type of public dissemination was reflected on how the leaders discuss on their decisions in assisting the community during disasters (Jackson and Mogan, 2007).

## **Survey Items for Social Equity:**

1. Sense of belongingness within the community (nagbibigay ng isang pakiramdam ng pagiging kabilang sa aming komunidad)
2. The capacity of places of worship to be open and accommodating to all types of people (bukas at tumatanggap sa lahat ng mga tao)
3. The capacity of places of worship to provide donations and disaster management processes to the community.



**Figure 5.3.4. Word cloud from themes of social equity.**

### 5.3.5. Assessing Places of Worship as a Social Belief in a Disaster Context

In this section, the social resilience framework was operationalized to identify potential measures in assessing resilience that involves the use of places of worship as a social belief. The dimension of social belief also includes the cultural values and faith that has been embedded in the community (Kwok *et al.*, 2016).



**Figure 5.3.5. Word cloud from themes of social belief.**

activities highlight their continuing need for spiritual activities. Social activities such as processions, meetings, ministries, and prayer were discussed in detail by the church leaders during the interview.

Due to the current pandemic, 'different' ways of conducting spiritual activities were mentioned. As most of the interview respondents as of the upper age group, most of them use TV as an alternate source of joining religious activities. On the other hand, communications, public information, and coordination of activities are mostly done in social media.

## **Survey Items for Social Beliefs:**

1. Spiritual activities that encourage and assist the community (e.g., prayer, bible studies) (ispirituwal na pangagailangan tulad ng panalangin at pag-aaral sa bibliya)
2. Social activities associated with religious activities and programs accompanied by church leaders, fellow members, and friends (pakiki-pagkapwa sa mga kaibigan at ibang mga tao)
3. The use of virtual places of worship during the pandemic which includes the use of TV, zoom app, YouTube, Facebook and other social media. (virtual na paraan ng pagsamba)

The word cloud highlights the significance of activities and services related to 'worship'. As the interview in conducted during the COVID pandemic, interview respondents have highlighted the 'importance' of religious belief as a coping mechanism during the quarantine period (Gaillard and Texier, 2010). While most public religious services have been prohibited, the concept of 'allowing' the community to create small groups and alternate

### 5.3.6. Assessing Places of Worship as a Social Innovation in a Disaster Context



**Figure 5.3.6. Word cloud from themes of social innovation.**

members continue to find alternative ways in doing their religious activities. The results of the interviews highlight the importance of watching, joining, and attending 'live' religious activities. While many church leaders promote gathering in small groups, community leaders often mention the use of social media (e.g., Facebook and YouTube) as a tool in participating in various religious activities. These activities are often held on Sundays and sometimes in the houses of its members. Religious activities do not only include mass and ministries but also in raising funds for the community.

### **Survey Items for Social Beliefs:**

1. Alleys/roads are used for various religious and relief activities (mga iskinita / kalsada para sa mga gawaing pang-relihiyon)
2. Virtual places of worship are being conducted during the COVID pandemic (virtual na paraan ng pagsamba) (TV,zoom app,youtube,FB /messenger)
3. Various social media platforms are used for fund-raising/donations for the community (paggamit ng social media para makalikom ng pondo / mga donasyon)

In this section, the social resilience framework was operationalized to identify potential measures in assessing resilience that involves the use of places of worship as a social innovation (Geoff Mulgan et al, 2007).

Innovation is an important aspect of addressing disasters in the community (Kendra and Wachtendorf, 2007). Due to the various restrictions implemented during the COVID pandemic, the community leaders and their

### **5.3.7. Assessing social resilience dimensions with the selection of variables for Survey evaluation.**

While analysing the content of the interviews through word clouds may highlight emerging themes, assessing the responses with the characteristics of the individual respondents may show any bias or preconceptions that may arise from the collected data. Table 5.3.1. examines the possible bias of gender and age to their responses in the social dimensions. The preliminary observation one can see from the table 5.3.1. is that majority of the respondents were female. One factor is that majority (80%) of the community leaders and officers in Barangay San Andres are female. Another aspect is the willingness of the respondent to be interviewed. Many prospective male interviewees refer female officers to the researcher to be interviewed. This initial observation would provide an opportunity for the next phase of the research to verify if gender and age significantly influences the results of each social resilience dimension.

**Table 5.3.1. Matrix of Social Dimensions in Relation to the Age and Gender of Interviewees.**

Gender	Male (6)			Female (12)			Total
Age Group	18-39 years old	40-59 years old	60- above years old	18-39 years old	40-59 years old	60- above years old	
Social Beliefs	1	2	2	0	6	5	16
Social Capital	1	2	2	0	7	5	17
Social Equity	1	2	2	0	6	4	15
Social Innovation	1	2	2	0	6	5	16
Social Mechanism	1	1	2	0	5	5	14
Social Structure	1	2	2	0	5	5	15
<b>Total</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>7</b>	<b>5</b>	<b>17</b>

Table 5.3.2. shows the responses each individual interviewee to be balanced and gathered from both banks of the Manggahan floodway. As the Barangay Hall is located at the East bank, most of the barangay officials are in this area. In this table, one can see more participation of church officials from the West bank. One possible aspect is that the West bank is more populated and is the location of six (6) Homeowner Associations (HOAs), compared to the East bank's two HOAs. As the physical infrastructure of both areas are significantly different, the study aims to assess if their locations do provide a different understanding and perception to the different dimensions of social resilience.

**Table 5.3.2. Matrix of Social Dimensions in Relation to the Location and Designation of Interviewees.**

Person	Location = East (9)			Location = West (8)			Total (17)
Designation	Barangay Official (5)	Church Official (1)	HOA Official (3)	Barangay Official (0)	Church Official (3)	HOA Official (5)	
Social Beliefs	4	1	3	0	3	5	16
Social Capital	5	1	3	0	3	5	17
Social Equity	4	1	2	0	3	5	15
Social Innovation	4	1	3	0	3	5	16
Social Mechanism	4	0	3	0	3	4	14
Social Structure	4	1	3	0	2	5	15
<b>Total</b>	<b>5</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>5</b>	<b>17</b>

#### **5.4. Summary of Results from the Qualitative Research**

In the development of the questionnaire, table 5.3.3. now categorizes the different variables that are used in validating the results from the interviews of barangay officials, HOA officers, church officials and church workers. However, as the respondents are not familiar with how the social resilience framework is understood, the questions need to be rearranged to provide a simple flow of thought and understanding with regards to the use of places of worship. Table 5.3.4. show the questionnaire in a simplified format for easy answering of questions. Table 5.3.5. shows the codes of the social resilience dimensions to the corresponding survey questions.

**Table 5.3.3. Potential Variables Formulated for Evaluation for the Self-administered survey.**

Resilience dimension	Potential measuring variables
<b>Social Structure</b>	1. An emergency facility
	2. Near my home and accessible
	3. Protection from disasters
<b>Social Capital</b>	4. Socially (friends/people)
	5. Physically (donations/assistance)
	6. Healthy relationship with others
<b>Social Mechanism</b>	7. Enhanced resilience
	8. Mentally (counselling/seminar)
	9. Near my home and accessible
	10. Healthy relationship with others
	11. Use of social media platform for fund-raising/donations
<b>Social Equity</b>	12. Sense of belongingness
	13. Open and accommodating to all people
	14. Discusses disaster management and donation distribution
<b>Social Belief</b>	15. Spiritual activities
	16. Socially (friends/people)
	17. Virtual place of worship (TV, zoom app, YouTube /messenger)
<b>Social Innovation</b>	18. Alleys/roads for religious and relief activities
	19. Virtual place of worship
	20. Use of social media platform for fund-raising/donations

**Table 5.3.4. Showing how different SRF dimensions are designed on the survey questionnaire based on easier understanding of the respondents.**

SRF dimension	Describe how much you agree or disagree with the place of worship in times of disasters in the following statements.
<b>1. Infrastructure</b>	
a. As an emergency facility	Social Structure
b. Near my home and accessible	Social Structure
<b>2. Supports</b>	
a. Socially (friends/people)	Social Capital
b. Mentally (counselling/seminar)	Social Mechanism
c. Physically (donations/assistance)	Social Capital
d. Spiritually (prayer/bible)	Social Belief
<b>3. Provisions</b>	
a. Sense of belongingness	Social Equity
b. Enhanced resilience	Social Mechanism
c. Healthy relationship with others	Social Capital
d. Spiritual activities	Social Belief
e. Protection from disasters	Social Structure
f. Open and accommodating to all people	Social Equity
g. Discusses disaster management and donation distribution	Social Equity
<b>4. Innovations</b>	
a. Alleys/roads for religious and relief activities	Social Innovation
b. Virtual place of worship (TV, zoom app, YouTube, FB)	Social Innovation
c. Use of social media platform for fund-raising/donations	Social Innovation

**Table 5.3.5. 16-item and 6-dimensions of social resilience framework based on discussions on literature.**

Dim code	Question	Construct	Item in questionnaire
<b>SS1</b>	S1a	Emergency facility	a. As an emergency facility
<b>SS2</b>	S1b	Near access	b. Near my home and accessible
<b>SS3</b>	S3e	Protection	e. Protection from disasters
<b>SC1</b>	S2a	Social association	a. Socially (friends/people)
<b>SC2</b>	S2c	Social support	c. Physically (donations/assistance)
<b>SC3</b>	S3c	Social Cohesion	c. Healthy relationship with others
<b>SM1</b>	S2b	Competence	b. Mentally (counselling/seminar)
<b>SM2</b>	S3b	Resilience	b. Enhanced resilience
<b>SB1</b>	S2d	Spirituality	d. Spiritually (prayer/bible)
<b>SB2</b>	S3d	Religious practices	d. Mass, processions
<b>SE1</b>	S3f	Accommodating	f. Open and accommodating to all people
<b>SE2</b>	S3a	Belongingness	a. Sense of belongingness
<b>SE3</b>	S3g	Information Awareness	g. Disaster management and donation distribution
<b>SI1</b>	S4c	Fund raising	c. Use of social media platform for donations
<b>SI2</b>	S4a	Resourcefulness	a. Alleys/roads for religious and relief activities
<b>SI3</b>	S4b	Ingenuity	b. Virtual place of worship (TV, zoom, YT, FB)

## **Research Outline**

- 3. Introduction**
- 4. Review of Related Literature**
- 5. Theoretical Framework**
- 6. Research Methods**
- 7. Interview Results/Analysis**
- 8. Survey Results/Analysis**
  - 6.1. Stage 1: Survey Results**
    - 6.1.1. Survey Demographic Profile
    - 6.1.2. Survey Results
  - 6.2. Stage 2: Descriptive statistics and Inferential Statistics**
    - 6.2.1. The Distribution and the Measure of central tendency
    - 6.2.2. The Dispersion of the data
    - 6.2.3. Hypothesis testing
  - 6.3. Stage 3: Confirmatory Factor Analysis (#2) and Structural Equation Modelling (SEM) (#3)**
    - 6.3.1. Confirmatory Factor Analysis (CFA)
    - 6.3.2. Structural Component and relevant literature
    - 6.3.3. The Structural Equation Model
- 9. Synthesis of key findings**
- 10. Discussion/recommendations for future research**

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## **Chapter 6: Survey Results and Analysis**

Chapter 6 has three (3) key sections that presents the analysis from the results of the survey. Section 6.1 discusses the results of the survey through a heat map. Section 6.2. describes the survey statistics and providing inferences through non-parametric inferential statistics. Section 6.3. conducts a confirmatory factor analysis and structural equation modelling to a unified conceptual model to validate inferences and results found in the previous stages of the study.

## 6.1. Quantitative Analysis Stage 1 – Descriptive Statistics

### 6.1.1. Survey Demographic Profile

Four hundred nine (409) residents of Barangay San Andres responded to the survey on Social Resilience in Places of Worship – which represents a completion rate of 92.7%. Figure 6.1.1. shows that of the 409 respondents, 47.9% (N = 196) were from the ENAI, 29.1 % (N=119) were from Lakas Tao, 14.2 % (N=58) were from Buklod Maralita while 8.8% (N = 36) were from PFCI.

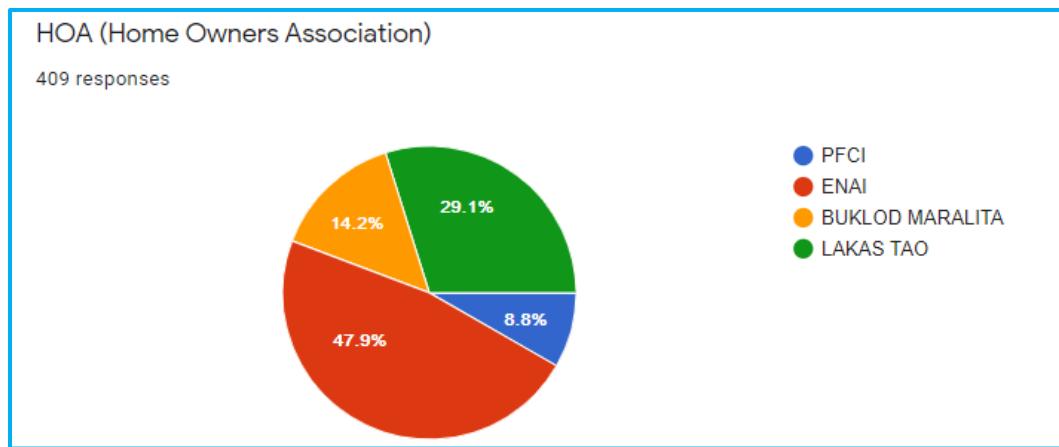


Figure 6.1.1. Number of Respondents in the Homeowners Association

In Figure 6.1.2. we can see that among the 409 respondents there were 77.5% (N = 317) female and 22.5% (N = 92) male.

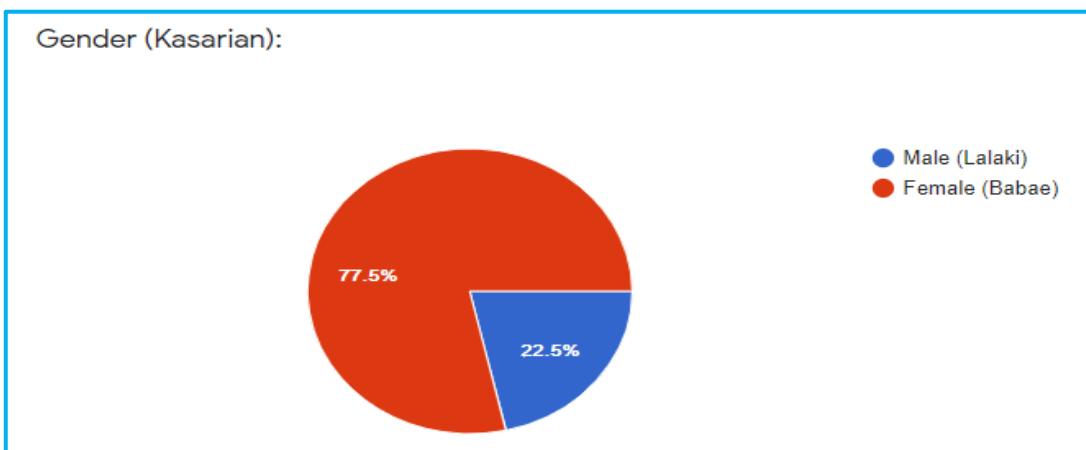
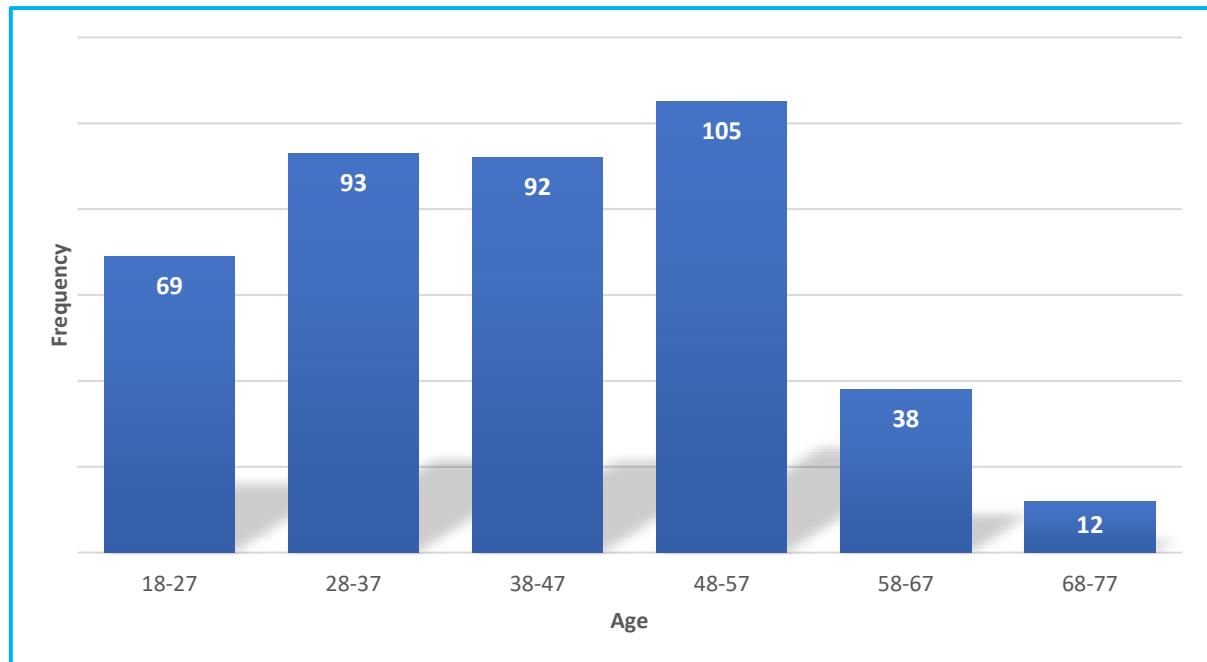
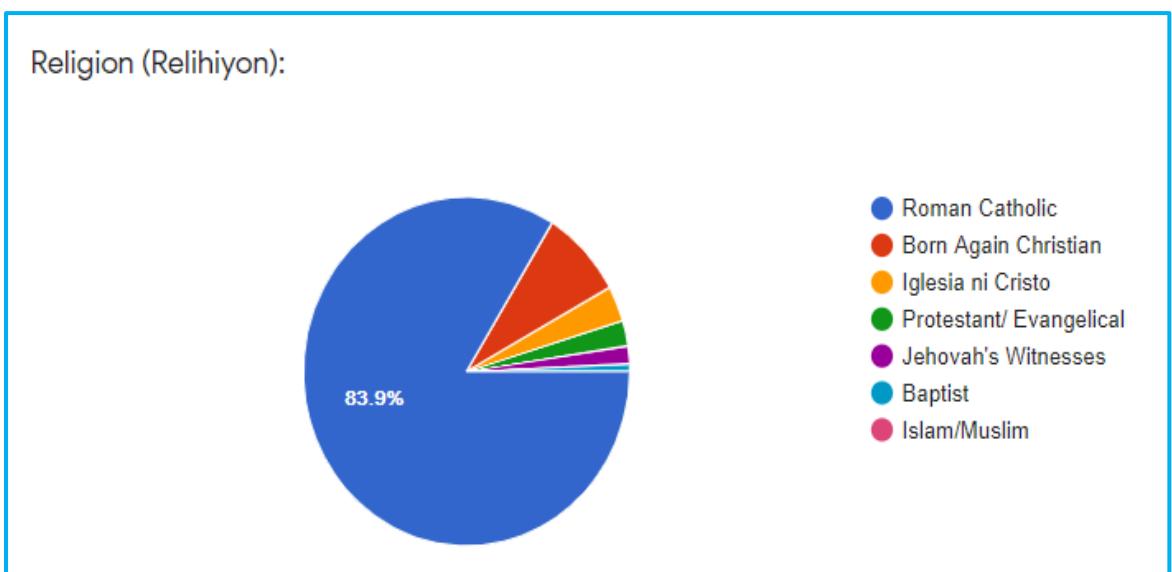


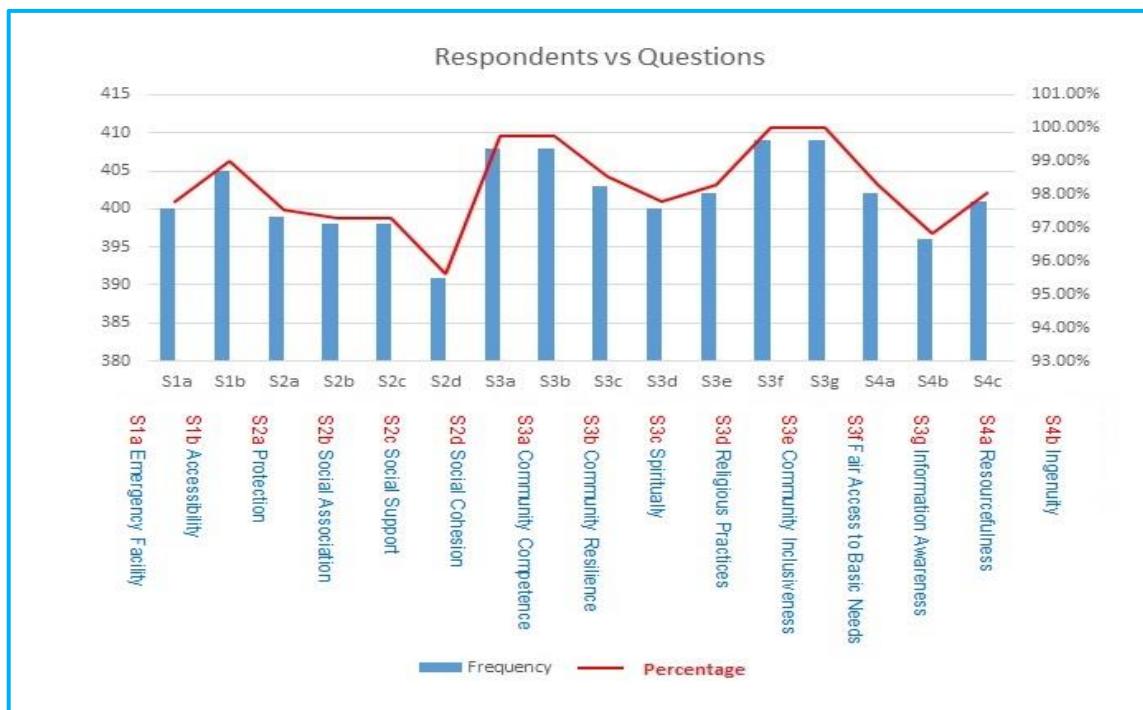
Figure 6.1.2. Gender of Respondents in the Homeowners Association



**Figure 6.1.3 Age of Respondents in the Homeowners Association.** As shown in the above figure, 25.67% (N=105) of respondents were from 48 to 57 years old; 22.74% (N=93) were from 28 to 37 years old and 22.49% (N=92) were from 38 to 47 years old.

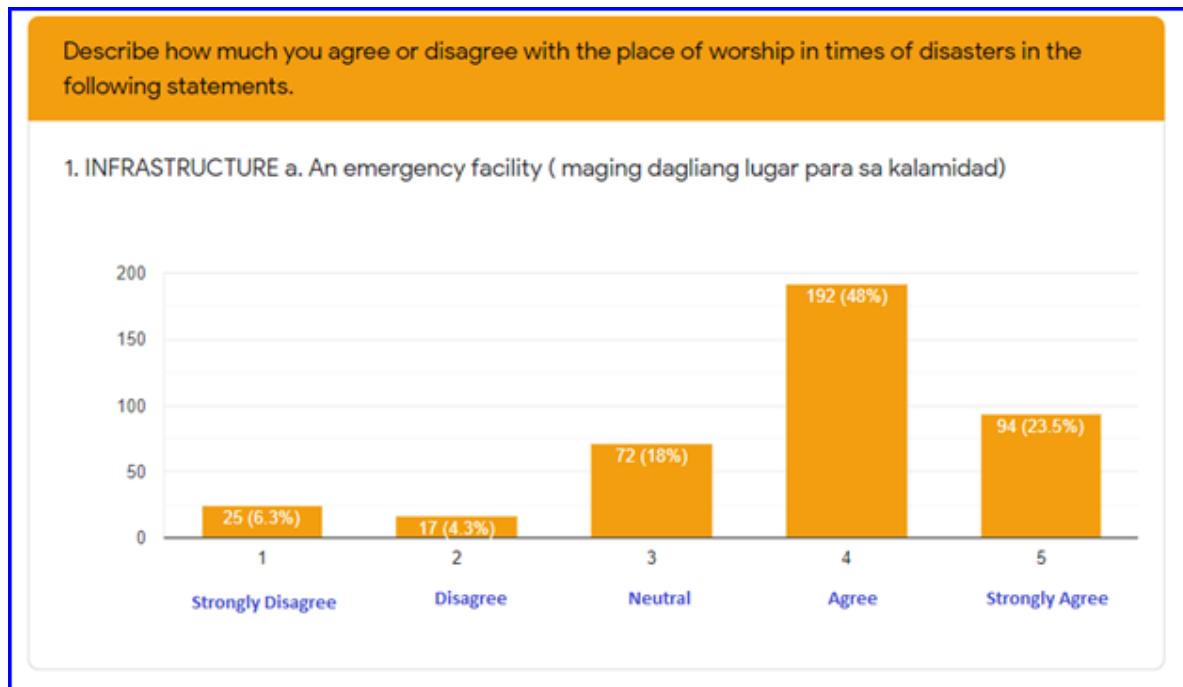


**Figure 6.1.4. Religion of Respondents in the Homeowners Association.** As shown in Figure 6.1.4, there are 83.9% (N = 343) of the respondents are unsurprisingly Roman Catholic since it is the dominant religion in the Philippines.



**Figure 6.1.5 Number of Respondents who Answered each Questions.** The graph shows that for each question in the survey questionnaire, there were respondents who completed the survey but there were some who did not answer the question properly.

### 6.1.2. Survey Results



**Figure 6.1.6. Places of Worship as an Emergency Facility**

Figure 6.1.6. shows, there are 48 % (N=192) of the respondents agree and 23.5 % (N=94) strongly agree that the places of worship can be used as emergency facility either shelter or storage during the disasters.

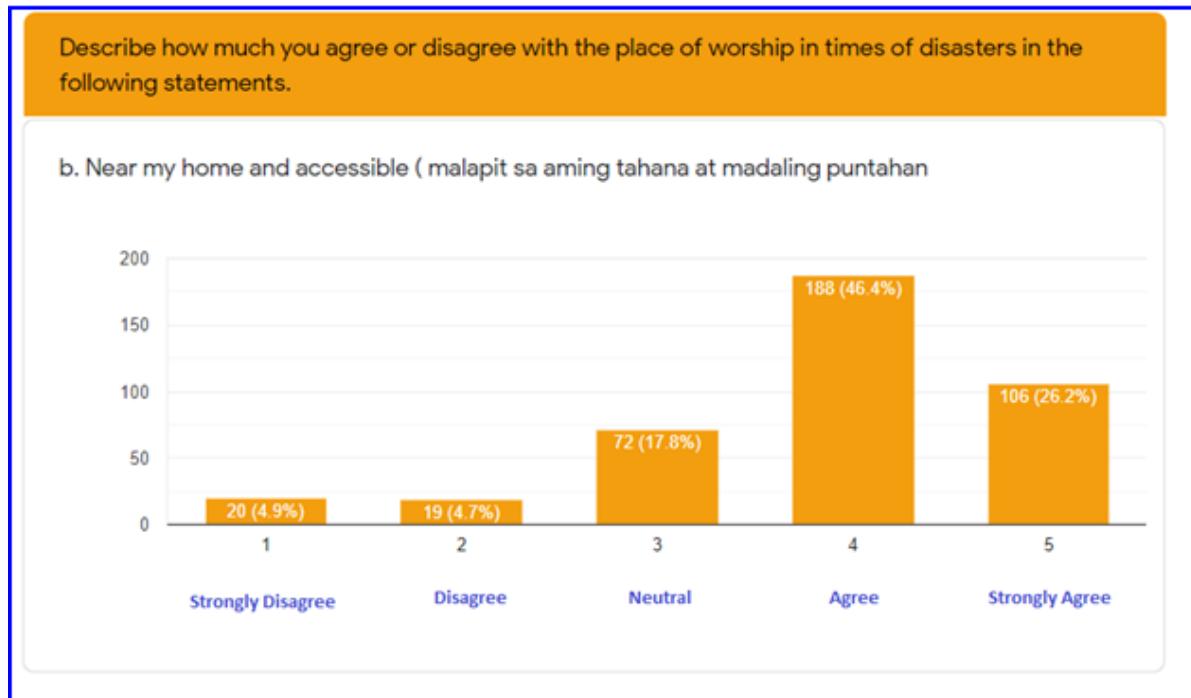


Figure 6.1.7. **Places of Worship as Accessible.**

As shown in Figure 6.1.7., there are 46.4% (N = 188) of the respondents who agree that places of worships are accessible to them while 26.2% (N=106) answered that they strongly agree.

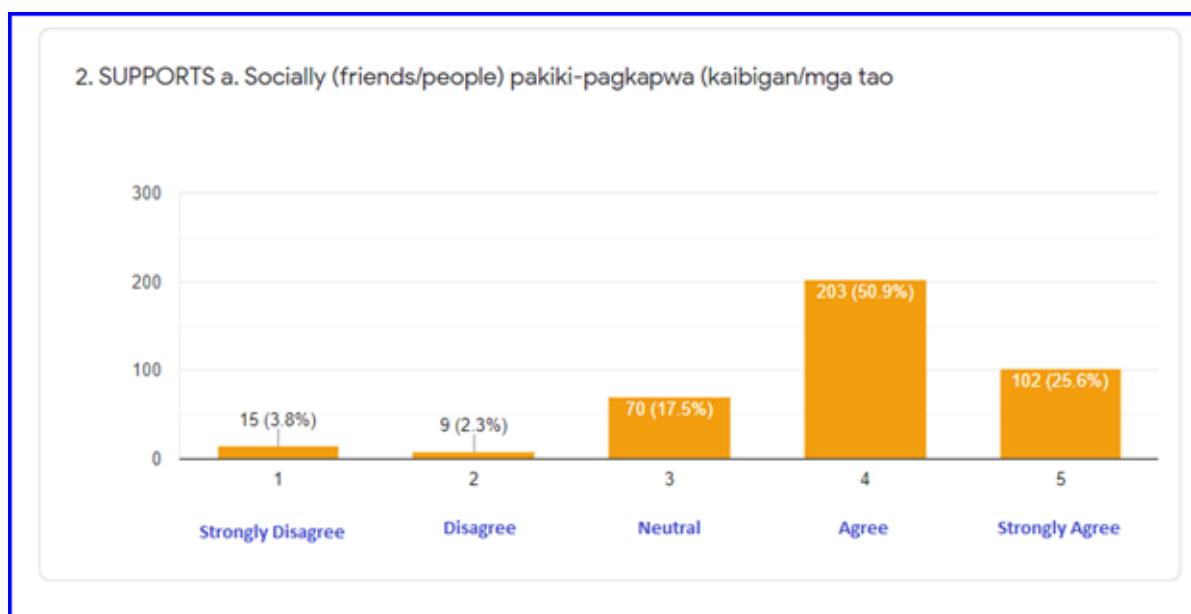


Figure 6.1.8. **Places of Worship in the Social Aspect**

As shown from the results above (Figure 6.1.8.), there are 50.9 % (N=203) of the respondents agreed that places of worship affect them socially.

b. Mentally (counselling/seminar) pang-kaisipan (pagpapayo/seminar)

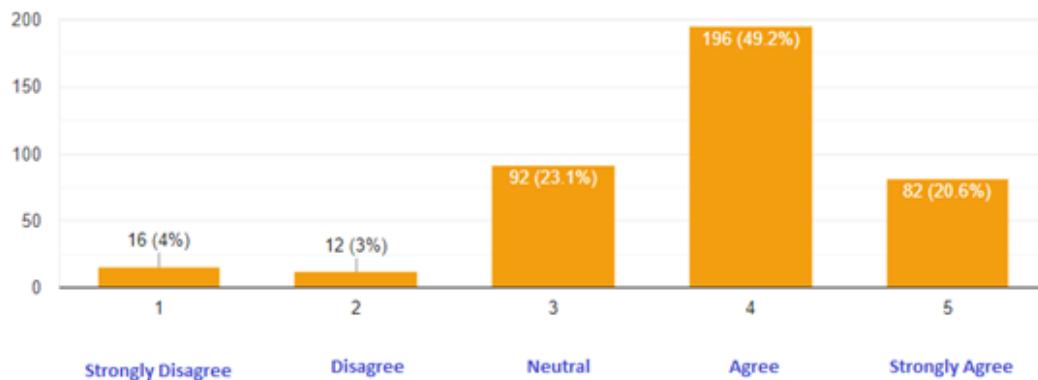


Figure 6.1.9. **Places of Worship in the Mental Aspect.**

As shown in Figure 6.1.9., there are 49.2% (N = 196) of the respondents who agreed that places of worships affect them mentally.

c. Physically (donations/assistance) pisikal (mga donasyon/tulong)

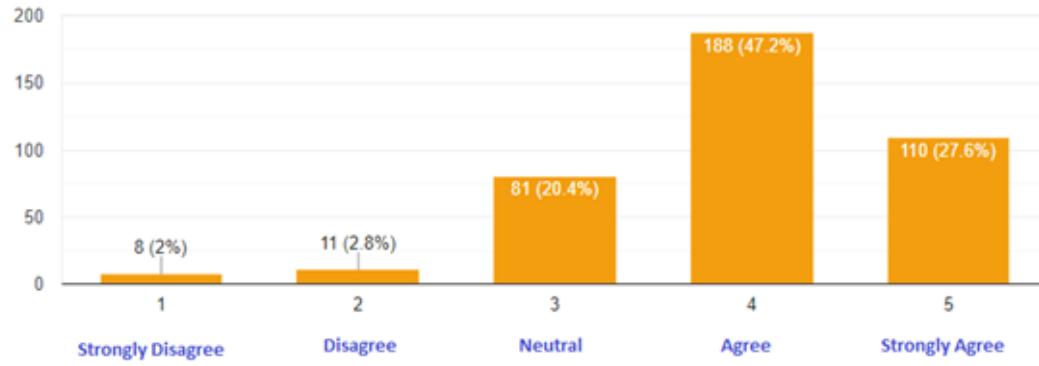
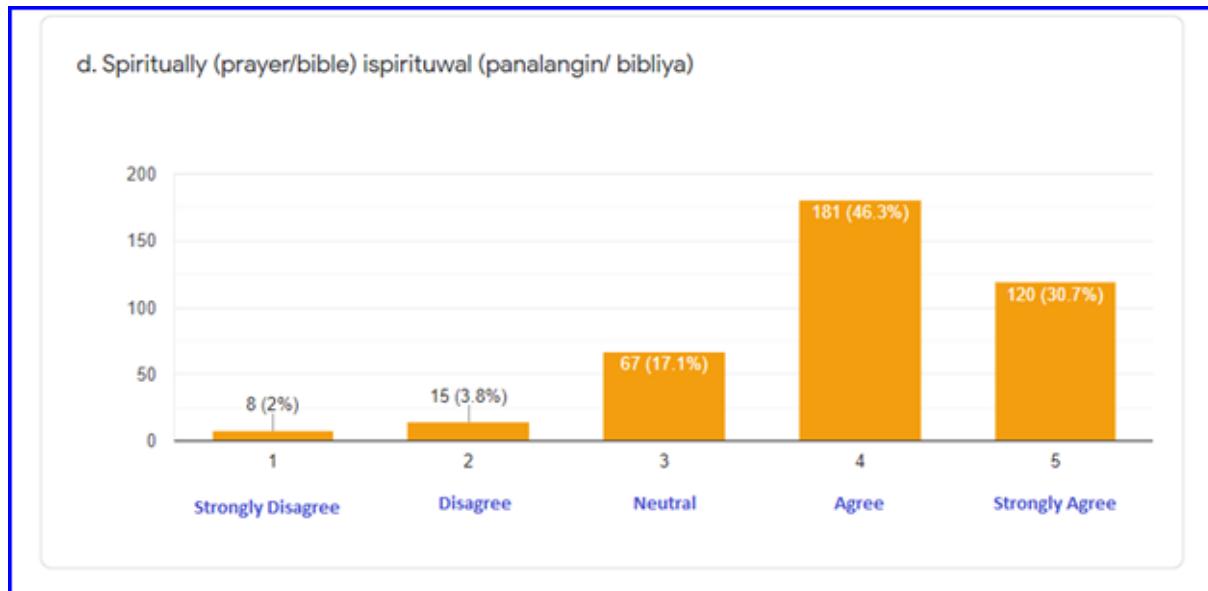


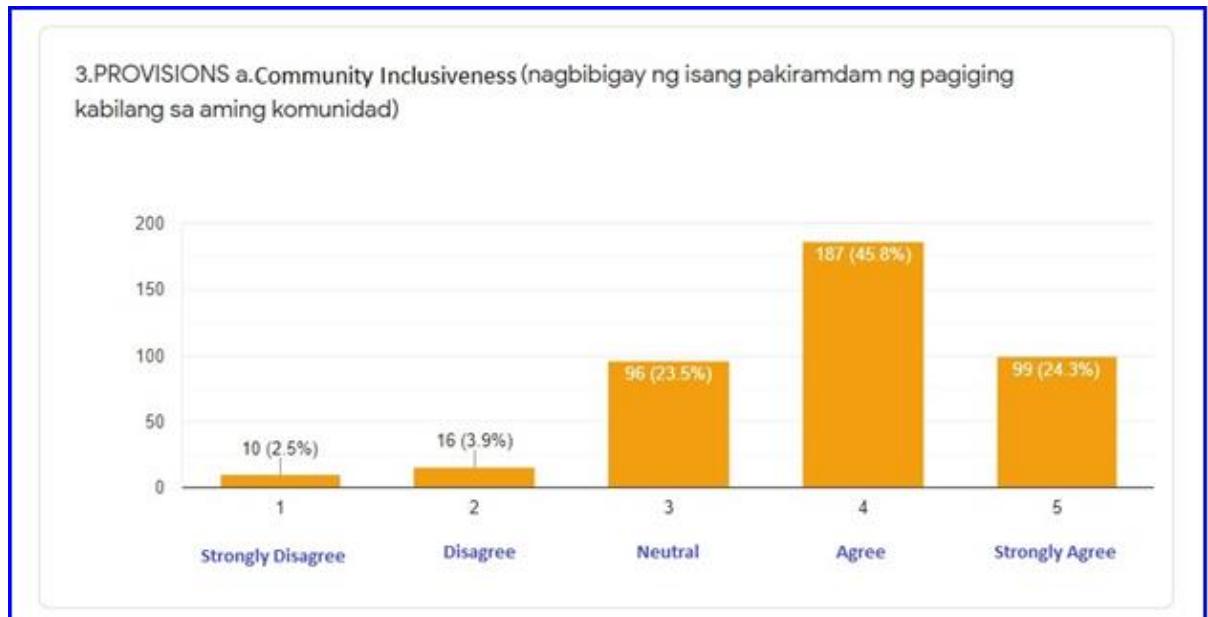
Figure 6.1.10. **Places of Worship in the Physical Aspect.**

Figure 6.1.10. shows, there are 47.2% (N=188) of the respondents agree and 27.6 % (N=110) strongly agree that the places of worship can affect them physically.



**Figure 6.1.11. Places of Worship in the Spiritual Aspect**

As shown from the results above (Figure 6.1.11.), there are 46.3 % (N=181) of the respondents agreed and strongly agreed 30.7% (N=120) that places of worship affect them spiritually.



**Figure 6.1.12. Places of Worship Provide a Sense of Community Inclusiveness.**

Figure 6.1.12. shows that 45.8% (N=187) of the respondents agreed that the places of worships provide a sense of belongingness to the community.

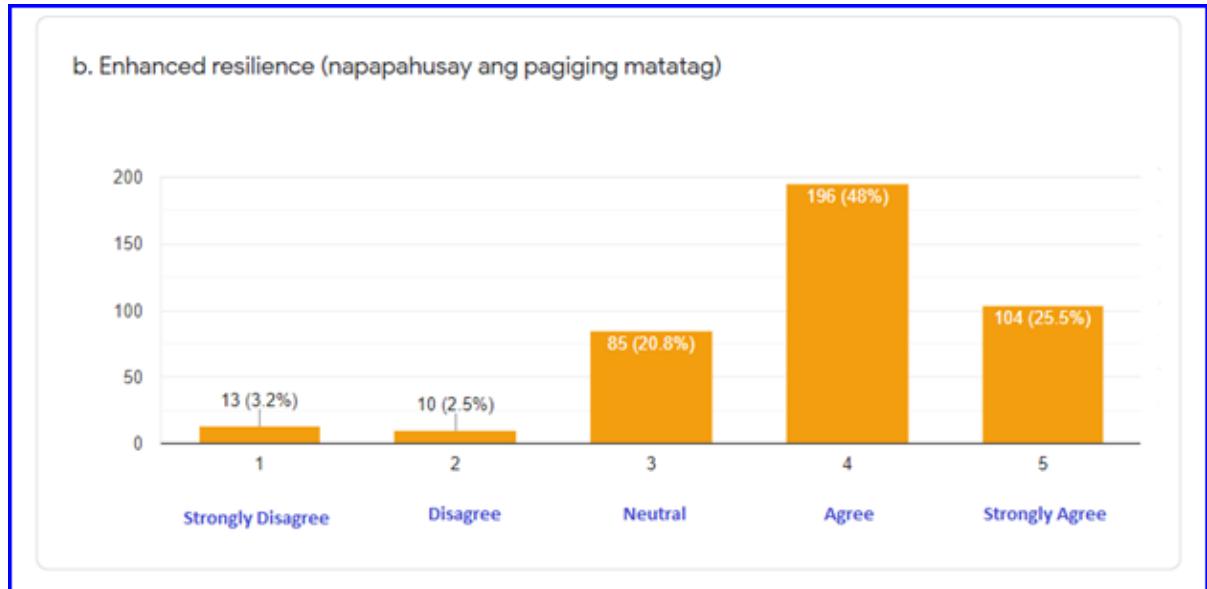


Figure 6.1.13. **Places of Worship Enhances Resilience**

As shown in Figure 6.1.13., there are 48% (N = 196) of the respondents who agreed that places of worships enhanced the community resilience during the disasters.

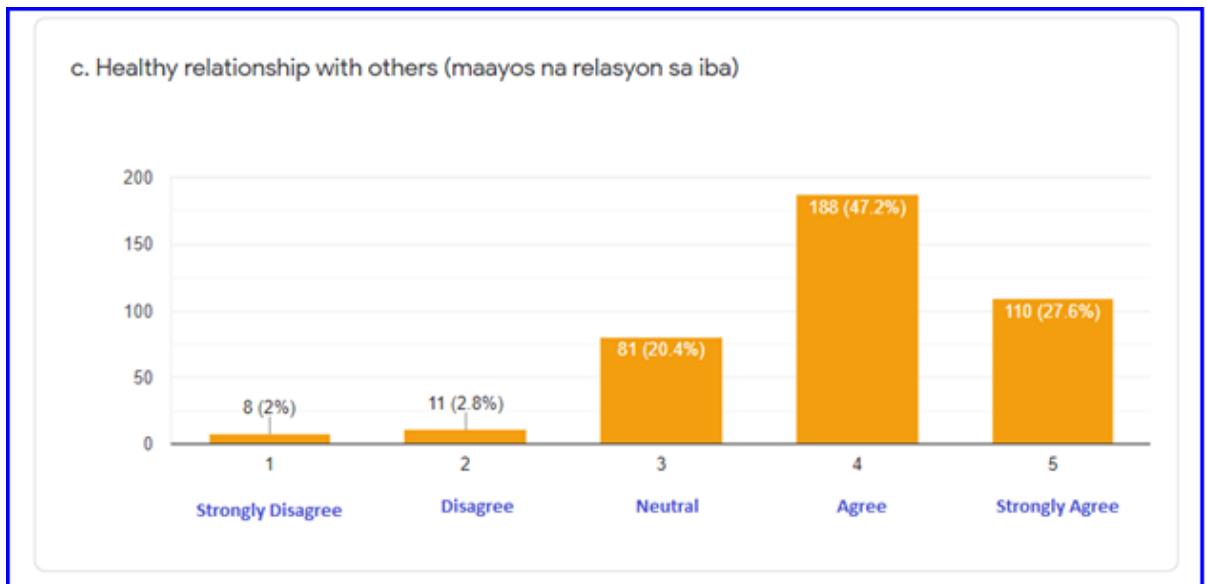


Figure 6.1.14. **Places of Worship Build a Healthy Relationship**

Figure 6.1.14. shows that 47.2% (N=188) % of the respondents agreed that the places of worships build a healthy relationship to the community.

d. Spiritual activities (mga gawaing pang-ispirituwal)

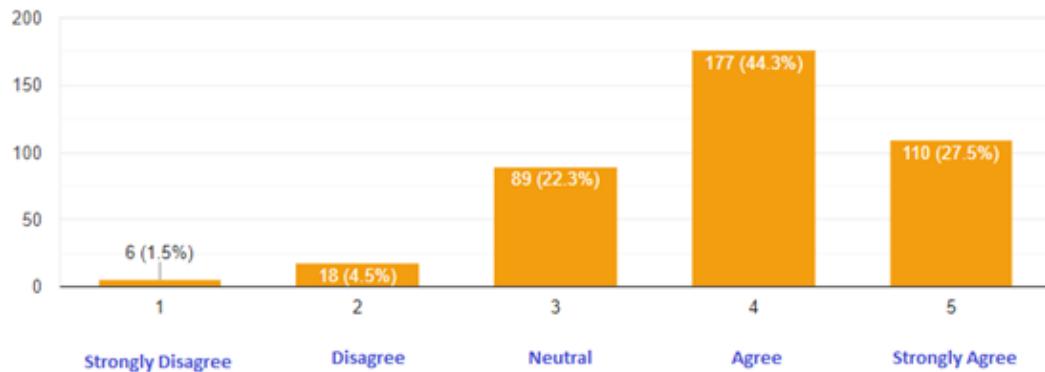


Figure 6.1.15. **Places of Worship Provide Spiritual Activities**

As shown in Figure 6.1.15., there are 44.3% (N = 177) of the respondents who agreed that places of worships provide spiritual activities that prepares the community to face the disaster.

e. Protection from disasters (protekson mula sa mga kalamidad)

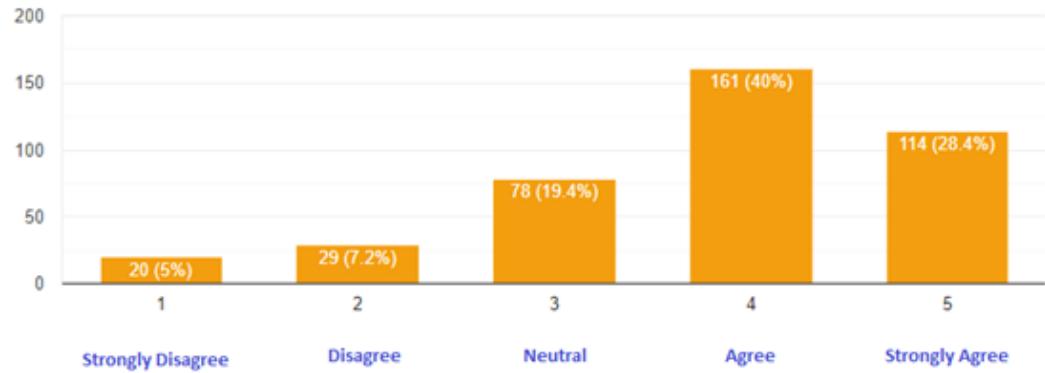


Figure 6.1.16. **Places of Worship as Protection from Disaster**

Figure 6.1.16. shows that 40% (N=161) of the respondents agreed that the places of worships provide protection from the disasters.

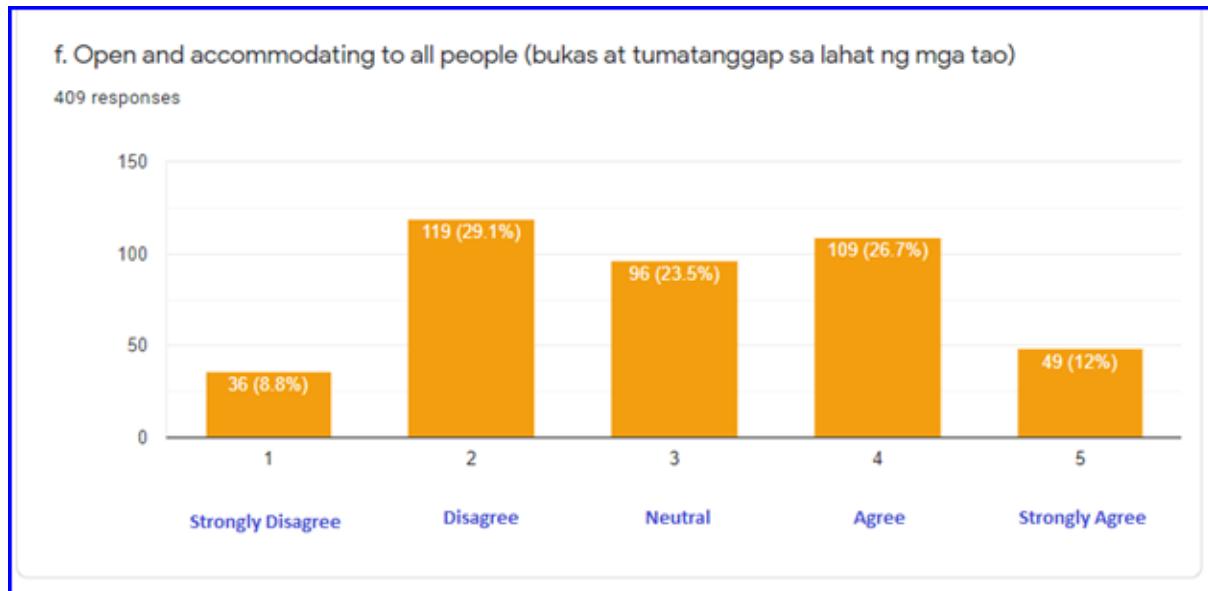


Figure 6.1.17. **Places of Worship as Open and Accommodating to All People**

Based on Figure 6.1.17., there are 29.1% (N= 119) of the respondents who disagree that places of worship are open and accommodating to all people while 26.7% (N=109) agree here.

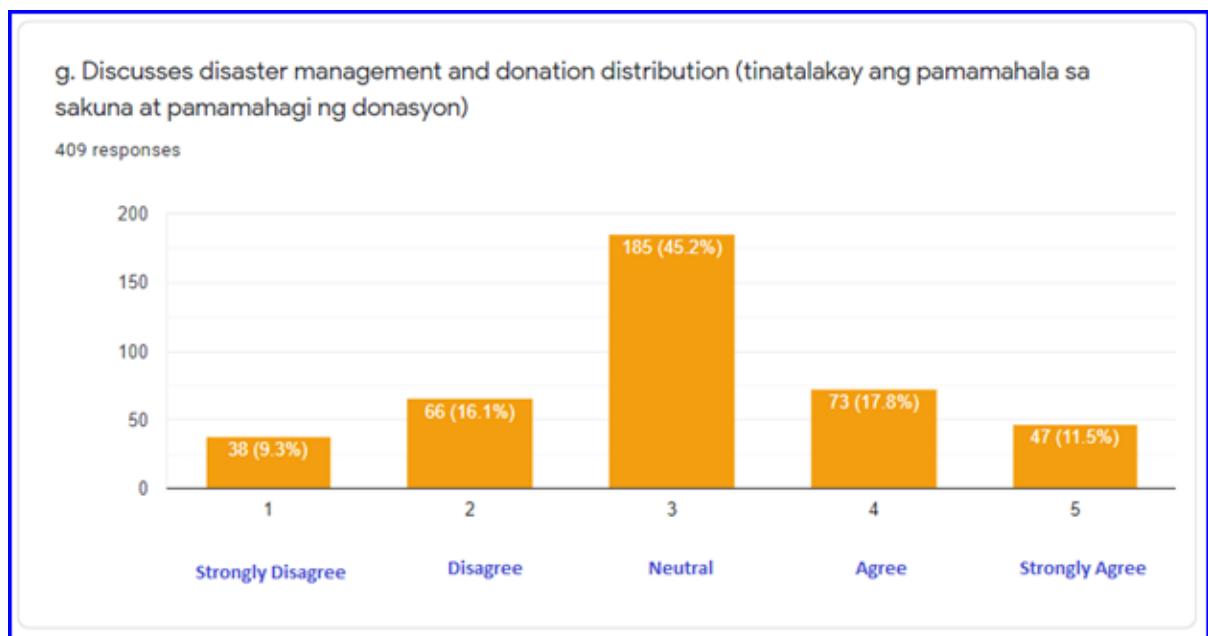


Figure 6.1.18. **Places of Worship Discusses Disaster Management and Donation Distribution**

As shown from the results above (Figure 6.1.18.), there are 45.2 % (N=185) of the respondents agreed that places of worship discuss disaster management and donation distribution to the community.

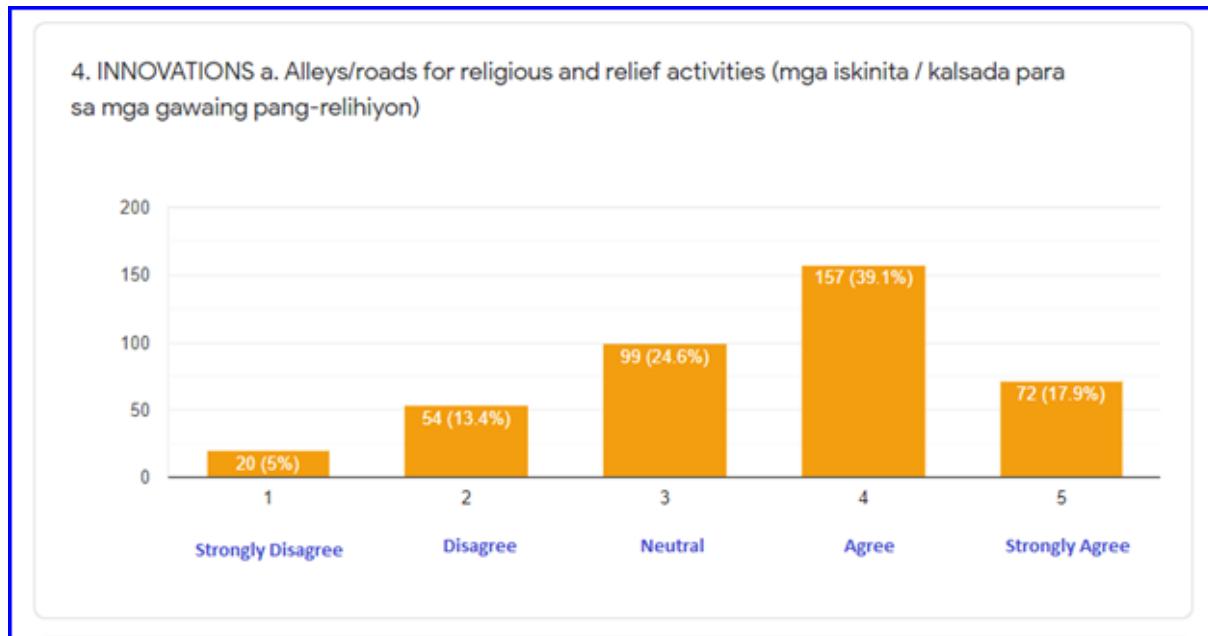


Figure 6.1.19. **Places of Worship Use Alleys/Roads**

Figure 6.1.19. shows that 39.1 (N=157) of the respondents agreed that the places of worships use alleys/roads for religious and relief activities.

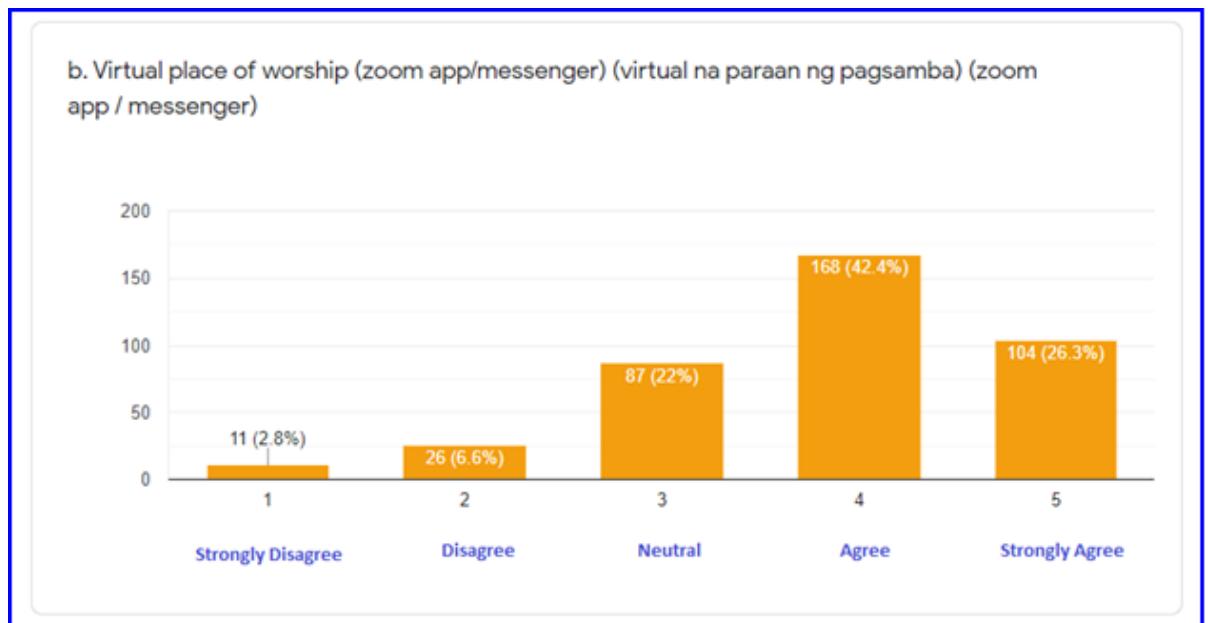


Figure 6.1.20. **Virtual Places of Worship**

Figure 6.1.20. shows, there are 42.4% (N=168) of the respondents agree and 26.3 % (N=104) strongly agree that the place of worship uses virtual places of worship to maintain the spirituality of their members.

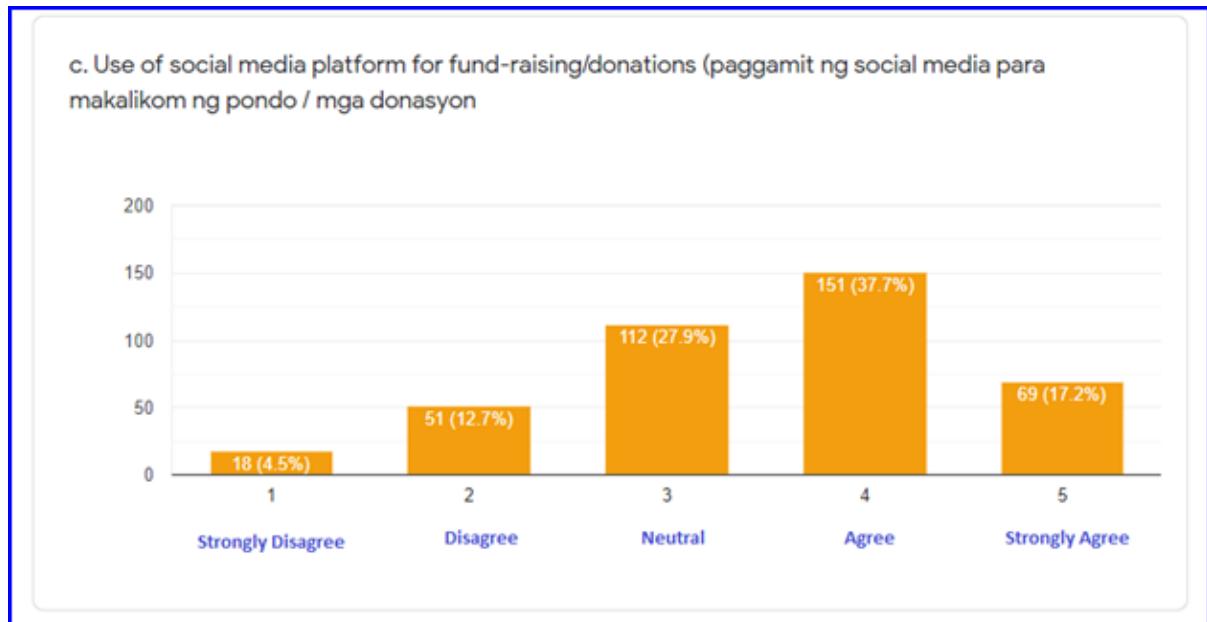
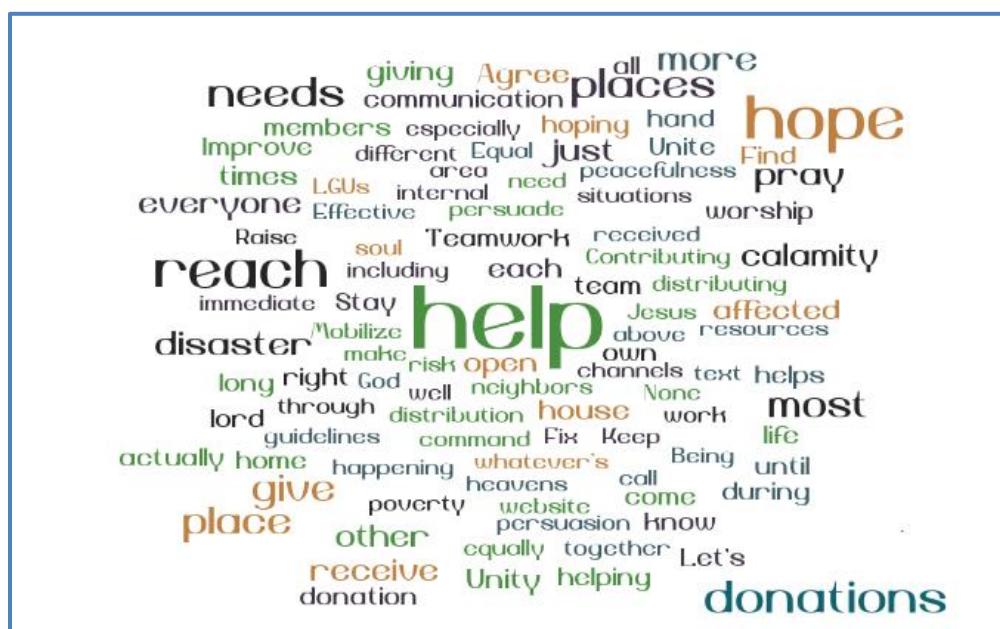


Figure 6.1.21. **Places of Worship Use Social Media**

Based on Figure 6.1.21., there are 37.3% (N= 151) of the respondents who agree that places of worship can use social media platform for fund-raising and donations.



**Figure 6.1.22. Respondents' suggestions about "how to strengthen the assistance of the place of worship in times of disasters?".**

In the survey, the researcher asked the respondents, ***"Do you have any suggestions to strengthen the help of the place of worship in times of disaster?"***

Examining the result of the word cloud in Figure 2.16 we obtained key words such as “help”, “donations”, “hope”, “needs” and “reach”. These data suggests that the majority of respondents acknowledged the need for more donations and for more help. These results

also suggest that the use of places of worship should be well coordinated with the Local Government Units and church leaders in the distribution of relief goods and in-kind donations during the disasters.

**Table 6.1. Heat map of the survey results of how of places of worship are used in enhancing social resilience.**

Q	Concept	Frequency	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
S1a	Emergency facility	400	25	17	72	192	94
S1b	Near access	405	20	19	72	188	106
S2a	Social support	399	15	9	70	203	102
S2b	Mental support	398	16	12	92	196	82
S2c	Physical support	398	8	11	81	188	110
S2d	Spiritual support	391	8	15	67	181	120
S3a	Belongingness	408	10	16	96	187	99
S3b	Resilience	408	13	10	85	196	104
S3c	Relationships	403	9	12	78	216	88
S3d	Spiritual activities	400	6	18	89	177	110
S3e	Protection	402	20	29	78	161	114
S3f	Accommodating	409	36	119	96	109	49
S3g	Distribution	409	38	66	185	73	47
S4a	Alleys	402	20	54	99	157	72
S4b	Virtual PoW	396	11	26	87	168	104
S4c	Social media	401	18	51	112	151	69

In conducting surveys, it is ideal to provide as many questions as possible to collect as much information as possible. However, the number of variables was designed to limit the length of time the survey is to be answered and the time of contact between persons during the COVID pandemic.

In summary, the survey has provided individual and collective insights on how the use of places of worships enhances social resilience. However, the inequality of how spaces in places of worship are used has been highlighted in the survey. There is also uncertainty from many respondents on how these places worship is equally open and accommodating to be used for all the people in the community. The next survey analysis is conducted to examine whether the difference of age, gender, religion, and location of the respondents has affected the results of the survey, preventing any type of wrong generalization from the results.

## 6.2. Quantitative Analysis Stage 2 – Descriptive Statistics and Inferential Statistics

This first section on descriptive statistics discusses the frequency of the results, the mode, skewness, and identifying the variation, range, and standard deviation of the data. The second section on inferential statistics discusses the results of different hypotheses through non-parametric tests.

### 6.2.1. Describing the Distribution and the Measure of Central Tendency

The study was first evaluated by a descriptive analysis of the survey data. As the survey was manually completed, they were encoded and uploaded in google Sheet for document management. The consolidated data was then downloaded in MS Excel. Categorical data such as gender, location, age group, and religion were assigned dummy variables to be used in future computations.

Table 6.2.1. Distribution of Respondents According to Location, Religion, Gender, and Age Group

Variable	Categories of the Variable	Frequency	Percentage
Location	East bank	232	56.72
	West bank	177	43.28
	Total	409	
Religion	Catholic	348	85.50
	Others	59	14.50
	Total	407	
Gender	Female	323	79.17
	Male	85	20.83
	Total	408	
Age Group	18 to 19 years	177	43.28
	40 to 59 years	196	47.92
	60 years and above	36	8.80
	Total	409	

Table 6.2.2. Dummy Variables used in the Survey Analysis.

Age	Gender	Location	Religion
18-39 y/old =0	Female = 0	East bank = 0	Roman Catholic = 0
40-59 y/old =1	Male = 1	West bank =1	Other Religion =1
<60 y/old=2			

## Probability Distribution

Tables included in the text of this report highlight selected relevant survey findings and are expressed in percentages. The base for each table is all respondents (N=409) unless otherwise noted. Survey questions require the participation to select one answer from a predefined list of 5 options – from strongly disagree (1) to strongly agree (5). Table 6.2.1 shows that there are survey items that get less than 70% of the respondents.

**Table 6.2.3. Frequency Distribution of Respondents by Survey Item.**

Code	Variables	Total Frequency	Percentage Attainment of at least “Agree”	Percentage Attainment of at least “Strongly Agree”
SS1	Emergency Facility	378	89%	72%
SS2	Accessibility	383	90%	74%
SS3	Protection	380	87%	69%
SC1	Social Association	377	94%	77%
SC2	Social Support	377	95%	75%
SC3	Social Cohesion	382	95%	76%
SM1	Community Competence	377	93%	70%
SM2	Community Resilience	387	94%	74%
SB1	Spiritually	370	94%	77%
SB2	Religious Practices	378	94%	72%
SE1	Community inclusiveness	387	94%	71%
SE2	Fair Access to Basic Needs	409	62%	39%
SE3	Information Awareness	409	75%	29%
SI1	Resourcefulness	381	81%	57%
SI2	Ingenuity	375	90%	69%
SI3	Fundraising	380	82%	55%
Overall attainment		6130	88%	66%

## Measure of Central Tendency

A meaningful result is seen in the mean for all the dimensions of social resilience that reveal mean scores that range from 3.32 to 3.80. This shows a positive perception of Places of Worship as a contributor of social resilience among the respondents. A comparative analysis of the mean showed the most significant variable, or indicator, within each dimension that contributes greatly to the perception of their respective groups. A summarized table of the means and the results are tabulated in Table 6.2.4.

**Table 6.2.4. Comparative Analysis of the Mean Results of the Indicators of Social Resilience.**

Code	Social dimensions	Mean	SD	Results
	<b>Social Structure</b>	3.8023	0.8672	
SS1	Emergency facility	3.7704	1.0206	
SS2	Accessibility	<b>3.8490</b>	0.9941	
SS3	Protection	3.7876	1.0522	The SS2 (Accessibility) had the highest mean value indicating that the respondents showed social resilience towards places of worship as social structure.
	<b>Social Capital</b>	3.9174	0.7350	
SC1	Social Association	3.9125	0.8940	
SC2	Social/Physical Support	<b>3.9496</b>	0.8343	
SC3	Social Cohesion/ Relationships	3.8900	0.8245	The SC2 (Physically-donations/shared assets) mean value indicates the importance of physical assets, especially in the use of places of worship in enhancing social resilience as a social capital.
	<b>Social Mechanism</b>	3.7229	0.7629	
SM1	Community Competence	3.7774	0.8956	
SM2	Community Resilience	<b>3.8968</b>	0.8881	The SM2 (Enhanced Community Resilience) indicates that the resilience is evident in the use of places of worship as a social mechanism.
	<b>Social Equity</b>	3.3168	0.7524	
SE1	Community Inclusiveness	<b>3.8501</b>	0.8706	
SE2	Fair Access (accommodating)	3.0391	1.1792	
SE3	Information Awareness	3.0611	1.0817	The SE1 (Sense of belongingness) had the highest mean value indicating that the respondents showed social resilience towards places of worship as social equity.
	<b>Social Beliefs</b>	3.8971	0.7447	
SB1	Spirituality (prayer)	<b>3.9786</b>	0.8629	
SB2	Religious Practices	3.8998	0.8606	The SB1 (Spirituality) mean value indicates prayer to be a very important aspect in enhancing resilience as social belief.
	<b>Social Innovation</b>	3.6056	0.8391	
SI1	Resourcefulness (alleys)	3.5092	1.0632	
SI2	Ingenuity (virtual)	<b>3.8131</b>	0.9405	
SI3	Fundraising (social media)	3.4944	1.0254	The SI2 (Ingenuity (virtual)) had the highest mean value indicating that the respondents showed social resilience towards places of worship as social innovation.

### **6.2.2. Dispersion of the Data**

In analysing the dispersion of the data in social resilience, measures of variability are used such as range, standard deviation, and variance. The range indicated in the table is based on the 5-point Likert scale used in the survey forms. There is however a variation in the total count ( $n=409$ ) of each question as some of the respondents either did not fully accomplish the questionnaire or refused to answer the question. With a confidence level of 95%, the sample of the survey was able to provide a more accurate and precise understanding on how people use places of worship during disasters. The statistical results for questions (See table 6.2.3.) show that most Standard deviation (SD) values show a value less than one (1). Values less than one signify that most of the answers does not deviate far from most of the positive answers on the use of places of worship.

In doing inferential statistical tests, the data are assumed to be (1) normally distributed, (2) that the groups that are being compared have similar variance, and (3) that the data are independent. If the data collected are not able meet these assumptions, it is recommended to make use of non-parametric test in the analysis. While most of the dimensions resulted in a normal bell-shape distribution, negatively skewed distribution is seen in the indicators of the dimension on social equity (See Table 6.2.13). However, variance results show that most of the data are unified. In final consideration for choosing a statistical test, the data should be independent. Some scholarly literature has considered the different dimensions of social resilience to be of different entities (Saja et al., 2018). However, the study chose to expect some type of interdependencies to occur between dimensions due to the complex and integrated characteristics of social resilience (Kwok et al., 2016). Thus, the study uses non-parametric inferential statistical tests in testing the various hypotheses.

### **6.2.3. Hypothesis Testing and Non-parametric Tests**

Kruskal-Wallis test is used to compare the mean ranks of respondent scores and dimension scores across age groups, while Wilcoxon Mann-Whitney test is used to compare the mean ranks of respondent scores and dimension scores across categories of location, religion, and gender. Significance level was set at  $P\text{-value} < 0.05$ . Data were analysed using Microsoft Excel and Stata for Windows statistical software. Summary statistics such as mean, standard deviation, median, minimum, and maximum values were determined for respondent scores.

**Table 6.2.3.1. Partial Summary Statistics of Dimension Scores based on Social Structure by Location, Religion, Gender, and Age Group**

Wilcoxon-Mann Whitney U-test							
Ranks					Inferential		
Dimension	Location	N=409	Mean Rank	Sum of Ranks	p-value (0.05) significance level	cohen (r)	
Social Structure	East	232	238.36	55299.00	<0.0000	0.33	
	West	177	161.28	28546.00			
Kruskall-Wallis H-test							
Ranks					Inferential		
Dimension	Age	N=409	Mean Rank	Sum of Ranks	p-value (0.05) significance level	KW chi-square (df=2)	
Social Structure	18-39 y/old	177	208.56	36915.12	0.681	0.769	
	40-59 y/old	196	200.00	39200.00			
	above 60 y/old	36	214.71	7729.56			

Table 6.2.4. presents a partial summary statistics of social structure dimension scores by location, religion, gender, and age group. Mean ranks provide the direction to which inclination of the response would be. In the aspect of location, the mean rank of responses in the east bank is higher than those of the west bank on all dimensions. While some differences are anticipated, the significance of the difference is seen at the p-value.

P-values are used to determine whether the outcome of an experiment is statistically significant. This study sets that p-values less than (<) 0.05 to be statistically significant (See Appendix-1 for a complete summary of the statistics). By comparing only two variables, a social dimension score is measured by using the Wilcoxon-Mann Whitney test. In comparing for more than three variables, the Kruskal-Wall's test is used to validate the significance of the social dimension. As seen in the interviews and survey results, a dominance of female responses and Roman Catholicism in the data set. However, non-parametric tests did not yield results of significant differences of responses associated with their demographic characteristics such as gender, age, and religion.

### 6.2.3.1. Social Structure

Based on the findings, places of worship are considered as Social Structure where 73% ( $P<0.0001$ ) of the respondents agreed that their place of worship is accessible in a community, among the respondents 72% ( $P<0.0001$ ) recognized that places of worship in their area could be used as an emergency shelter in times of disaster, and 68% ( $P<0.0001$ ) considered it as place of protection from disasters. Significantly, respondents who live in the east bank gave higher scores on Social Structure ( $P<0.0001$ ), (Mean 3.98, SD=0.95) compared with those who live in the west bank (Mean=3.46, SD=0.88).

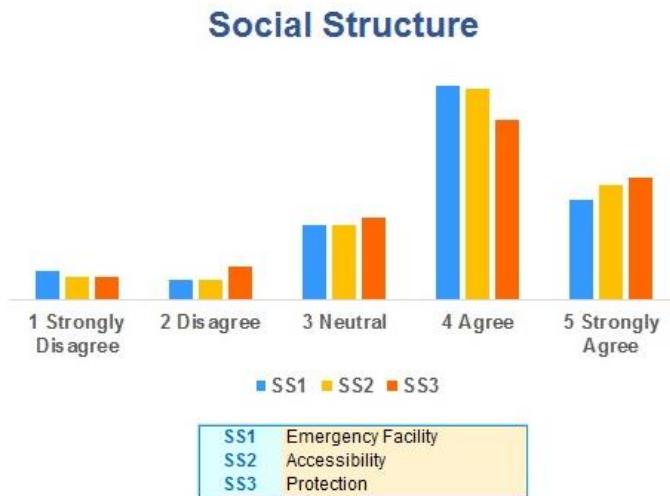


Fig.6.2.3.1. show places of worships score high as a **Social Structure** because of its function as an emergency facility (SS1) (73%) ( $P<0.0001$ ) and having good accessibility (SS2) (72%) ( $P<0.0001$ ) and proving ample protection during disasters (SS3) (69%) ( $P<0.0001$ ).

Table 6.2.3.1. Inferential Statistics on Social Structure.

Social Structure	Categories of Selected Variable	N=409	Mean Rank	p-value (<0.05=significant)	Hypothesis Supported
Location	East bank	232	238.36	<0.0000	yes
	West Bank	177	161.28		
Religion	Catholic	349	203.18	0.578	no
	Others	60	212.31		
Gender	Female	324	205.24	0.936	no
	Male	85	204.09		
Age Group	18-39 years	177	208.56	0.681	no
	40-59 years	196	200.00		
	60 years and above	36	214.71		

### 6.2.3.2. Social Capital

Based on the survey, places of worship are considered as Social Capital where 76% ( $P<0.0001$ ) of respondents said that places of worship can support them socially where they can meet new friends and improve their well-being. There are 75% ( $P<0.0001$ ) of respondents who acknowledged that places of worship can affect them physically when their basic needs during the disasters are provided. Also, 75% ( $P<0.0001$ ) of respondents agreed that places of worship can provide healthy relationships with others that build unity in a community. Significance level was set at  $P < 0.05$ . Significantly, respondents who live in the east bank gave higher scores on Social Capital ( $P<0.0001$ ), (Mean 4.02, SD=0.78) compared with those who live in the west bank (Mean=3.71, SD=0.79).

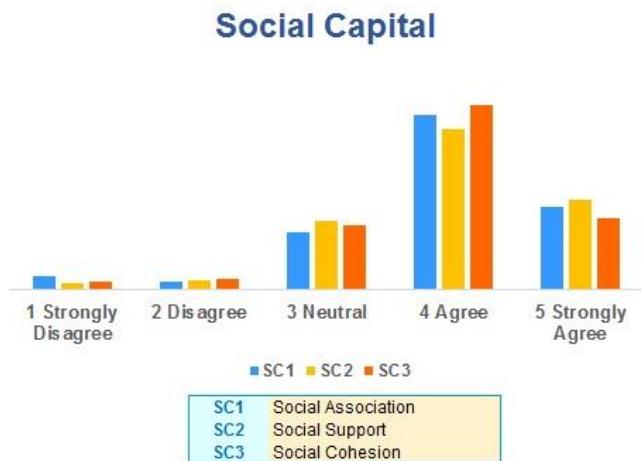


Fig. 6.2.3.2. show that places of worships score high in **Social Capital** because it affects their social association (SC1) (76%) ( $P<0.0001$ ), their social support (SC2) (75%) ( $P<0.0001$ ) and their social cohesion (SC3) (75%) ( $P<0.0001$ ).

Table 6.2.3.2. Inferential Statistics on Social Capital.

Social Capital	Categories of Selected Variable	N=409	Mean Rank	p-value (<0.05=significant)	Hypothesis Supported
Location	East bank	232	222.65	<0.0000	yes
	West Bank	177	181.86		
Religion	Catholic	349	201.20	0.161	no
	Others	60	224.03		
Gender	Female	324	201.82	0.279	no
	Male	85	217.11		
Age Group	18-39 years	177	208.92	0.734	no
	40-59 years	196	200.34		
	60 years and above	36	211.10		

### 6.2.3.3. Social Mechanism

Places of worship are considered as an effective Social Mechanism wherein 74% ( $P<0.0001$ ) of the respondents perceive places of worship can enhance their resilience during disasters. Among the respondents 70% ( $P<0.0001$ ) recognized that it can affect them mentally by attending training and seminars. Based on the survey, respondents who live in the east bank gave higher scores on Social Mechanism ( $P<0.0001$ ), (Mean 3.97, SD=0.84) compared with those who live in the west bank (Mean=3.63, SD=0.80). Also, respondents who are Roman Catholic ( $P=0.0424$ ) (Mean =3.79, SD=0.86) gave lower scores on the dimension of social mechanism compared with those of other religions ( $P=0.0424$ ) (Mean =4.03, SD= 0.68).

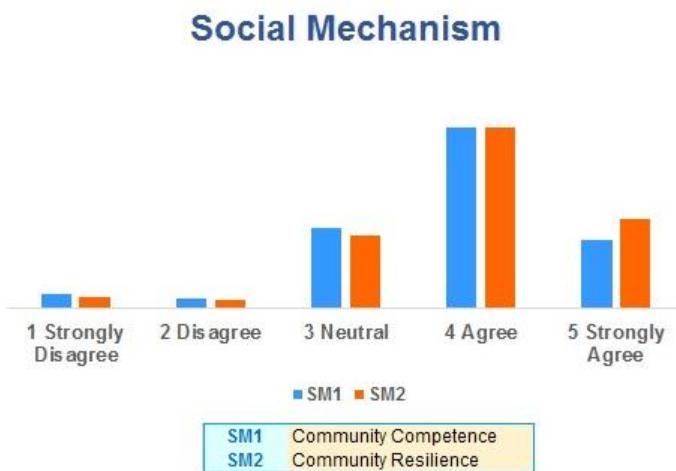


Fig. 6.2.3.3. Places of worships are considered Social Mechanism because it enhances community competence (SM1) (74%) ( $P<0.0001$ ) and positively affects their community resilience (SM2) (70%) ( $P<0.0001$ ).

**Table 6.2.3.3. Inferential Statistics on Social Mechanism.**

Social Mechanism	Categories of Selected Variable	N=409	Mean Rank	p-value (<0.05=significant)	Hypothesis Supported
Location	East bank	232	229.54	<0.0000	yes
	West Bank	177	172.84		
Religion	Catholic	349	202.31	0.356	no
	Others	60	217.44		
Gender	Female	324	203.69	0.658	no
	Male	85	209.99		
Age Group	18-39 years	177	210.60	0.646	no
	40-59 years	196	202.02		
	60 years and above	36	193.65		

#### 6.2.3.4. Social Beliefs

Based on the survey, 77% ( $P<0.0001$ ) of the respondents acknowledged that spiritual activities prepared the community to face disasters. Among the 72% ( $P<0.0001$ ) of respondents claimed that places of worship improve their spirituality through Bible study, prayer, and mass. Significantly, respondents who live in the east bank gave higher scores on Social Belief ( $P<0.0001$ ), (Mean 4.09, SD=0.81) compared with those who live in the west bank (Mean=3.70, SD=0.80). Also, respondents who are Roman Catholic ( $P=0.0027$ ) (Mean =3.87, SD=0.85) gave lower scores on the dimension of social mechanism compared with those whose religion is other than Roman Catholicism ( $P=0.0027$ ) (Mean =4.22, SD= 0.67).

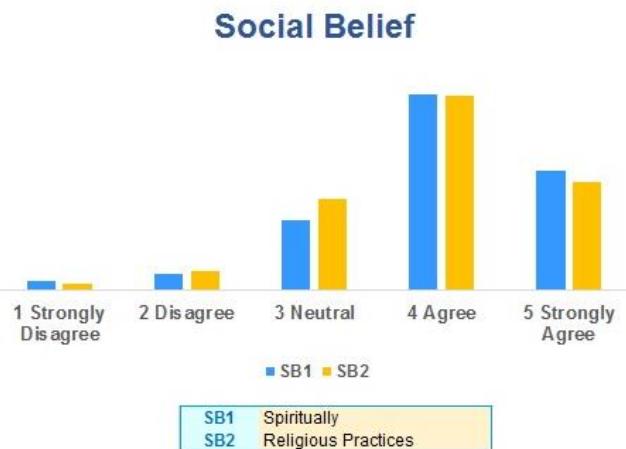


Fig. 6.2.3.4. shows places of worships are considered **Social Belief** because it affects their spirituality (SB1) (77%) ( $P<0.0001$ ) and provides them opportunities to practice their religious beliefs (SB2) (72%) ( $P<0.0001$ ).

**Table 6.2.3.4. Inferential Statistics on Social Beliefs.**

Social Beliefs	Categories of Selected Variable	N=409	Mean Rank	p-value (<0.05=significant)	Hypothesis Supported
Location	East bank	232	222.57	<0.0000	yes
	West Bank	177	181.97		
Religion	Catholic	349	197.63	<0.004	yes
	Others	60	245.15		
Gender	Female	324	201.20	0.199	no
	Male	85	219.47		
Age Group	18-39 years	177	207.87	0.876	no
	40-59 years	196	201.91		
	60 years and above	36	207.74		

### 6.2.3.5. Social Equity

Based on the findings 70% ( $P=0.0002$ ), of the respondents accepted that places of worship gave them a sense of inclusiveness, this means that community inclusions took place in the community, however, 39% ( $P=0.0002$ ), said places of worship were open and accommodating to all during disasters, this is relatively small compared to those who responded that places of worship can be used as emergency facility during disasters while only 29% ( $P=0.0002$ ), answered that they discusses disaster management and donation distribution, as a result many are unaware of this information for it is limited to their members only.

Significance level was set at  $P < 0.05$ . Significantly, respondents who live in the east bank gave higher scores on Social Equity ( $P=0.0002$ ), (Mean 3.41,  $SD=0.88$ ) compared with those who live in the west bank (Mean=3.14,  $SD=0.63$ ).

Table 6.2.10. Inferential statistics on Social Equity.

Social Equity	Categories of Selected Variable	N=409	Mean Rank	p-value (<0.05=significant)	Hypothesis Supported
Location	East bank	232	223.58	<0.0000	yes
	West Bank	177	180.65		
Religion	Catholic	349	199.67	<0.043	yes
	Others	60	233.07		
Gender	Female	324	205.00	0.999	no
	Male	85	205.02		
Age Group	18-39 years	177	199.68	0.210	no
	40-59 years	196	203.87		
	60 years and above	36	237.33		

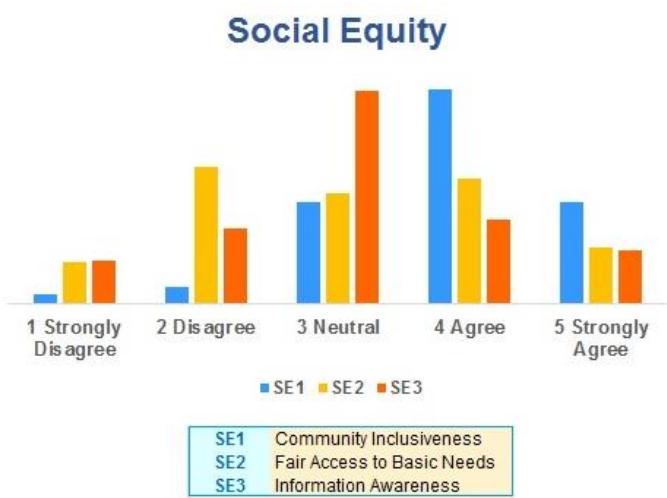


Fig. 6.2.3.5. shows places of worships are considered as a place of **Social Equity** because it scores high in community inclusiveness (SE1) (70%) ( $P=0.0002$ ), but low in fair access to all (SE2) (39%) ( $P=0.0002$ ), and information awareness (SE3) (29%) ( $P=0.0002$ ).

### 6.2.3.6. Social Innovation

Based on the findings places of worship are considered to be socially innovated in which, 57% of respondents used alleys/roads for religious and relief activities, 69% watched television, Facebook and YouTube for virtual places of worship that can help them faced the disasters especially at this time where the barangay complies with the GCQ (general community quarantine) for the COVID-19 Pandemic and 55% of the respondents consider that places of worship may use of social media platform for fund-raising/donations. Significance level was set at  $P < 0.05$ . Significantly, respondents who live in the east bank gave higher scores on Social Innovation ( $P < 0.0001$ , (Mean 3.73, SD=0.94) compared with those who live in the west bank (Mean=3.40, SD=0.84).



Fig.6.2.3.6. Places of worships are considered **Social Innovation** as the survey scores high in the use of alley/roads for religious activities (SI1) (57%) ( $P < 0.0001$ ), conducts virtual worship (SI2) (69%) ( $P < 0.0001$ ), and uses social media platform for fundraising (SI3) (55%) ( $P < 0.0001$ ).

Table 6.2.3.6. Inferential Statistics on Social Innovation.

Social Innovation	Categories of Selected Variable	N=409	Mean Rank	p-value (<0.05=significant)	Hypothesis Supported
Location	East bank	232	225.50	<0.0000	yes
	West Bank	177	178.13		
Religion	Catholic	349	204.10	0.865	no
	Others	60	206.88		
Gender	Female	324	205.61	0.837	no
	Male	85	202.68		
Age Group	18-39 years	177	209.60	0.741	no
	40-59 years	196	202.61		
	60 years and above	36	195.40		

Based on the summary in Table 6.2.12., respondents who live in the east bank gave higher scores on all dimensions compared with those who live in the west bank. On the aspect of social beliefs, respondents who are Roman Catholic gave lower scores on the dimensions social mechanism and social belief compared with those whose religion is other

than Roman Catholicism. The results of the survey provided an assessment of the quality of the data and how independent variables (e.g., location and religion) can influence the perception of the users of places of worship. While the questionnaire survey handles the different dimensions as equal significance, the interview and survey analysis showed the influence of location in the role of providing social resilience in the framework. As the dimensions of Saja et al.'s (2018) social resilience framework are comprehensive and inclusive, the dimensions may need to show other distinctive characteristics and weights of each dimension to validate the study. In this study where the survey is conducted on a resource-limited community (e.g., informal settlements), the results highlight the contribution of most social dimensions, except for social equity and belief, in the enhancement of community resilience from disasters.

**Table 6.2.3.7. Summary of p-Value Dimension Scores according to Location, Religion, Gender, and Age Group.**

Social Dimension	Categories of Variable	p-value	Social Dimension	Categories of Variable	p-value
Social Structure	Location	<b>&lt;0.0001</b>	Social Belief	Location	<b>&lt;0.000</b>
	Religion	0.578		Religion	0.004
	Gender	0.939		Gender	0.199
	Age Group	0.936		Age Group	0.876
Social Capital	Location	<b>0.0001</b>	Social Equity	Location	<b>&lt;0.000</b>
	Religion	0.161		Religion	<b>0.043</b>
	Gender	0.279		Gender	0.999
	Age Group	0.734		Age Group	0.210
Social Mechanism	Location	<b>&lt;0.0001</b>	Social Innovation	Location	<b>&lt;0.000</b>
	Religion	0.356		Religion	0.865
	Gender	0.658		Gender	0.837
	Age Group	0.646		Age Group	0.741

### 6.3. Quantitative Analysis Stage 3 – Confirmatory Factor Analysis

Stage three (3) of the quantitative analysis is conducted to validate, in a unified concept, the inferences from the different statistical results of social resilience dimensions in stage two (2). Stage three (3) is comprised of two (2) steps of analysis, namely: confirmatory factor analysis (CFA) and structural equation modelling (SEM).

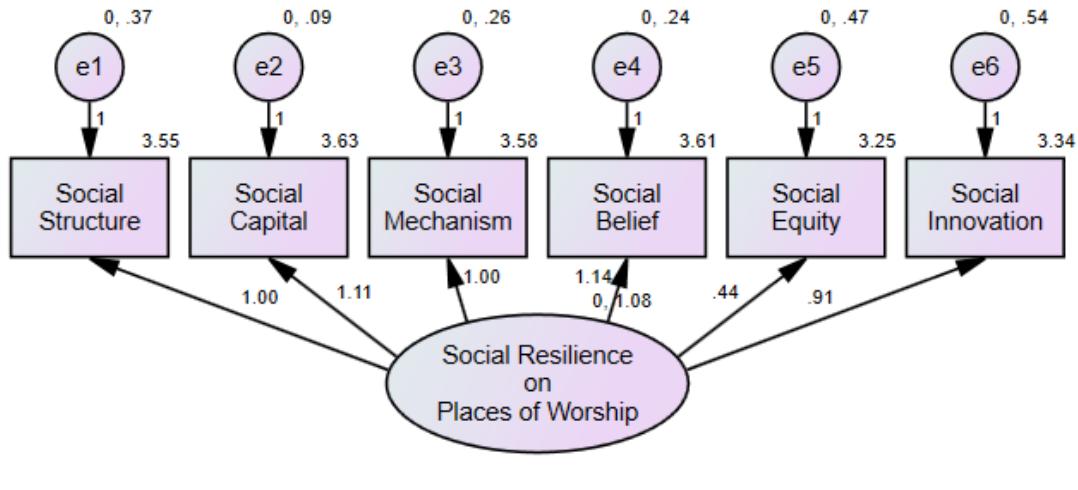
#### 6.3.1. Confirmatory Factor Analysis

Upon creating a CFA model of the six (6) dimensions of social resilience, many of the co-variance, or correlations between dimensions are above 1.00. The results for the measurement component include the p-value of <0.000, an RMSEA of 0.076 (<0.08), a GFI = 0.915 and a CFI = 0.48. Analysis of the data reveals that the two models (model 1 and 2) are adequate since all the Model Fit and Quality Indices are at least within the acceptable range. It is important to validate first the Model fit and Quality Indices for the model to be adequate for further analysis. As SPSS Amos requires complete data to proceed with calculation, a process of replacing missing data called imputation is conducted on the SPSS database.

In exploring the different degrees on how each dimension affects the social resilience of the community in places of worship, an imputation of the observable variables is computed. By doing a confirmatory factor analysis in SPSS Amos, the significance of social innovation (1.02) and social mechanism (1.01) to social resilience is evident in the model (See table 6.3.1. and figure 6.3.2.). The aspect of social equity on the other hand, while still significant above 0.30 (a factor weight less than 0.30 is considered insignificant), is the least significant of all the social resilience dimensions.

**Table 6.3.1. Regression Weights of CFA Model.**

			Estimate	S.E.	C.R.	P	Label
Sstructure	<---	SocRes	1.000				
Scapital	<---	SocRes	1.109	.036	30.728	***	
Smechanism	<---	SocRes	1.005	.039	26.018	***	
Sbelief	<---	SocRes	1.139	.041	27.686	***	
Sequity	<---	SocRes	.440	.036	12.307	***	
Sinnovation	<---	SocRes	.910	.044	20.459	***	

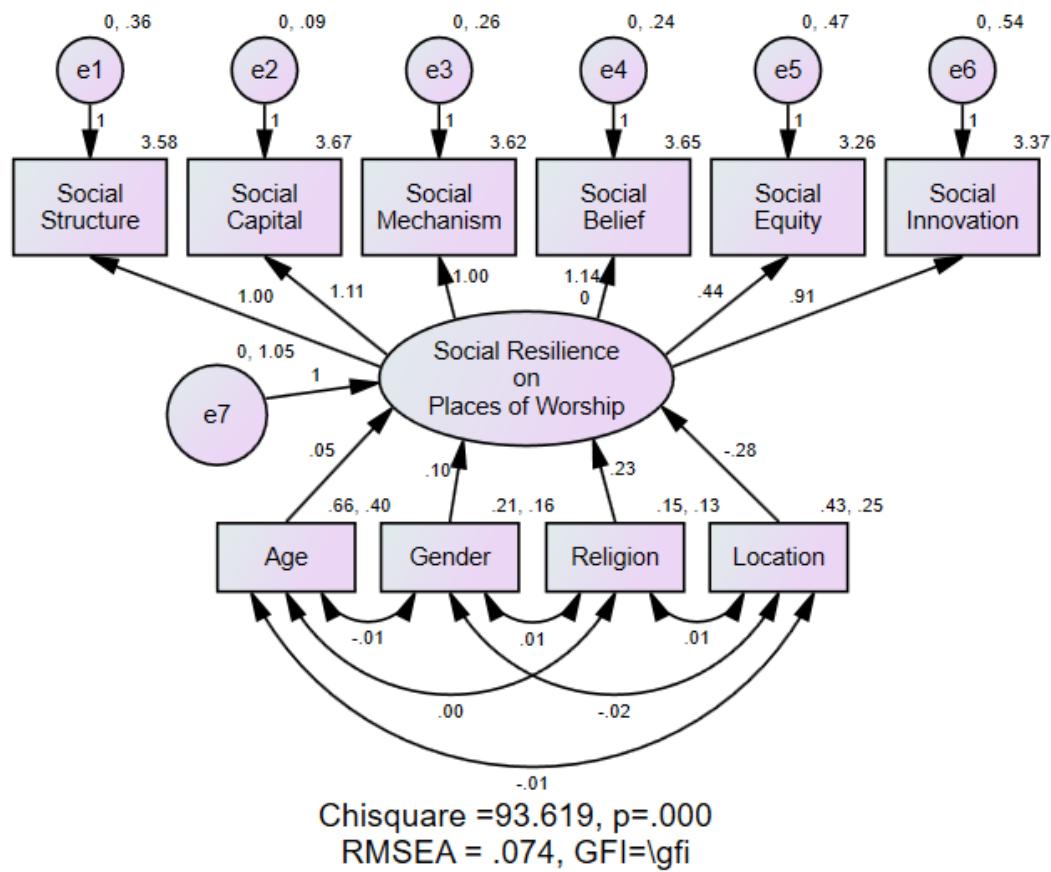


Chisquare = 55.287, p=.000  
RMSEA = .112, GFI = .98

**Figure 6.3.1. Confirmatory Factor Analysis Model of Social Resilience using Places of Worship.**

### 6.3.2. Structural Equation Modelling

The different regression weights of the dimensions confirm the effects of these factors to social resilience. However, it is also important to provide whether all these dimensions are significant in a certain context. Thus, the study has used independent variables (e.g., age, location, religion, and gender) in analysing in the model. It was mentioned in the previous section that data analysis using SEM is a two-stage approach: the measurement component and structural Component. By creating a SEM model that shows the relationship of independent variables to places of worship, one can see there is no significant relationship between gender and the type of religion in enhancing social resilience in places of worship (See Figure 6.3.3.). However, there is a significant effect in the response to social resilience with regards to the location of the respondents (West = 0, East = 1). The difference of the values is also evident between the wider roads of the east bank in comparison to the narrow and more populated streets of the west bank. In looking at the regression weights of the model using unstandardized figures, there are co-efficients that are above 1.0, showing an issue with regards to the possible similarities in measurement between the six dimensions used in the study. While an exploratory factor analysis (EFA) is needed to validate this, EFA is not be presented in this analysis. Therefore, the study now aims to explore on how the six (6) dimensions of social resilience interrelate with one another.



**Figure 6.3.2. SEM model-A of Social Resilience with Independent Variables.**

In SEM Model-A, the hypothesis of whether these social dimensions, based on the use of places of worship, can contribute to social resilience is further validated. The inclusion of other variables into this confirmatory analysis provides additional information as to what other factors may affect the production of social resilience in a certain context.

**Table 6.3.2. Regression Weights of SEM model-A.**

		Estimate	S.E.	C.R.	P	Label
SocRes	<--- Age	.051	.082	.625	.532	
SocRes	<--- Gender	.096	.128	.752	.452	
SocRes	<--- Religion	.232	.147	1.578	.115	
SocRes	<--- Location	-.278	.105	-2.644	.008	
Sstructure	<--- SocRes	1.000				
Scapital	<--- SocRes	1.108	.036	30.752	***	
Smechanism	<--- SocRes	1.004	.039	26.060	***	
Sbelief	<--- SocRes	1.139	.041	27.737	***	
Sequity	<--- SocRes	.441	.036	12.329	***	
Sinnovation	<--- SocRes	.910	.044	20.487	***	

In the second SEM model of the study, the previous hypothesis of value of the different social dimensions of resilience is tested to validate their effectiveness in the production or impedance of social resilience in the community.

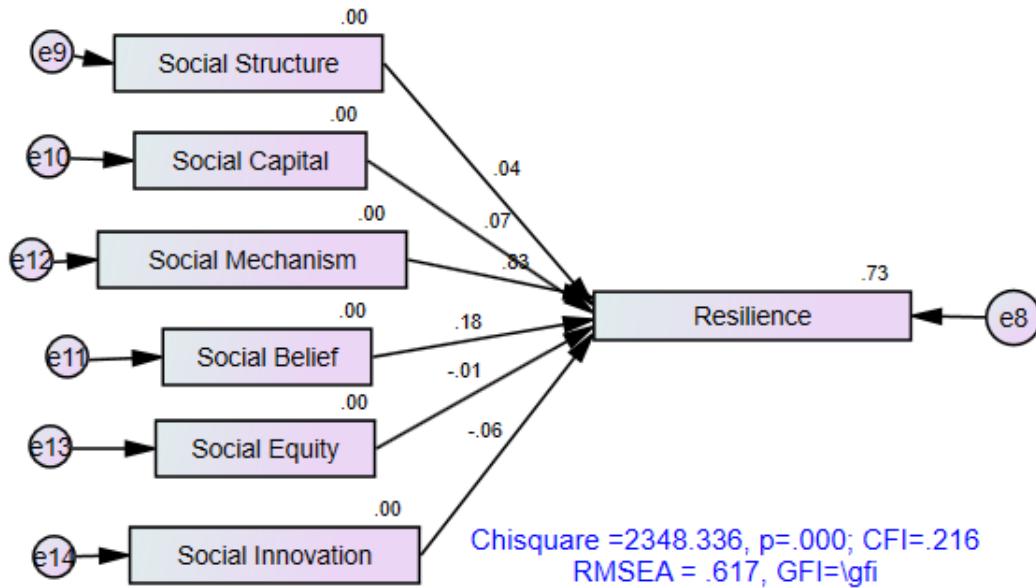


Figure 6.3.2. Hypothesized Model.

The hypothesized model exhibited an extremely high Root Mean Square Error of Approximation (RMSEA) value of 0.617 (of which a value of greater than 0.10 is considered poor) is attained. Despite a p-value of less than 0.000, its Comparative Fit Index (CFI) value of 0.216 is considered very low. This model reflected the previous error encountered in the CFA model wherein the measurements of these models could be measuring the same element of the explored theoretical concept. In reframing a conceptual model, an emerging model is shown as the interdependent relationships of the different dimensions are studied against each other. The paths created in the emerging model is based on three (3) ways. First, it was based on the insights from the interviews as to how one dimension has influenced the achievement of another dimension (i.e., how social equity has affected on the social structure of the community). Second, the paths were also defined based on significant values attained through the regression weights exhibited by the various dimensions to each other. Lastly, existing and changing associations between two dimensions are reviewed from scholarly literature to further assess their relevance and importance in the evolving concept of social resilience.

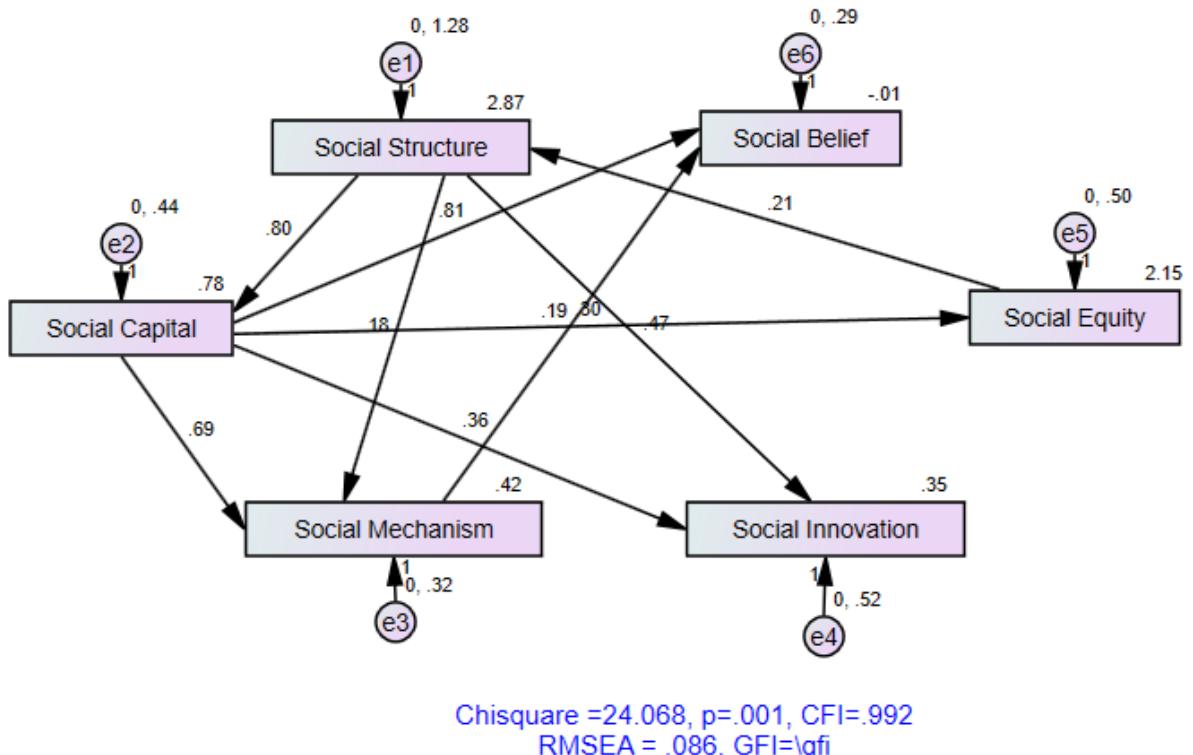


Figure 6.3.3. Emerging Model.

Basing on the interviews and survey collected from Barangay San Andres, the above emerging model highlighted the operation of social resilience with regards to the use of places of worship during disasters. However not all associations are shown in this model as they have negatively affected the fit of the model. Thus, only the above SEM model has provided goodness-of-fit values, with an RMSEA value of 0.086, a CFI value of 0.992, and a p-value of 0.001.

## **Research Outline**

- 1. Introduction**
- 2. Review of Related Literature**
- 3. Theoretical Framework**
- 4. Research Methods**
- 5. Interview Results/Analysis**
- 6. Survey Results/Analysis**
- 7. Discussion and synthesis of key findings**
  - 7.1. Identifying the critical parameters of social resilience in assessing places of worship
  - 7.2. Finding the significance of places of worship as a social infrastructure and as a contributor of social resilience
  - 7.3. An emerging approach to operationalizing the social resilience framework
- 8. Discussion/recommendations for future research**

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## **Chapter 7: Discussion and Synthesis of Key Findings**

This chapter presents the discussion of the findings in the qualitative and quantitative approaches in the assessment of places of worship. It builds on the research, discussions, and findings presented in the previous chapters. Section 7.1. discusses the critical parameters found findings in relation to the indicators used for research objective number one (RO#1) as defined in section 1.4. Section 7.2 then synthesizes the results of the different dimensions of social resilience and translated into its religious/spiritual dimension. Finally, Section 7.3 discussion the application of the social resilience framework in reconstructing how we understand the role of places of worship in disaster resilience.

## **7.1. Identifying Critical Parameters of Social Resilience in Assessing Places of Worship**

The various characteristics and indicators collected from the interviews and surveys provide the basis on the how the research will assess the use of places of worship. Basing on Saja et al.'s (2018) social resilience framework, these dimensions are examined through how they are operationalized and understood based on the various concepts discussed in Chapter 3.

### **7.1.1. Social Structure as Religious Buildings/Spaces**

The use of social structure as defined in Saja et al.'s social resilience framework (e.g., gender, age, location) was initially considered in the administration of interviews and survey questionnaires. Majority of the indicators of social structure, such as gender and age, did not provide a significant effect on the outcome of the results except for the location of the places of worship (See Table 6.2.6). The use of social structure as a 'spiritual space' highlight and translates the dimension into the physical aspects (e.g., physical protection, geographic accessibility) of places of worship (Kong, 1993; Rainey and Tanzer, 2020). The results of this study found that places of worship are found to score highest (87% - 90% agree) as a provider of resilience based on the survey on Table 6.2.3.

The results of the interviews and survey validated observation of the strength of religiosity and faith of Filipinos in the reliance of places of worship as a high guarantee of safety during times of disasters. While many academic literatures use an outcome-based approach in studying resilience, this dimension was able to emphasize the process of how Cutter et al., (2008) and Sharifi (2016) viewed these (e.g., places of worship) as assets in facing adversities. The SEM model further validates the importance of 'social structure' to social resilience (see figure 6.3.1. and 6.3.2.). In examining the interrelationship between dimensions, the SEM model reveal the high influence of social capital and mechanisms to how places of worship are being used (See Figure 6.3.3.). However, religious buildings have also shown the negative effects of the perception of social and religious equality on how these spaces are being used during disasters.

The exploration of the dimension of 'social structure' in this phase of analysis is still highly limited to the basic physical disaster-related aspect of places of worship. This analysis has not yet included how the interior design of spaces and physical elements affect the perception of users in using these social infrastructures. While the COVID-19 pandemic limited the scope with which the study can gather, these indicators help extend the research of (Brenneman and Miller, 2016) in substantiating the attitude that religious buildings matter.

### 7.1.2. Social Capital as Religious Capital

This study finds social capital, described by the Lexicon dictionary (2021) as “the networks of relationships among people” in Barangay San Andres to be the most significant dimension in social resilience. The use of “religious social capital”, deriving from Muskett’s (2014) understanding as the time and physical work involved with the religious faith, in the community is evidently seen in the interviews and surveys (Musket, 2014). The interview analysis found places of worship is a popular way to find trusted friends and ways to volunteer and train the community in planning and responding to disasters (See Table 5.2.1.). 94-95% of the survey also shows social support and association is found to be the most important contribution of places of worship in times of disasters (See Table 6.2.3.). While the resilience framework can be considered as ‘biased’ towards the social aspect of disaster resilience, this study lends support to the theories of Aldrich (2012) and Kwok et al. (2016) that social resilience remains to be a critical aspect in managing disaster risks.

In considering social capital as an asset or resource in the community, the findings in the interview were able to capture the appeal of the informal settlers for the need of more additional resources in times of disasters (See Figure 5.2.4. and Figure 5.3.2.). This need and emphasis on resources was further seen as one of the highest scores among the social dimension of resilience with a mean score of 3.95 (See table 6.2.4.). This finding is further validated in the SEM model wherein it obtained the highest factor loading (1.14) among the six dimensions of resilience (See Figure 6.3.1.). In exploring how social capital can influence other dimensions, Figure 6.3.3. shows its significant influence on the social belief and mechanism of how people use places of worship. On the other hand, social equity again creates another pessimistic influence over the way how social capital is utilized. Thus, the findings on social capital show how it is one of the most critical dimensions of the framework but also reveals its weakness in relation to the dimension of social equality/ equity.



**Figure 7.1.2. Temporary shelter in a basketball in Lakas Tao HOA, San Andres, Cainta Rizal** (Source: Brgy. San Andres FB page, 2013)

### **7.1.3. Social Mechanism as Spiritual Capital**

The results found in the dimension of social mechanism suggests that most respondents perceive activities associated with places of worship to have significant effect to their mental, social, and spiritual experience in facing disaster risks (See table 5.2.2.). Given that most of the interview and survey respondents are associated to an organized religious group, much of the social activities mentioned include weekly ‘ministries’, bible studies, and church attendance. Why participants are likely to provide a positive response to most questions is possibly due to its association with the religious ideals and organizations in disaster response. This empirical evidence is comparable to how Friedli (2001) considers how ‘social and spiritual capital’ serve as contributors to the ‘emotional resilience’ of communities and individuals (Friedli, 2001). Another possibility of positive perception is attributed to living with risk as a ‘normal way of life’ to the community as personally observed by (Bankoff, 2007a) in the Philippines. With local government units working together closely with the local religious organizations, the social mechanism supports Aten et al.’s (2014) notion that participants do feel protected and assured of aid and support if it comes from two different entities.

The provision of fire drills, disaster risk training, and seminars is also another aspect of social mechanism that is contributed by places of worship in managing disaster risks (See Figure 5.2.4.). These activities highly provide a ‘sense of competence’ (See Figure 6.1.2.6) and ‘enhanced resilience’ (See Figure 6.1.2.7) that is needed for the community in responding to the negative effects of disaster risks. Further statistical analysis in Table 6.2.3. shows that using places of worship provides a sense of competence (93%) and community resilience (94%) to the community when facing disasters. While this approach may confirm their general perception of resilience, more study is needed to refine the indicators that create such observation. This concern is highlighted how ‘social mechanism’ may tend to provide a negative impact (0.30) to ‘social beliefs’ as shown in the emerging SEM model of social resilience (See Figure 6.3.3.). Nonetheless, places of worship (designated as social structure) proved to be very significant (0.80) in enhancing the social activities, competence, and shared values of the community.

### **7.1.4. Social Equity as Religious Equality**

As social equity is related to concepts that may illicit some form of bias and prejudice, this dimension was not included as one of the main questions in the interview questions. Interestingly, despite the exclusion of mentioning any form of fairness or equality, the subject

of social equity arises from the discussions on how the leaders and the community respond and behave in places of worship in times of disasters (See table 5.2.2.).

As the survey questionnaire is based both on the output of the interview and the modified social resilience framework, the importance of social equity is seen in the heat map in Table 6.1.4. The heat map shows the ‘disagreements’ on how the users are accommodated and overseen during a disaster. However, Table 6.2.4. includes community inclusiveness to be part of the dimension of social equity. The understanding of this term is highly affected by the Filipino term of “pagiging kabilang sa comunidad” with which equality and equity can be synonyms as being “part of the community” (See Figure 6.1.8.). The Filipino trait of having suffered prejudice despite being “part of family” is highlighted during the interviews wherein sharing of stories and experiences is a significant part of ‘Filipino resilience culture’. The varied results in ‘social equity’ on Table 6.2.4. suggests that further studies on the mechanisms of ‘social equity’ is required to provide a clearer picture of how it is being operationalized inside the social resilience framework.

Most issues on inequality are often related to gender, age, and belonging to a different religious organization. While the initial interview analysis would seem to show bias and differences in the answers of men and women (See table 5.1.10.), the statistical analysis showed gender, age, and religious association to have no effect on how they develop social resilience (see Table 6.2.12.). However, calculation of the mean indicates that social equity is the least favourable dimension that contributes to social resilience (See Table 6.2.3.). The SEM model on the other hand shows how social equity can even be possibly detrimental to how places of worship are being used (See Figure 6.3.3.). Given that majority of the respondents associate themselves to be Roman Catholics, there is a need to further explore how religious equality and diversity is to be understood in the context of social resilience.

The United Nations Convention on the Rights of Persons with Disabilities was adopted in 2006 to address the issue of inclusivity. Persons with disabilities are often excessively affected in disaster, emergency, and conflict situations due to inaccessible facilities, services (including shelters, camps, and food distribution), transportation systems, and recovery efforts. Also, when resources are limited, there can be potential discrimination based on the person’s or community’s weaknesses. These limitations of resources were highlighted from the complaints of community leaders along the west bank. Residents who live adjacent to the floodway (e.g., Lakas Bisig and Lower Planters) often seek refuge at places of worship located along the inner roads (e.g., Anak Pawis and Upper Planters) (See Figure 4.3.3).

On the other hand, the relationship between equality and religion stems from cross-national differences in religious beliefs and practices (Barber, 2013; Immerzeel and van Tubergen, 2013; Norris and Inglehart, 2004). From this perspective, high inequality creates economic uncertainty, leading the poor to seek refuge in religion and religious institutions for both spiritual and material comfort. While majority of the respondents are Catholics, members of Iglesia ni Kristo (INC) in Upper Planters were mentioned to acquire better economic and social support from their religious leaders. By considering religion as a purely cultural variable, this approach fails to consider that religious institutions are themselves political actors who directly seek their own perceived self-interest (Fink, 2009). This social mechanism and understanding supports the continuous 'politico-religious' nature of Iglesia ni Kristo in Filipino communities (Ando, 1969, Tolentino, 2010). However, further studies are needed to explore how the beliefs and civic engagement of certain religious organizations influence their collaboration and cooperation in managing of disaster risks.

As most economic and social assistance under disaster management is provided by the local barangay in San Andres, these support services are mentioned in the interviews to be influenced by the religious affiliation and support of the politician during the election. These social mechanisms continue to support the Islam outlook as to how religious faith continuous to shape the perception of societies in post-disaster development (Fanany and Fanany, 2013). On the other hand, Paulson and Menjivar (2012) prefers not to assume religion as a source of conflict or disorder during disaster relief activities, but rather to understand the complex role of religion in each social context or environment. By research design, the study in Barangay San Andres is constrained by the limited financial resources of the community. Hence, additional studies can be done on gated communities adjacent the research site. This could aim to explore how two different economic societies interact, cooperate, or manage disasters risks in their built environment.

#### **7.1.5. Social Beliefs as Religious Beliefs**

In the aspect of social beliefs, residents of Barangay San Andres experience more relief and a sense of resilience when they do religious activities related to their beliefs such as prayer, fiestas, etc. (See Table 5.1.5 to 5.1.7.) While most answered are expected to be related to religious activities, the significant contribution of places of worship is evident through the numerous experiences and projects mentioned by the respondents in the interviews. In addition, the willingness of the residents to innovate in attending religious meetings and services reinforces Bankoff's (2007) observation of the role religious belief play

on how Filipinos live in a life exposed to danger. In contrast, religious beliefs promote disaster preparedness instead of fatalistic attitudes that tend to be detrimental to disaster resilience as surveyed by Baytiyeh and Naja (2016).

Statistically, 94% of respondents agreed that social beliefs are one of the dimensions that contribute greatly to the development of social resilience (See table 6.2.3.). The mean results also suggest that prayer (3.9786), or sometimes viewed as divine intervention, seems to be the highest indicator of social resilience among all indicators in the resilience framework (See table 6.2.4.) (Mitchell, 2003). In the SEM model, social beliefs are shown to directly influence social capital (0.81), in which is highly affected by the social structure (0.80), or places of worship. While a direct causation cannot be drawn from social beliefs to places of worship, the results can provide future research to explore how prayers and places of worship can be integrated into disaster risk reduction and management strategies.

Filipinos has long considered disasters to be a part of their daily lives (Bankoff, 2007; Usamah et al., 2014). The significance of Filipino belief in a disaster resilience context is noteworthy in scholarly literature (Chiongbian et al., 2021; Hechanova et al., 2015; Kurata et al., 2022). Early beliefs that these disasters were “acts of god” has continued to be accepted by most of the respondents interviewed and surveyed in this research. Except for some social and political inequalities mentioned, their reliance and response to places of worship are often revealed in a positive tone. Despite the traditional paradigms and beliefs that the Filipino Catholic church still holds, Chiongbian et al. (2021) still identifies the contribution of the collectivist behaviour of the community to the building of resilience among emerging Filipino queers.

Thus, the religious beliefs of the Filipinos have continued to play a significant role in their capacity to cope with disasters and unforeseen catastrophes (Ballano, 2022; Gaillard and Mercer, 2013; Israel and Briones, 2014). While there are many studies that tackle some reasons for Filipino resilience, there is limited exploration on how these beliefs are being operationalized or created. What are the various elements or factors that could significantly affect the future perception of disaster preparedness to the local Filipino beliefs? Will Filipinos continue to rely on fatalism and familiar social cohesion in responding to disaster risks?

### **Belief in the context of places of worship in the Philippines**

The importance of physical structures as a coping mechanism during disasters is often reiterated and explored in scholarly literature (Bankoff, 2007b; Loreto et al., 2021).

However, the need for government institutions and implementing agencies to identify this connotation is often absent in the existing built environment of Philippine cities and communities. Nonetheless, like the sentiments in the interviews and surveys, churches continue to serve as a 'sacrament' to the Filipinos during the time of the pandemic as an expression of their belief in the power to heal and recover (Abellanosa, 2020). In terms of social support, Filipino personalities are generally perceived as friendly and open to support people with limited financial resources. While the interviews do exhibit some form of conflict, the local communities in Barangay San Andres often have women to serve as their community and church leaders. The belief of having characteristics of peace and mercy within the community is often paramount in Filipino culture (Montiel, 1994). This belief signifies their intent to lessen conflict and argument in community organization as women are considered to be more agreeable than men (Rubinstein, 2005).

As majority of the interviews are conducted with Catholic Filipinos, the differences in response to different religious beliefs were not clearly examined. However, many literatures do mention the positive influence of the Muslim faith and Buddhism monks in the management of disaster risks (Gianisa and Le De, 2018; Ha, 2015; Sun, Deng and Qi, 2018; Taufik and Ibrahim, 2020). While specific religious beliefs (e.g., karma, resurrection, fatalism) were not explored during the interviews and surveys, these values may well provide an interesting spectrum on how the social mechanisms and its built environment of a community are shaped and understood (Levy, Slade and Ranasinghe, 2009). As cities and communities continue to experience the increasing occurrence of disasters, there is a need to constantly understand the values, beliefs, and coping mechanisms of humans in the aspect of resilience.

#### **7.1.6. Social Innovation as Religious Innovation**

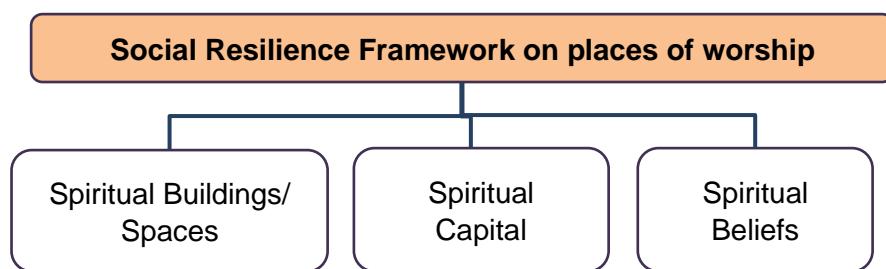
In introducing an additional dimension of social resilience, the results of the study were able to present other ways on how a community manifest their resilience to disaster risks. This observation is likened to Westley's (2013) reflection on how resilience brings about innovation. Innovations done by the participants were expressed through the utilization of their current available resources (e.g., streets, alleys) and technology (e.g., TVs, Facebook) (See table 5.1.9.). Use of public roads, selling of food, and joining 'social service ministries' were also mentioned to be "innovative" by community leaders, given the setting of the study is in informal settlements and people with limited resources (See Table 5.1.4. and 5.1.8.). Another result of the interviews is the periodic mention of FB Live and Facebook in interviews, which is possibly inclined by the minimal monetary costs of using Facebook online in the Philippines as reported by (Vince, 2014) based on the plans offered by Globe

Telecom (See Figure 5.2.6.). As the study was done during the COVID-19 pandemic in 2020, one of the highest mean scores in social innovation (3.813) includes the ingenuine use of virtual meetings in doing religious activities (See table 6.2.4). This finding is reinforced by the adoption of protocols by the World Health Organization in using technology as a coping mechanism in delivering spiritual/religious care to ally physical and mental health as observed by (Dutra and Rocha, 2021) during the COVID-19 pandemic.

While examining social innovation as a single entity benefit knowing its effect to social resilience, the study also benefits on how it is viewed in relation to other dimensions. While the confirmatory factor analysis model in Figure 6.3.1. shows the significant contribution of social innovation to social resilience, the SEM model in Figure 6.3.3. identifies innovation more as a 'means' or 'end' rather than as an initiator of social resilience. This approach lends support to (Paidakaki, 2012) perspective of the ability of people to innovate in many ways in order to address their respective predicaments.

### **Redefining the Different Dimensions of Social Resilience**

Once the key dimensions of social resilience have been translated into their religious/spiritual counterparts, further clarification and discussion is made on how these dimensions or parameters are to be used when assessing places of worship. While there were some studies that has used Saja et al.'s (2018) social resilience framework, there is yet to have studies applied on the religious or spiritual context. The most important aspect of this resilience framework approach is to identify and comprehend the major theories that is the focus of this study, namely: (1) social infrastructure, (2) social resilience, and (3) places of worship. Hence, three major concepts from academic and grey literature are used to be applied on the dynamic (refers to concepts and meanings that change over time) dimensions used in the social resilience framework. The three major concepts include (1) spiritual buildings/spaces, (2) spiritual capital, and (3) spiritual beliefs (See Figure 7.1.6.).



**Figure 7.1.6. Redefining the major theories and concepts in assessing places of worship**

## **7.2. Finding the Significance of Places of Worship as a Social Infrastructure and as a Contributor of Social Resilience**

After dissecting and translating the various dimensions of social resilience, it is important also to analyse these dimensions in their religious/spiritual perspectives. The following paragraphs explores the three major theories of places of worship based on the results of the interview and the survey done in Barangay San Andres.

### **7.2.1. Spiritual Spaces and Social Infrastructure**

The role of places of worship as a social infrastructure was presented through the relevance of the religious activities in the social resilience framework. In contrast to the dimensions by Latham and Layton (2019), the social resilience indicators presented in Table 7.2.1. have wholly or partially contributed to the six (6) dimensions of a social infrastructure.

Places of worship specifically excels in the *provision of services* that is not only related to religious services but also to responses in disasters. These provisions partially exhibit Rivera and Nickel's (2016) understanding that lack of trust in government authorities and programs have empowered communities to act on their own. In the Barangay San Andres' cases, the local authorities collaborated with church workers to get the support and validation they need to gain public trust. As a provider of services through their social infrastructure, religious organizations continue to serve as a "bridging and bonding" resource for the community (Park and Bowman, 2015b). On the other hand, the *concept of diversity* in the use of places of worship in Barangay San Andres echoed (Lefebvre, 2020) observation of the new sense of interreligious space of the practising Catholic population. While religious diversity was found to have 'significant consequences' on the urban environment such as those (Chiodelli and Moroni, 2017) found in the mosques in Italy, the organic integration of the places of worship with local government units have somehow promoted religious diversity in Barangay San Andres.

In the aspect of a social infrastructure to have *adequate physical maintenance*, places of worship in Barangay San Andres continue to possess their value as an important place in their community. The proactive support of community leaders in maintaining their places of worship correspond with Kinney and Winter's (2006) study that places of worship are linked to the stability and safety of the neighbourhood. Local church leaders are also mentioned to receive healthy financial and social support from its members. However, it was also noted that the younger generation of attendees have continued to show a diminishing enthusiasm in religious volunteer work. While not part of this study, (Quilala, 2018) noted that political support of religious organizations are becoming a part of the administrative

mechanisms of many Philippines local government units. Thus, more study is needed to explore the role of places of worship both in the physical and political environment in the Philippines. In terms of the *accessibility* of places of worship, the density of the number of places of worship not only proves their abundance, but also the initiative of the community to create new ones if previous religious organizations have discontinued their aspirations (See Figure 4.3.1).

The ability of places of worship to respond to the needs of the community was made evident by the positive responses in the survey. While the interviews underscored on the ability of the religious organizations to respond to disasters, some inequality was highlighted as a main concern on how it was done (See table 5.1.4.). As church leaders and community leaders are proud of their programs and activities for the community, “help” is still much a cited topic among the resource-limited members of the informal urban environment (See Figure 5.3.2.). With regards to the ability of places of worship to capture the ‘ethos’ of democratic living, these structures can be considered as the symbol of the ‘ethos’ of the community. The community is clearly characterised by their belief in divine intervention and the moral goodness of the Catholic church or other religious organizations. The presence of numerous places of worship in the area and the association of community leaders with church volunteers provides a clear integration of the beliefs and aspirations of the community in facing disaster risks.

In summarizing all the associations of the dimensions of social infrastructure to places of worship, the study helps to create a pattern how to correlate the relationships of social infrastructure and social resilience in the context of disaster resilience. While the comparative analysis is quite far from being conclusive or complete, the analysis helps the theories to be applied in other forms of social infrastructure. The next section discusses social resilience through the perspective of spiritual capital.

### **Spiritual spaces and resilience in architecture**

In the broader discussion of physical spaces, especially in the field of architecture, places of worship were mentioned to play a significant role in mitigating risks from events of disasters (Boano and Hunter, 2012; Ha, 2015; Legarda, 1960). However, most of these studies could be often categorized in their respective specialized fields such as heritage conservation, urban planning, architectural design, and emergency shelters to name a few.

With regards to heritage conservation, Sowinska-Heim's (2020) discussions about protecting cultural heritage and identity of the post-communist city of Łódź in Poland

(Sowińska-Heim, 2020). However, further research is still needed on Barangay San Andres to identify the physical characteristics that is unique in their places of worship. In addition to preserving identity, Dugan (2007) encounters the challenges of developing a community's identity when it is lost from the effects of disasters such as seen in New Orleans in 2005. While scholars identify the importance of preserving the identity of communities from post-disaster construction, many Filipinos communities still need to identify their own unique architectural physical character (Alexander, 2013; Jeleński, 2018). This occurrence is reflective of the continuing argument among scholars and professionals of what really defines Philippine architecture (Ogura, Yap and Tanoue, 2002; Paredes-Santillan, 2009).

In the aspect of urban planning and practice, Boano and Hunter (2012) calls for an anthropocentric approach in the creation of post-disaster spaces. Other disaster studies in architecture discuss in risk-based community planning (Sapountzaki *et al.*, 2022), rural tourism (Kamarudin, Wahid and Chong, 2020), shelter designs (Bashawri, Garrity and Moodley, 2014), and other process-oriented developments in disaster management (Campos, 2020). While informal settlements seem to lack a formal of process of growth and development, further studies are needed to define the framework by which these "processes" are cultivated. Hence, how does the informal community develop which structures are to be built, such as places of worship? In addition, how are the spaces in places of worship designed and used in preparation and post-disaster situations.

While some research do examine on the use of stilts (Biswas, Hasan and Islam, 2015) and flexible spaces (Jahani and Tazike Lamsaki, 2016) in designing disaster resilient structures, there is limited scholarly discussion on the design of architectural elements in disaster management. Being in a resource-limited community, further studies could explore the role of physical attachments, open spaces, and sense of place in disaster resilience. Lastly, discussions on the multi-faceted roles of an architect in disaster management is as a designer, teacher, student, and friend require different approaches (Andriessen *et al.*, 2021). Thus, it is common to see post-disaster shelter design competitions to explore the different facets and gaps of the design of post-disaster architecture (Anh, van Phong and Mulenga, 2014; Torus and Sener, 2015). Is there a process or framework that can capture the design development for community resilience, especially in the field of informal settlements? How should architectural guidelines be created with regards to spaces owned by religious institutions? These questions may provide some initial insights on how future studies may enhance research in places of worship.

**Table 7.2.1. Parallel Association of Social Infrastructure Dimensions with the Social Resilience Framework.**

	Dimensions of a Social Structure	Corresponding social dimension	Findings from case study in Barangay San Andres	References
1	Provider of services	social structure	serves as an emergency shelter and distribution centre	Rivera and Nickels, 2014; Park and Bowman, 2014; Kahlili et al., 2015; Joakim & White, 2015;
		social capital	provide food distribution, donations, and social support	
		social mechanism	provide feeding programs, catechism, disaster drills, and seminars	
		social innovation	provides online access to religious services and meetings	
2	Diversity	social capital	Distribution of goods and donations are given to everyone, except for some religious organizations	Park and Bowman, 2015; Chiodelli and Moroni, 2017; Lefebvre, 2020; Kwok et al., 2016; Cutter et al., 2016
		social mechanism	conducts diverse forms of programs that range from religious, political, and social activities in the community	
		social innovation	Leaders and members of different religious group created diverse ways in conducting their services and meetings	
		social equity	creates a sense of inclusiveness in the community	
3	Place of activity should be physically maintained well	social structure	Places of worship are regularly maintained by its members and the community.	Kinney and Winter, 2006; Quilala, 2018; Yıldırım, 2013; Warner et. al., 2015; Waugh Jr. & Streib, 2006
		social capital	Members continue to give donations for the upkeep of their places of worship	
		social mechanism	Community leaders and church leaders collaborate on maintaining their places of worship	
4	Accessibility	social structure	Places of worship are numerous and easily accessible to the community.	Hoernig, 2006; Lam, 2002; Bekkers & Schuyt, 2008; Kwok et al., 2016
		social capital	Community leaders also serve as church volunteers in assisting the community.	
5	Responsive to people's needs	social capital	Community residents mostly agreed on the ability of church leaders and volunteers to respond to their needs during disasters.	Becker& Dhingra, 2001; Hugen, 2006; Kong 2001; Gökariksel, 2009; Knott, 2005; Utaberta and Asif, 2017
		social mechanism	Church spaces are always readily available for services, seminars, food distribution, catechism, and other services	
		social innovation	Roads are readily available for religious processions	
6	Able to capture the ethos of democratic living	social capital	While the community can choose which type of worship they would join, some organizations would have more resources.	Gale, 2004; Sunier, 2005; Cattivelli and Rusciano, 2020; Joakim & White, 2015;
		social mechanism	Many members of the community volunteer in praying and helping others in the event of a disaster.	
		social innovation	The community find ways to raise funds and meet during the pandemic.	

### 7.2.2. Spiritual Capital and Social Resilience

Much of the origins and emphasis of social resilience is on the effect of social capital in the mechanisms of disaster resilience. Due to the similarities in results and characteristics of the dimensions of social capital and social mechanisms in the resilience framework, it helps to examine them in their religious/spiritual dimension. Figure 7.2.2. illustrates how the different aspects of spiritual capital was manifested in the results of the interview and survey.

Spiritual capital, as previously defined in Section 3.3.2., was exhibited as an asset or resource by many of the indicators of the resilience framework. Verter (2003) viewed these assets as things that can be invested, earned, squandered, or lost. Such examples of assets exhibited in the data analysis include creating relationships with church members, information dissemination, prayers meetings, and regular religious parades (See Figure 5.2.5). It is also good to note that many respondents in the interview viewed their religious/spiritual beliefs and physical churches as “inherited” from their parents and grandparents. While some of these activities may not seem to have the ability to be “spent”, but these activities create relationships and networks that enable the community to get needed help during a disaster (See Figure 5.2.6) (Berger and Hefner, 2003). While Zohar and Marshall (2004) found the three (3) different types of capital (e.g., material capital, social capital, and spiritual capital) as different, the results of the interview found these elements to be highly integrated and interdependent in nature by many respondents.

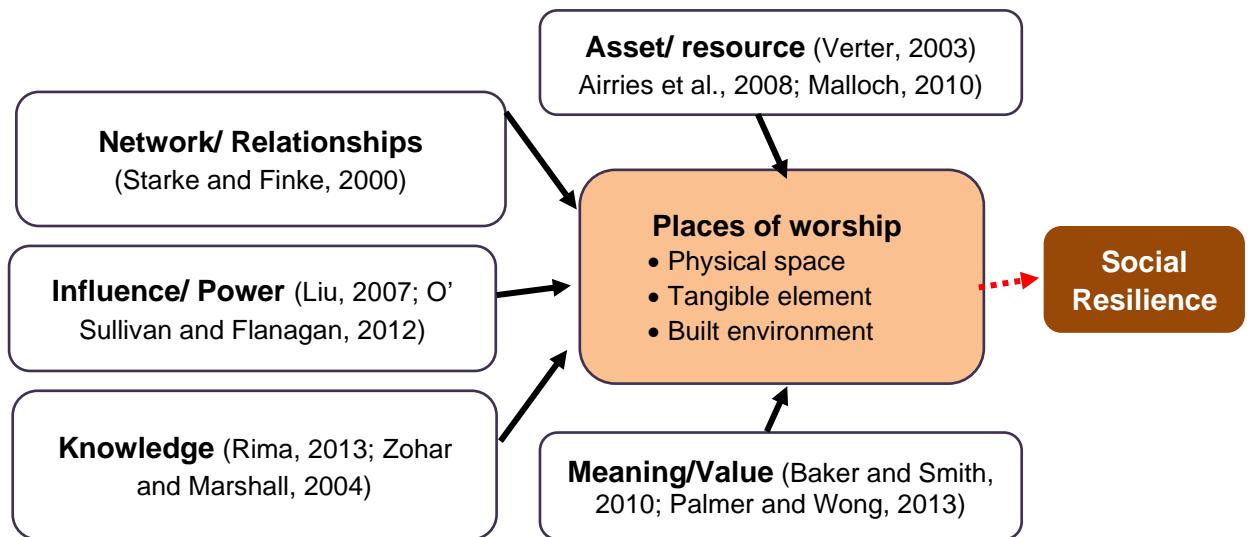


Figure 7.2.1. A theoretical approach from the characteristics of spiritual capital to understanding social resilience in assessing places of worship in disaster management.

Another manifestation of places of worship in its role in social resilience is its ability to influence residents and members of the community to participate both in religious and

political activities as noted by Driskell Embry, and Lyon (2008). This expression coincides with Berger and Hefner's (2003) reflection of the role and influence of religion in the creation of modern capitalism and democracy. Residents also tend to follow the advice of church leaders with regards to doing religious activities (See Figure 5.2.7. and 93% of the community view them as competent leaders (See table 6.2.3.). The capability of these leaders to lead also provides the community adequate information (SE3 of Table 6.2.3.) This study also noted how places of worship agrees with Zohar and Marshall's (2004) necessity of providing spiritual knowledge and expertise in managing disaster risks or other various adversities in life. This type of participation may also be influenced by how Liu (2007) have attributed spiritual capital to the reliance of the power and influence of 'something or someone 'ethereal'. Nonetheless, confidence with which people give to the community leaders and the function of places of worship underscores the contribution of such 'capital' to the perception of social resilience.

Lastly, the interviews manifest the spiritual capital creates the meaning and value that the community identifies themselves with (See Figure 5.2.5.). Many Filipinos view neighbourhood activities and events as essential parts in their life. This concept of "what I am" as a spiritual capital by Zohar and Marshall (2004) was expressed by the participants and respondents as proud members of their religious beliefs. Thus, the next section will discuss how significant characteristics of spiritual beliefs affect social resilience through the context of places of worship.

### 7.2.3. Spiritual Beliefs and Places of Worship

Due to the limited sources of literature yet in differentiating 'religious belief' and 'spiritual belief', studies on 'religious beliefs' related to the resilience framework is considered in this section. Measuring spiritual beliefs is still a very limited discourse in the academic field as mentioned by (King *et al.*, 2006) in their research on health and psychology. Thus, an almost similar set of characteristics are used for the analysis of 'spiritual beliefs' as these findings will be largely based on the dimensions of social resilience framework as seen on Figure 7.2.3.

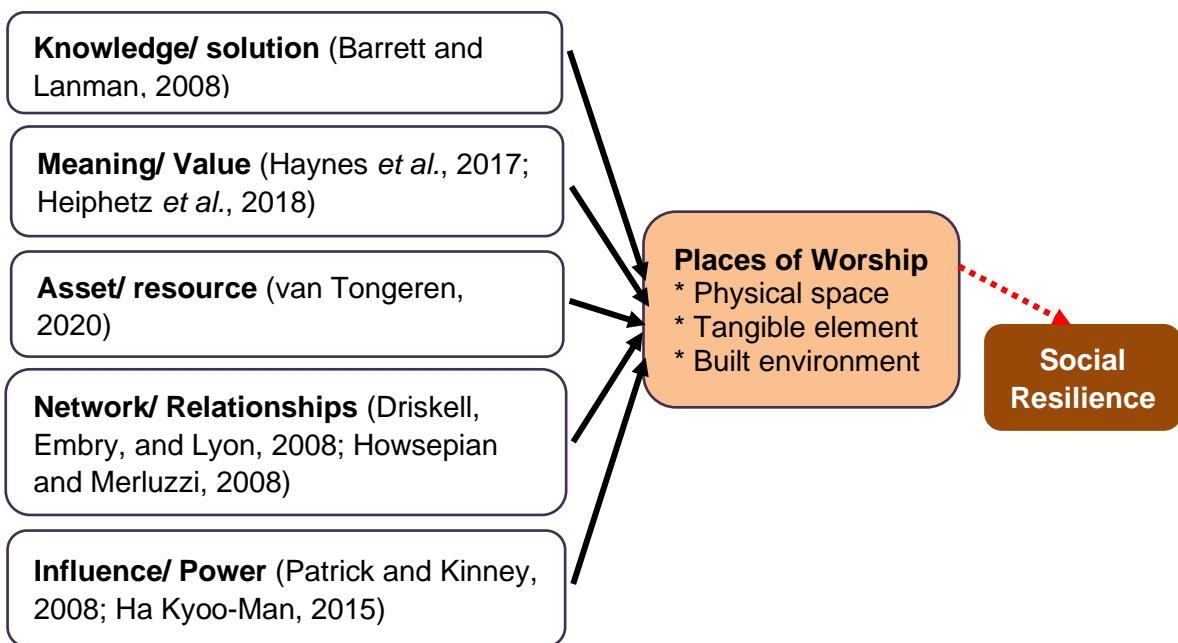


Figure 7.2.2. A theoretical approach from the characteristics of spiritual beliefs to understanding places of worship in disaster management.

Religious/spiritual beliefs are mentioned by Barrett and Lanman (2008) to arise 'because of their natural outputs to solve ordinary problems'. The ability of beliefs to become knowledge and a solution to disaster resilience was manifested in the interviews in Figure 5.3.5. wherein "worship" is an important part of their activities related to disasters. Although (Falsetti, Resick and Davis, 2003) research found that traumatic events tend to alter one's spiritual belief, this was not manifested in the interviews or surveys. In the survey, statistical mean revealed prayer as the most recognized form of belief (3.978) (See Table 6.2.4.). This result lends support to Mitchell's (2003) recognition of the positive role of prayer in the recovery and relief process of disasters. On the other hand, the meaning and value of religious/spiritual beliefs evident among the upper-aged bracket of the respondents in the interview and survey (See Table 5.1.2. and Figure 6.1.1.3). In contrast, some consider religious/spiritual beliefs are relatively influenced by a person or communities' past

experiences and values in life with which they pass on to their children that perceive them as statement of facts (Heiphetz *et al.*, 2018). Heiphetz et al. (2018) prefers to attribute “perceived stability” on personal development and social learning over religious beliefs. However, the results of the survey agree with Haynes et al.’s (2017) understanding of the ability of ‘spiritual meaning’ in attenuating the effects of disaster-related resource loss on posttraumatic stress.

Some view religious/spiritual beliefs as a form of resource that helps them feel secure which resembles to (van Tongeren, 2020; Wadsworth and Freeman, 1983) understanding on religion’s role in coping with suffering. The results of the study also resemble their beliefs to (Verter, 2003a) view of spiritual capital. The community have perceived positively their religious inheritance as a coping mechanism. Given that most of the respondents are ‘inherently’ Catholics, the concept of ‘switching beliefs’ did not emerge, but rather the discontentment of the unequal distribution and treatment of other religious denominations to the community in response to disaster management (See Table 5.1.3.). However, social support from faith-based organizations continues to be highly present (95% agree) in the results of the interviews and surveys (Table 6.2.3.). Religious/spiritual beliefs are also strongly connected to perceived social support than other constructs such as those used by Howsepian and Merluzzi (2008) in the medical field. In the political field on the other hand, Driskell Embry, and Lyon (2008) mentioned that increased participation in religious activities has motivated the community to increased political participation. Similarly in other fields, (Javanmard, 2013) has observed that religious/spiritual beliefs will continue to be a positive contributor of networks and relationships in communities.

Lastly, survey results in Table 6.2.3. show strong religious/spiritual beliefs and practices are present in Barangay San Andres. This result supports various studies (Gianisa and Le De, 2018; McCabe *et al.*, 2014; Patrick and Kinney, 2003) that consider religious/spiritual beliefs significantly help people in coping with stress and develop emotional well-being in disaster management.

### 7.3. An emerging Approach to Operationalizing the Social Resilience Framework

As discussed in the theoretical framework chapter, much of the approach in assessing places of worship are derived from Saja et al.' (2018) social resilience framework. Figure 7.1. exhibits the various sub-dimensions and indicators that was the result of the interview data in Chapter 5. It is the intention of this research to explore further how these dimensions and indicators are able to understand the mechanisms of social resilience in places of worship.

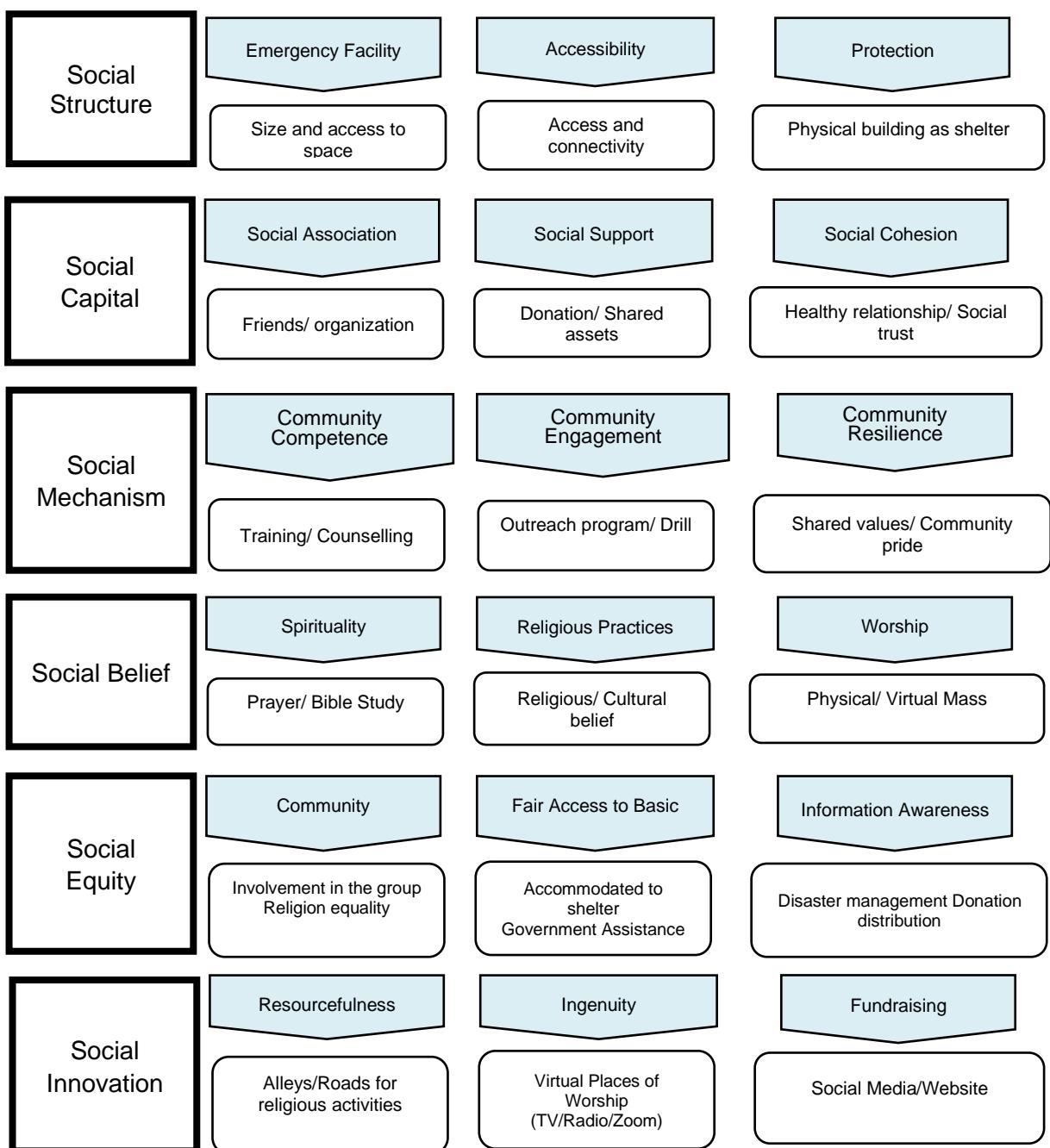


Figure 7.3.1. A modified six-dimension social resilience framework (adopted from Saja et al.'s social resilience framework (2018))

### 7.3.1. Evaluation of the Framework

Much research has often focused on how to develop social resilience in a disaster management context. This was also the preliminary assumption of the study that most of the dimensions that are reviewed directly relates to the production or hindrance of social resilience (See Figure 7.3.2.). Thus, the study conducted a mixed methods approach on understanding the in-depth meanings and reasons for the response of informal settlements to disaster risks as discussed in Section 4. The findings resulted in most social resilience dimensions providing a positive contribution to resilience in many aspects. However, relationships and causal effects between the dimensions start to emerge during the interviews in Section 5.

While the survey is based on a relatively straightforward Likert scale measurement, the limitations impacted by the pandemic has limited the number of indicators the survey is able to provide. Likewise, various statistical analyses were made in Section 6 to ensure the different possible perspectives that the statistics may want to express or define. In discussing how each dimension is being applied to places of worship, important details from the religious/spiritual context also start to develop. While many of the results of the interviews and survey support and complement other religious/spiritual studies, further studies are needed to analyse more deeply into their processes and meaning. The broad spectrum of religious/ spiritual studies has also limited the comprehensiveness of associating parallel and contrasting theories in places of worship.

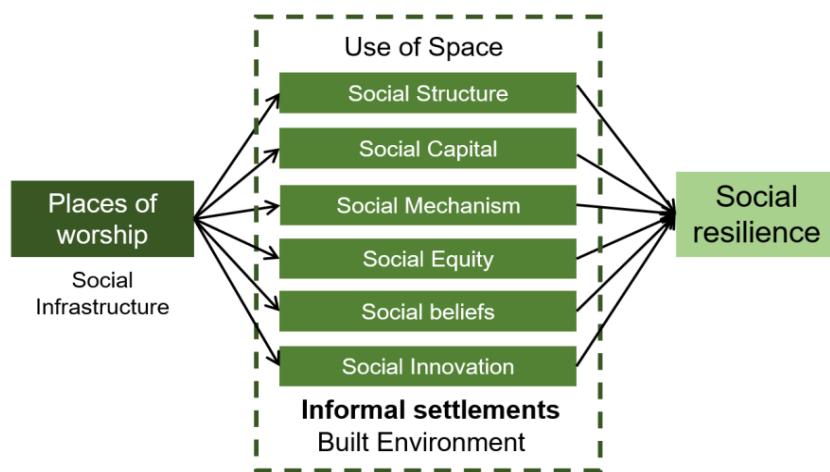


Figure 7.3.2. Hypothesized social resilience framework on assessing places of worship.

In the last phase of the data analysis in Section 6.3., the structural equation modelling (SEM) confirmed the inability to calculate the model as shown in Figure 7.3.2. as many of the dimensions are measuring similar attributes of the concept. In a different approach, the

qualitative analysis done in Section 5 and literature review in Section 7.1. showed distinct and diverse characteristics of each of the dimensions. Thus, in making sense of the various dimensions of social resilience, a revised model was created to make a functional model with goodness-of-fit in the SEM analysis.

### 7.3.2. Reframing of the Framework

The revisions of the hypothesized social resilience framework are largely based on numerous literature review of disaster risk reduction and social resilience frameworks. In contrast, limited discussion is made on the theories of social infrastructure and places of worship. The opportunity to merge these different concepts together could provide current studies with a more high-resolution understanding on how specific elements of the built environment function in a specific context. Thus, in making an operational SEM model, a new model was created as shown in Figure 7.3.3.

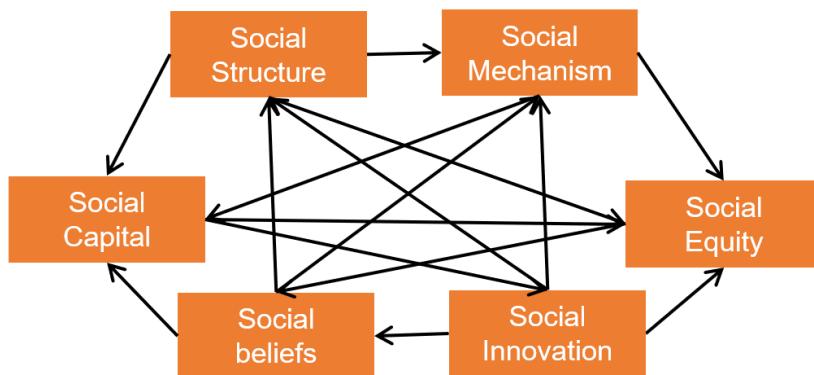


Figure 7.3.2. Emerging social resilience framework on assessing places of worship.

The mixed-methods approach, coupled with statistical analysis, showed a very strong positive contribution of the use of places of worship to social resilience. All social resilience dimensions, except for social equity, provides a positive impact on social resilience. The research design was initially planned to not include social equity as the approach was to analyse resilience, not vulnerability. However, the experiences and involvement of social inequality continues to occur from the interviews. In integrating the effects of both resilience and vulnerability in a single framework, the interactions between dimensions grew complex.

*The influence of social structure.* It was expected that social structure (places of worship) could provide a place of agreement between individuals and the community during times of adversity, but this was not the case in the emerging SEM model in Figure 6.3.3. It was also unexpected that social capital would have a negative effect on social equity, although this may be influenced by the lack of appropriate indicators needed for that specific

analysis. Another noteworthy result is that social structure (places of worship) does not directly influence the social beliefs of the community, but rather social capital and social mechanisms. This connotes that the high number of present social structure that exists in the community may not be enough to positively influence the social beliefs in the community. On the other hand, the analysis of places of worship through the dimensions of the social infrastructure on Table 7.2.1. lack the balance of considering both the resilience and vulnerability aspects of places of worship. Hence, the developed social resilience framework would require further modification and adaptation to suitably depict how social resilience is achieved by places of worship.

*In the context of informal settlements.* The communities in Barangay San Andres are often constrained to the help and support given by their families, local government units, and the religious organizations. While community and church leaders have planned programs in responding to disaster risks, majority of the residents are not prepared in their individual capacity to do so. Whereas most of the social dimensions support each other in providing social resilience, this is hampered by their perception of social equity/equality as shown in the results of the interviews and the survey. On the other hand, it is evident that the community continues to create innovative solutions, highly influenced by social capital, to be regularly active in their religious/spiritual services (See Figure 6.3.3.). This form of resilience resembles Mercado's (2016) understanding on the ability of the "urban poor" to rely on oneself "to cope with challenges of everyday living". Thus, these findings provide additional insights as to how informal settlers can build community resilience and increase their adaptive capacities in the face of disaster risks.

### **Understanding the survey through the lens of the interviews**

As mentioned in Section 4.3.1., contrasting the results of the interviews through qualitative analysis with the quantitative results of the survey helps narrow down the theoretical concepts and clarifies the content from the interviews. While results from the interviews (See Sections 5.2. and 5.3) explore and echo the sentiments of the respondents to how places of worship are used, the survey (See Sections 6.1 and 6.2) was able to confirm statistically how these insights are similar to the opinions of the population. The use of the mixed-methods approach, with supplemental support of SEM (See Section 6.3.), guided the framework to display a non-linear pattern in assessing how places of worship are used.

The main findings of the qualitative interviews, narrowed and guided into six (6) dimensions of social resilience, highlights elements that are of significant concern in

Barangay San Andres (See Table 5.3.3). As there are still other dimensions of social resilience that can be reviewed and studied, the results of the survey did highlight how religious sentiments positively influence the social resilience of the community. In addition, modern innovation and technology has also been a feature of even in resource-limited communities. On the other hand, the survey underscored the adverse effects of social inequality in disaster management.

### **Understanding the interviews through the lens of the survey**

In reviewing the results of the survey and SEM, the developing patterns of social resilience may provide future research on what other types of interview questions may be asked in a community. While the pandemic has limited the time needed to fully explore the social mechanisms of how places of worship are used, a different framework may be needed in structuring future interviews. The SEM however was able to quantify the strengths of each dimension and how each was able to somehow affect the other variables. These quantities may somehow also guide the focus of some research on how spaces are used in disaster management.

In summary, testing the resilience framework in assessing places of worship allows the research to examine other essential parameters or dimensions that may influence social resilience. This research was also able to partially explore the associations and interdependence of the different dimensions of social resilience. Additionally, the research adds a novel approach of analysing social resilience through the inclusion of the religious/spiritual dimension (See Figure 7.4). Hence, examination and application of the social resilience framework proved useful in understanding the role places of worship play in social resilience.

### **7.3.3. Examining the social resilience framework in the Philippine context**

The integrated social resilience framework is best described as a process-based framework which aims to explore possible gaps and unique characteristics that is found in different religious beliefs and cultural background. While Philippines have historically been governed by different races such as the Spanish, Dutch, American and Japanese, it is also a country comprised of numerous ethnic groups with 120 to 187 different spoken languages (e.g., Ilokano, Bisaya, Bikolano, etc.) (McFarland, 1994). It is the aim of the research objectives of the framework to identify unique cultural differences among the study group and clarify their strengths and weaknesses.

The research method section on the other hand is quite commonly done in many mixed-methods research methods. Even so, the framework takes advantage of the friendly culture of the Filipinos and their openness to tell their stories to guests and outsiders. In addition, the SEM can characterize well the prominent social patterns of the Filipinos as it is widely used in studies in psychology and in the social sciences (Sriyanto and Novianto, 2018). However, the research should be cautious of leaning to biases of certain Filipino groups as conflicts exist between different Filipino groups (Reyes, Mina and Asis, 2017; Sterkens and Vermeer, 2015).

One advantage of the integrated framework is its ability to be adapted studying other types of physical structure such as schools, condominiums, and other types of public buildings. Critical parameters that are found in the key findings section can also adopt to other types of framework and theories of studies in engineering, psychology, and urban planning. An examination of the different interactions and interdependencies of various variables also helps future research in identifying clear roadmaps and various distinct social patterns of resilience.

It is the aim of the resulting social resilience framework from this research to serve as an initial guide as to how the social interactions of the Filipinos can be understood and analysed in the context of disasters. While the framework is designed to be adapted to different settings, people, and culture, the framework can take advantage of the strengths of the notable social cohesion and support of the Filipino culture. One notable weakness of the framework is its inability to assess resilience in a physical space, a prominent topic in architectural studies. While the framework can be used to stimulate discussion on understanding spaces in places of worship, future research needs to clearly define the scope and limitations of the concepts they will be using and operationalising in their frameworks.

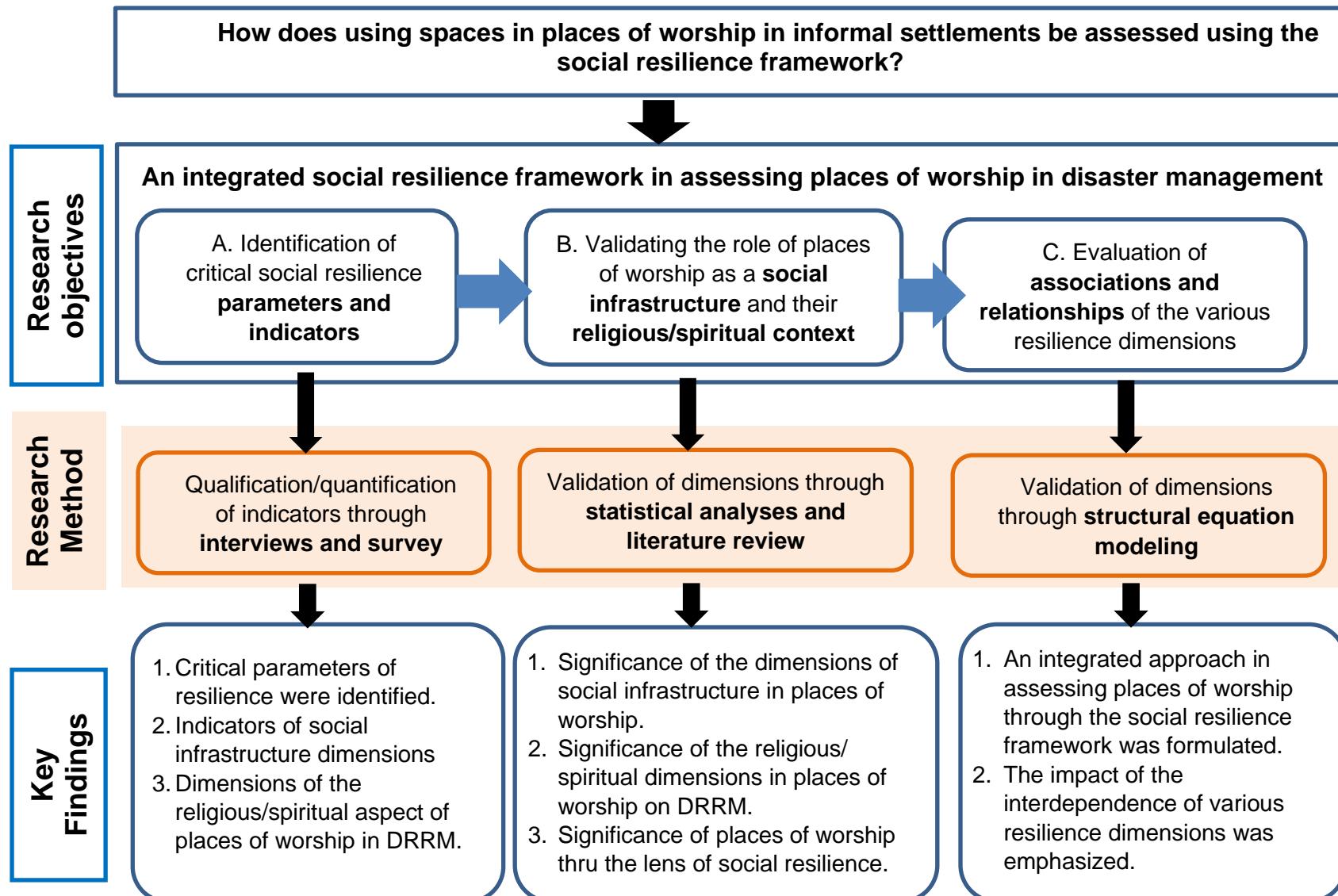


Figure 7.4. Process diagram of achieving the research objectives in response to the key research question. (Source: author)

## Research Outline

1. **Introduction**
2. **Review of Related Literature**
3. **Theoretical Framework**
4. **Research Methods**
5. **Interview Results/Analysis**
6. **Survey Results/Analysis**
7. **Synthesis of key Findings**
8. **Conclusions, Recommendations, Contributions, and Limitations**
  - 8.1. Achievement of research objectives
  - 8.2. Addressing key research questions
  - 8.3. Study contributions to knowledge and practice
  - 8.4. Limitations of the study
  - 8.5. Key recommendations for future research

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## Chapter 8: Conclusions, Recommendations, Contributions, and Limitations

This chapter contains five sections that presents how the research objectives were achieved in Section 8.1. and followed in Section 8.2. by how the key research question was answered based on these objectives and the analysis of the data. Section 8.3. then discusses the contributions of the study to knowledge and practice Section 8.4 examines the limitations of the research and the final section (Section 8.5) discusses key recommendations for future research.

## 8.1. Key findings of the Research Objectives

The discussion and process of how the three research objectives were answered is described in a diagram on Figure 7.4. The process diagram is categorized into three categories of the (1) designed research framework, (2) the research methods, and the (3) key research objectives that needs to be addressed. While Section 7 discusses how the results of the data analysis is able to motivate the research objectives, Section 8.1. considers how these objectives are appropriately fulfilled and what are the key findings found with each research objective.

### Research Objective # 1

To identify the critical parameters of social resilience of communities through their use of places of worship as a social infrastructure and their religious/spiritual context. The steps in achieving RO#1 are shown in Figure 8.1.



Figure 8.1. **Key Steps in Achieving Research Objective # 1.**

The first step in achieving RO#1 is to provide a clear context of where and who will be interviewed and surveyed in using the social resilience framework. The second step requires the translation of the social resilience dimensions into operational tools in assessing the use of places of worship. These tools are organized through the semi-structured interviews and the survey questionnaire. The outcome of identifying whether these social resilience indicators are categorically critical or vital to disaster resilience is confirmed through the administration of survey questionnaire to 409 respondents.

The initial step of identifying and selecting the indicators for the social resilience framework was carried out in the literature review in formulating the interview questions to be conducted for Section 5. Social innovation was added to Saja et al.'s (2018) 'inclusive and adaptive social resilience framework due to its relevance and applicability to the informal settlers in Barangay San Andres. Classification of the competence of key informant interviews was intentionally designed to provide sufficient and unbiased understanding of the

how places of worship are being used. Qualifying themes of the interview was then quantitatively analysed to formulate the survey questionnaire for Section 6. Furthermore, the survey questionnaire was designed to gather at least 409 respondents during the COVID-19 pandemic in providing a valid and reliable statistic through adequate sampling. Based on the series of phases and stages of research design in Section 4, the six dimensions of an integrated social resilience framework was developed in assessing how places of worship are used in managing disaster risks.

### **Key Findings in Attaining Research Objective # 1.**

One of the first key findings in achieving research objective # 1 is the identification and validation of the *critical parameters of the social resilience framework*. These dimensions were discussed in detail in Section 7.1. and how these dimensions are able to provide additional insight to how places of worship relate to the concept of social resilience. Some difficulties were encountered in the interpretation of these dimensions into the concepts of a physical space. Thus, certain adjustments in the meaning and understanding of particular concepts (e.g., social structure) were made to holistically capture the intent of the study. These adjustments are especially evident when the dimension of social resilience is juxtaposed against the dimensions of the social infrastructure.

The second key finding obtained in research objective # 1 is *the attributes of places of worship as a social infrastructure* as tabulated in Table 7.2.1. These characteristics are validated by using the empirical approach of Saja et al.'s (2018) social resilience framework in relating them to Latham and Layton's (2019) theoretical discussion of the social infrastructure. While the studies are not as extensive as may be needed, it provides a preliminary investigation as to how social infrastructure can be studied and explored.

The third key finding that resulted from achieving research objective # 1 was the *identification of the various dimensions and attributes of the religious/spiritual aspect of places of worship in DRRM*. These preliminary attributes were identified from the empirical research and studied through the lens of spiritual capital and spiritual beliefs (See Section 7.2.2. and Section 7.2.3.). However, it is also good to note that these attributes still need further studies and validation as different concepts may require different methods of analysis.

Another aspect that could be accommodated for future research includes identifying the social resilience dimensions based on the Philippine built environment. However, there are still different types of informal settlements in the Philippines with differing types of resources, opportunities, and beliefs. Thus, it is vital that the first few stages of research of

the resilience framework be approached in accordance with the prevailing conditions of the study area. Some Filipino social and cultural norms to be explored may include identifying their goals, priorities, and habits as informal settlers (Bankoff, 2007). What are they willing to sacrifice or work on for a more secure future? While the fatalistic attitude of the Filipinos may have negatively contributed to their industriousness, further exploring their strengths in creativity and resourcefulness may provide additional insights as to their coping capacity towards adversities.

With regards to the understanding of the role of these physical spaces in their community, it would be helpful to explore their historical background. While many places of worship found in Barangay San Andres are found to be dilapidated and unused, many are just starting to grow and create their own following. The different social mechanisms on how these spaces are created and disappeared are yet to be understood. In terms of the physical characteristics of these spaces, there is still a need to explore the patterns on how these spaces are designed. Are the designs of places of worship fully reliant on the resources available? Does the design of these spaces matter to the members of the Catholic church? While many of these elements may be wholly or partially associated with social resilience, creating future resilience frameworks may require more focused and purposeful motives to provide valid and useful indicators of resilience.

### **Research Objective # 2**

To examine the significance and influence of places of worship to the community in their management of disaster risks. In addition, some social resilience dimensions are integrated into theories that have similar functions and behaviour. Then, recognized theories in religious/spiritual literature were associated to their corresponding major theories in the social resilience framework.

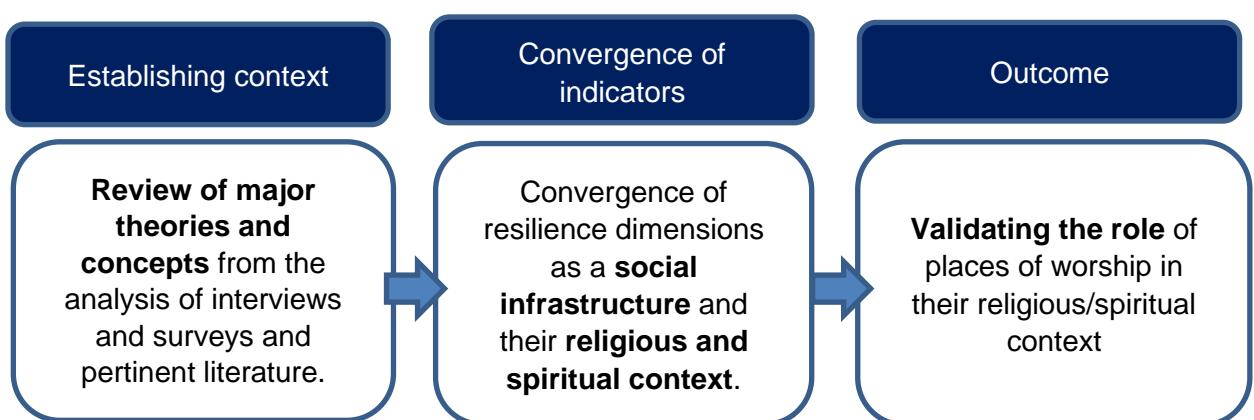


Figure 8.2. **Key Steps in Achieving Research Objective # 2.**

Three key steps were implemented to identify the three (3) major concepts that intends to assess how places of worship are being used in a disaster resilience context (See Figure 8.2.). The first step requires establishing the context of the analysis through the review of the findings of the research with applicable and important literature that either validates or invalidates the findings of the current study. The second step enables the research to simplify and congregate similar measuring tools among the dimensions of the framework. These similarities of the indicators were manifested in an exploratory factor analysis showed few variances or differences that was discussed in Section 6.3.2. The final step of achieving RO#2 is substantiating the role of places of worship through the contrasting of the findings of the research and relevant literature on the religious/spiritual context of places of worship.

In achieving research objective # 2, there is a need to validate the six dimensions of social resilience through the religious/spiritual perspective of places of worship. The review of literature in this thesis related to the social dimensions provides additional support to their relevance and appropriateness in assessing places of worship both as a key element in social infrastructure and as a religious/spiritual element. The analysis of this review revealed three potential and major facets of the religious/spiritual dimension of places of worship, namely: (1) Spiritual spaces, (2) spiritual capital, and (3) spiritual beliefs. These major facets of places of worship provided a significant contribution to the knowledge of assessing the resilience of a community in a religious/spiritual perspective since there are limited studies that examines places of worship as a social infrastructure and as a contributor of social resilience (See Section 7.2).

Because they were limited to the social resilience framework, the indicators and dimensions used in this study may require further studies in exploring the significance of places of worship in disaster resilience. Hence, the quantitative analysis in SEM (see figure 6.3.2.) provided a holistic analysis of the significance of places of worship as a contributor of social resilience. A qualitative review of related literature was carried out in Section 7.1 where the dimensions of social infrastructure (Section 7.2.1.) and the religious/spiritual aspects of resilience (Section 7.2.2. and 7.2.3.) substantiated the positive role of places of worship in disaster resilience.

### **Key Findings in Attaining Research Objective # 2.**

The first key finding from achieving research objective # 2 is *validating the significance of places of worship as a social infrastructure* through the empirical data done

through this study (See table 7.2.1.). This analysis is based on the limited literature review of the various dimensions of the social infrastructure by Latham and Layton (2019).

The second key finding found is the substantiation of the *significance of places of worship in DRRM thru the lens of Saja et al.'s (2018) social resilience framework*. The substantial effect of places of worship was verified through conducting the qualitative interviews and quantitative surveys in Barangay San Andres. Further validation was made through an SEM analysis of the various latent variables derived from the survey.

The last key finding obtained in research objective # 2 is laying the groundwork for examining the *significance of the religious/ spiritual dimensions* in places of worship in DRRM. By validating the significance of places of worship through the two main theories of social resilience and social infrastructure, the study was able to explore the third and most unique dimension of places of worship, its religious/spiritual dimension. The significance of places of worship in their religious/spiritual dimension is reiterated through the three concepts mentioned in Section 7.2.

### Research Objective # 3

To provide recommendations on how to reframe some approaches in assessing places of worship through the social resilience framework in the context of the Philippine informal built environment. Figure 8.3. provides the steps on how to achieve research objective # 3.

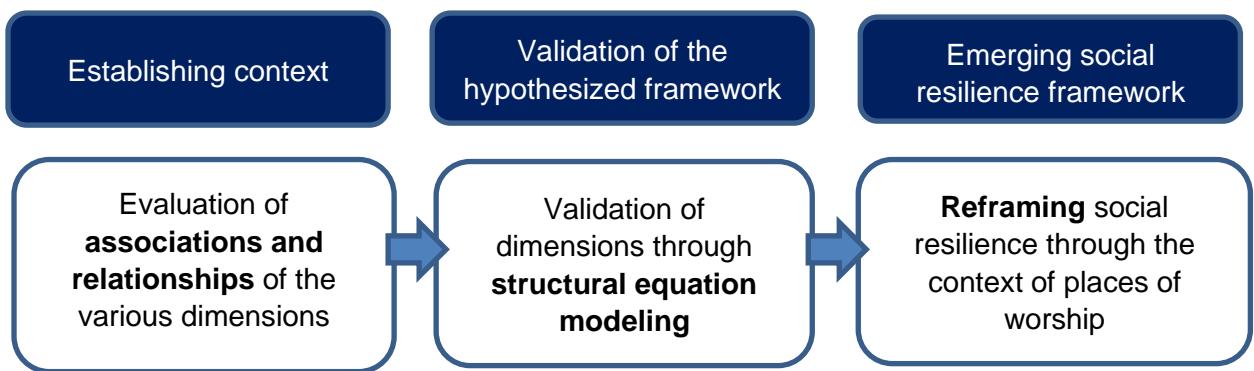


Figure 8.3. Key Steps in Achieving Research Objective # 3.

The final step in the assessment of places of worship is the examine how these social resilience dimensions relate and associate with each other. This analysis was operationalised using the structural equation modelling wherein the variables in the conceptual framework are tested as a single entity (See Section 6.3.). Three (3) social resilience dimensions stand out to be the strongest positive contributor of social resilience

and comprise: (1) social structure, (2) social capital, and (3) social mechanisms. The analysis also showed that social equity has a negative impact to how the other dimensions operate in the management of social resilience in the community. A review of related literature on religious /spiritual beliefs (See Section 7.2) also provides some insight and aligns with the results on social equity (See Figure 6.3.2.) on the adverse effects of places of worship in disaster management.

### **Key Findings in Attaining Research Objective # 3.**

The first key finding obtained in achieving research objective # 3 is *the creation of an integrated approach in assessing places of worship* through the social resilience framework as seen in Figure 7.4. The application of the three stages of assessing places of worship in the integrated approach yielded an alternative perspective on the social resilience framework is to be applied or understood. By integrating the three stages of assessing places of worship created a rigorous multi-stage mixed method approach on research in disaster resilience, an integrated process analysing social resilience emerged from the study. The findings from this reformulated framework provides a preparatory approach on how places of worship are being studied. This integrated framework also introduces a novel way of exploring social infrastructures in the urban built environment.

The second key finding achieved by research objective # 3 is *reiterating the impact of the interdependence of the various social resilience dimensions in the analysis* (See Figure 7.3.3.). The finding reveals the non-linear process of the social resilience framework. The outcome of analysing these dimensions in SEM is the detection that most of them seem to measure similar characteristics or attributes of social resilience as seen in Figure 6.3.2. Further analysis and finding alternative ways of assessing these data can be quite beneficial in exploring how the social resilience framework can function in other contexts.

## 8.2. Addressing the Research Question and Aim of the Study

The key research question in Section 1.4.1 is – **“How does the concept of using places of worship as a social infrastructure in informal settlements be assessed using the social resilience framework?”** In addressing the research question of the study, the aim of the research was: **To develop an approach in assessing the role of places of worship in the development of social resilience in the DRRM context of the informal built environment.**

In the early stages of the research, conceptual frameworks (Figure 2.4. and 2.5.) were created from the literature review to provide a baseline on how the different social resilience dimensions are to be operationalized. As currently there is no established official way of assessing social resilience, the early stages of research started with semi-structure interviews and open-ended questions that would be able to represent current understanding and interpretation of how places of worship are being used in managing disaster risks (Section 5). While statistical analysis and SEM is often used in disaster resilience studies, this study could be considered as one of the first to assess places of worship using a mixed-methods approach.

In addition, studies in social infrastructure are still early its development and discussions. This study can pioneer future studies on how to assess the critical role of social infrastructure in the built environment. This study is also especially unique in its context in examining the vulnerable and highly hazardous environment of the informal settlements in Barangay San Andres. The ability to capture the perceived valuable assets available to the community in confronting disasters risks has provided additional insights to how communities manage risks when resources are limited. Furthermore, one of the main contributions of this study to knowledge in resilience management is the creation of the integrated social resilience framework for assessing places of worship (Figure 7.4.).

**Key Finding from the Research Question.** In achieving the research aim, this study has provided the integrated social resilience framework as a new method of assessing places of worship through a social resilience context. However, the framework still requires further improvement as to its comprehensiveness and inclusiveness of its variables as the research was done during the COVID-19 pandemic. Nonetheless, the framework’s qualitative approach also allows future studies to monitor changes and provides opportunities to devise appropriate strategies in the enhancement and production of social resilience in different contexts. Thus, the multi-staged mixed method research design of this study was able to achieve the research aim of to “develop an approach in assessing the role and relationship of

places of worship between the space and its users in creating or improving the social resilience of the community”.

### **8.3. Study Contributions to Knowledge, Practice, and Policy Making**

This research was able to make original contributions to knowledge and practice in various fields of research. The fields of research include disaster resilience studies, the built environment, and religious or spiritual studies. This sub-section discusses how the current research was able to make original contributions to (1) knowledge, (2) professional practice and policy, and (3) design and architecture.

#### **8.3.1. Original Contribution to Knowledge**

First, it contributes to studies in disaster resilience and the built environment through establishing the indicators (Table 6.2.4.) found in the integrated social resilience framework. These indicators could be a starting point of further studies in conceptualizing, assessing, and refining social resilience strategies especially with respect to their religious/spiritual dimensions.

Secondly, the formulation of an integrated social resilience framework approach of assessing the religious/spiritual dimension of physical buildings provides a robust multi-staged research design for various fields of specialized studies (Figure 7.4.). The method also cross-examined the social resilience dimensions with the other attributes of other theories such as social infrastructure (Table 7.2.1.) and spiritual capital (Figure 7.2.1. and 7.2.2.). These interpolation of different theories helps observe how the various social dimensions relate or influence with the other dimensions related to disaster resilience. Through the “transdisciplinary” nature of resilience, this research contributes to the ability to examine concepts of social infrastructures in relation to social resilience (Hassler and Kohler, 2014). The stages of the framework can also be adapted to its corresponding fields of study as the interview participants consulted have different kinds of specialization and characteristics. This is a key contribution to urban studies since a social resilience framework on assessing a social infrastructure, especially places of worship, does not currently exist in any literature in the built environment.

Thirdly, the study provided an added approach in the emerging studies of social infrastructure, especially in places of worship. While ‘critical infrastructure’ and ‘social infrastructure’ has been used as a term in many government projects, the vital role of social infrastructure should not be underestimated (Casey, 2005; DPWH, 2021). Many studies have

been conducted on the role of schools and libraries in their function a social infrastructure. This study has been one of the first to examine the social and spiritual aspects of places of worship to its physical context.

Fourthly, the discussion, conceptualization, and mapping of social infrastructures (Figure 4.3.) could initiate future studies on how to assess the role of social infrastructure in the built environment. There are many studies that made use of mixed-methods approach and GIS-mapping in assessing resilience (Afnarius, Akbar and Yuliani, 2020; Sharp *et al.*, 2012; Sherrouse, Clement and Semmens, 2011; Yhee, Kim and Kang, 2021). However, a 'walking experience-based approach' could provide a more high-resolution insight as to the richness and vibrancy of life in informal settlements.

Lastly, the study uncovers the difficulty of examining the concept of places of worship due to the intermingled use of terms such as religious buildings, sacred buildings, spiritual spaces, religious sites, and other types of terminologies (Ahmed, Dwyer and Gilbert, 2020; Crompton, 2013; Johnson, 2016; Krause, 2017). Thus, there is a need for additional research on exploring and differentiating how and where these religious/spiritual terms are to be applied. These differentiations could also help clarify biases and explain religious behaviours in a more non-conflicting approach.

### **8.3.2. Contribution to Professional Practice and Policy**

The findings of this research have also contributed to the professional practice and policymaking of disaster management urban systems. First, this method can assist local government officials and practitioners of different fields to identify and conceptualize methods planning disaster resilience policies at the local level. These dimensions can also be used as a guide by politicians and consultants on crafting a more integrated and effective laws and programs in urban planning (e.g., location of emergency shelters and religious activities).

Second, the indicators and dimensions used in the framework can be used by policy makers and practitioners to assess the performance of their existing places of worship and other social infrastructure in the current environment. The integrated framework and its various stages allow the approach to be adapted to other types of social infrastructure (e.g., schools, libraries, hospitals, and public spaces) in assessing their ability to be resilient.

Third, the integrated social resilience framework can also be applied to assess different levels of resilience of community leaders and religious entities as an organization. While the homeowner's associations (HOAs) are known for their administrative functions, many of their operations are based on non-government organizations. The diversity of

interviewees allows the framework to also be modified to assess the resiliency of the projects, policies, and programs of many private and religious organizations.

### **8.3.3. Contribution to Design and Architecture**

In relation to the experience and academic background of the author, the research offers significant contributions to the field of design and architecture. First, the research framework contributes to the large-scale studies of architecture and planning. The additional insights on places of worship as a social infrastructure and contributor of social resilience adds richness to disaster studies in urban planning. As religious/spiritual spaces are treated as a separate entity in “church and state” dialogues, the analysis of the integration of these two elements is undeniably important (Almela, 2019). The collaboration of political leaders with the local churches also provides additional awareness of how planning and responses to disasters may be made more effective and contextual (Alawiyah et al., 2017; Cheemah et al., 2014).

Second, the social dimensions of the social resilience framework may also contribute to more specialized professions such as planning and design of places of worship, its interiors, and its artifacts. Architects, urban planners, interior designers, and other art professionals can explore and formulate design criteria based on the dimensions of social resilience. While disaster resilience has been the focus of the study, other types of resilience can be considered in the design of spaces. Many studies are done in the fields of clinical psychology and sociology with regards to religious/spiritual spaces and activities (Abu-Raiya, Pargament and Krause, 2016). The integrated social resilience framework can especially assist designers in alleviating the psychological effects and well-being of those affected by extreme weather events (Cherry et al., 2015).

## **8.4. Limitations of the Study**

The advantage of the findings in this study is that the framework can be applied in many contexts. However, the study is limited by many factors that have limited its capacity in providing an exhaustive list of parameters of social resilience. The following limitations were recognized as constraints to the key research aim of the study:

1. The research is limited by the socio-economic status and cultural values in a developing country. The case study is located in Barangay San Andres, Cainta, Rizal, Philippines, and is largely dominated by the Roman Catholic faith. The respondents, both from interviews and surveys, are residents of the local area. Modern strategies

of disaster resilience and other technologies from other more developed areas may not be known or recognized as possible solutions to their current problems.

2. The study was conducted in a high-hazard environment (along the Manggahan floodway) wherein the local resources are limited to their economic capacities. However, while the resources are limited to some degree, the dimension of social innovation helps explore other opportunities that are readily available to the local community. Floods are also a frequent occurrence in the area. The latest Typhoon Vamco (Ulysses) submerged villages in waist-high floods on November 2020 (Galvez, 2020). By using an “insider research” approach in conducting surveys, participants are often more open and inclined to participate in activities with people they are familiar with (Dwyer and Buckle 2009). Tokens of appreciation were also given to all those who participated in the interviews and the surveys. Hence, the results of the interviews and survey might yield different results if it was conducted in a more affluent or prosperous community.
3. The research was conducted during the COVID-19 pandemic. Challenges encountered during the collection of data include repetitive communication and schedules with government officials as to their availability and assistance during the restrictions of the pandemic. The limited time allowed for face-to-face conversations and conducting of surveys required the questionnaires to be short but clear. In-depth interviews and grounded theory research are also found unfeasible to conduct during the high level of restrictions on mobility during the pandemic. Through this mixed-methods approach, the study attempts to reach a knowledgeable and yet comprehensive respondents on how they use the places of worship in their community. This diverse set of respondents help increase the validity of the findings in the research.
4. The research is conducted within the three-year scholarship program of UST and CHED. Data collection was conducted within a (10) ten-month period between May 2020 to February of 2021. SEM often requires three (3) or more indicators to provide a good set of analysis. However, additional indicators and requires more time for data collection and analysis. The statistical analysis done on the social resilience dimensions in Section 6 lacks comprehensiveness.

## **8.5. Key Recommendations for Future Research**

This research has identified several key recommendations for future research in related fields. In summary, the increase of disaster events in the last few decades have required the need more research pertaining to the resilience of communities and the built environment. The following are the recommendations for future research:

### **8.5.1. Recommendations in transdisciplinary research and research methodology**

1. The integrated framework developed in this study suggests the importance of having interdisciplinary collaboration among experts of different fields of sciences, especially with the religious/spiritual aspect of the built environment. Future research can expose the hidden perceptions and biases that may cause a certain amount of vulnerability to some strategies in disaster resilience (Lwin et al., 2020; Usamah, 2014).
2. The research also found that there is a need for assessing of participatory programs of the community between local political leaders and church leaders. Much research has been done to highlight the importance of participatory-based and community-based research. However, little dialogue has been done to interrelate the religious beliefs and political ideologies of the communities (Cartagenas, 2010; Kusaka, 2010). While conflicts or tensions may emerge, insightful data may be found where conflict is confronted and when it is solved.
3. The exploration of spiritual spaces found the need to explore more on the psychology and spirituality of spaces to disaster resilience. Whether these spaces are formal or informal, there also seems to be a limited dialogue between clinical mental health and the built environment (Rosen, Matthieu, and Norris, 2009).
4. The findings in the interviews and survey found the need to improve the quality of the data. The aim is to create a more comprehensive inclusive range of human behaviour and mechanisms that would make a more reliable model. Improvements of defining the indicators would include inclusion of experts from higher offices in the government and possibly consultants from international institutions.
5. The use of places of worship in the study reveals the need to clarify the terminologies of religious buildings and infrastructure as mentioned in Section 8.3.1. This concern on terminologies is also true with regards to the use of “infrastructure” (Fulmer, 2009).

The need to categorize the terminologies in the proper context will be very valuable if examined in different corresponding fields and specializations.

### **8.5.2. Recommendations for Professional Practice and Policy Makers**

1. Many studies discuss the advantage of the collaboration and consulting different organizations and agencies in providing adequate and relevant information to managing disasters. The participation of informal settlers in the interviews and survey provided results that is oriented to certain social dimensions. Further research may be needed to create interviews and surveys based on respondents with a different socio-economic status or religious/spiritual perspective.
2. In using a modified '5D' social resilience framework (Saja et al., 2018), this study attempts to validate some formulated assessment tools on disaster resilience. It is also recommended that future studies be more geared towards the improvement and enhancement of effective resilience frameworks instead of formulating new ones. Many international organizations have been using their own assessment tools in their global projects. However, much literature that is published, often highlights the strengths of their tools rather than collaborating with others to formulate a comprehensive and highly adaptive tool for simpler communication.
3. In examining the role of the social infrastructure, urban planners, religious leaders, and political visionaries may need to further explore integrated frameworks on different the fields of the sciences. The benefits of interpolating the different theories of different disciplines help reveal interconnected characteristics that may be pivotal in the success or failure of a program or project.

In summary, this research has established the significant role of places of worship as a key element in social infrastructure and an important contributor of social resilience in disaster risk management through a mixed-methods research design. Future research can create tests that could validate and substantiate any gaps of latent variables or unseen factors that significantly affects our vulnerability and resilience.

*"Faith is unseen but felt, faith is strength when we feel we have none, faith is hope when all seems lost." – Catherine Pulsifer*

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## Glossary of Terms and Definitions

<b>Accessibility</b>	the concept of whether a places of worship or its services can be used by everyone
<b>Age Group</b>	a number of people or things classed together as being of similar age
<b>Beliefs</b>	are generally defined as convictions that things held in the mind are true
<b>Built Environment</b>	touches all aspects of our lives, encompassing the buildings we live in, the distribution systems that provide us with water and electricity, and the roads, bridges, and transportation systems we use to get from place to place
<b>Central Tendency</b>	a branch of descriptive statistics that gives a statistic summary of a dataset through a single value that reflects the centre of the data distribution
<b>Chi Square Test</b>	is to determine if a difference between observed data and expected data is due to chance, or if it is due to a relationship between the variables of the study
<b>Cochran Formula</b>	calculates an ideal sample size given a desired level of precision, desired confidence level, and the estimated proportion of the attribute present in the population
<b>Confirmatory Factor Analysis</b>	allows for the assessment of fit between observed data and an a priori conceptualized, theoretically grounded model that specifies the hypothesized causal relations between latent factors and their observed indicator variables

<b>Community Competence</b>	is the collective aptitude of individuals to learn about their social environment and use the information to identify problems and establish consensus to collectively address the problems to meet the needs of the community
<b>Community Engagement</b>	is the process of working collaboratively with and through groups of people affiliated by geographic proximity, special interest, or similar situations to address issues affecting the well-being of those people in the community
<b>Community Inclusiveness</b>	values all its members and helps them to meet their basic needs so that they can live with dignity, engage actively, and contribute to their community in three important areas: social connectedness and belonging
<b>Community Resilience</b>	is the sustained ability of a community to use available resources to respond to, withstand, and recover from multi-hazard threats with minimum damage to public safety and health, economy, and national security. This allows for the adaptation and growth of a community after disaster strikes.
<b>Descriptive Statistics</b>	refers to the analysis, summary, and presentation of findings related to a data set derived from a sample or entire population. It comprises three main categories – Frequency Distribution, Measures of Central Tendency, and Measures of Variability
<b>Disaster Risk Reduction and Management</b>	is the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses
<b>Disaster</b>	is a serious problem occurring over a short or long period of time that causes widespread human, material, economic or environmental loss which exceeds the ability of the affected community or society to cope using its own resources
<b>Dummy Variable</b>	is one that takes only the value 0 or 1 to indicate the absence or presence of some categorical effect that may be expected to shift the outcome. Dummy variables are also called indicator variables
<b>Emergency facility</b>	is buildings, structures, equipment, or systems used to provide emergency services to the public, including the administrative and support facilities essential to the operation of such emergency facilities even if not contiguous

<b>Fair Access</b>	refers to the fairness, free from discrimination, dishonesty, impartiality to care services and basic needs or otherwise, of the admissions processes of institutions
<b>Frequency Distribution</b>	is an overview of all distinct values in some variable and the number of times they occur and mostly used for summarizing categorical variables
<b>Fundraising</b>	is the process of seeking and gathering voluntary financial contributions by engaging individuals, businesses, charitable foundations, or governmental agencies
<b>Gender</b>	refers to the socially constructed roles, behaviours, expressions and identities of girls, women, boys, men, and gender diverse people
<b>Inferential Statistics</b>	use measurements from the sample of subjects in the experiment to compare the treatment groups and generalize about the larger population of subjects. It infers properties of a population, for example by testing hypotheses and deriving estimates
<b>Informal Settlement</b>	Include any form of housing, shelter, or settlement which is illegal, falls outside of government control or regulation, or is not afforded protection by the state
<b>Information Awareness</b>	directly affects the level of one's ability to use information effectively, and thus information literacy must serve as the foundation for improving the ability to capture, analyse, and evaluate information
<b>Infrastructure</b>	is the set of fundamental facilities and systems that support the sustainable functionality of households, businesses, regions, or nations
<b>Ingenuity</b>	is the quality of being cleverly inventive or resourceful. It is the skill of thinking, performing, or using things in new ways, especially to solve problems
<b>Kruskal-Wallis Test</b>	is a non-parametric alternative to the one-factor ANOVA test for independent measures. It relies on the rank-ordering of data and allows to evaluate the differences between three or more independent sample
<b>Likert Scale</b>	is a psychometric scale commonly involved in research that employs questionnaires. It is the most widely used approach to scaling responses in survey research

<b>Location</b>	the place where the survey or study happens or is situated
<b>Mean</b>	is the average of a data set
<b>Median</b>	is the middle of the set of numbers
<b>Mode</b>	is the most common number in a data set
<b>Non-Parametric Test</b>	serves as an alternative to parametric tests such as T-test or ANOVA that can be employed only if the underlying data satisfies certain criteria and assumptions such as the outcome is an ordinal variable or a rank, there are definite outliers, or the outcome has clear limits of detection
<b>Nvivo</b>	helps organize, analyse and visualize mixed media and unstructured information by providing tools for classifying, sorting and arranging your data in ways that enable the identification of themes and patterns.
<b>P Value</b>	is a measure of the probability that an observed difference could have occurred just by random chance. The lower the p-value, the greater the statistical significance of the observed difference. P-value can serve as an alternative to or in addition to preselected confidence levels for hypothesis testing
<b>Parametric Test</b>	make certain assumptions about a data set drawn from a population with a specific or normal distribution. Also, the variables in the population are measured based on an interval scale
<b>Pearson Correlation</b>	is the test statistics that measures the statistical relationship, or association, between two continuous variables. It gives information about the magnitude of the association, or correlation, as well as the direction of the relationship
<b>Places of Worship</b>	is a specially designed structure or space where individuals or a group of people such as a congregation come to perform acts of devotion, veneration, or religious study.
<b>Protection</b>	is any measure taken to guard a thing against damage caused by outside forces
<b>Qualitative Research</b>	relies on data obtained by the researcher from first-hand observation, interviews, questionnaires, focus groups, participant-observation, recordings made in natural settings, documents, and artifacts. The data are generally nonnumerical

<b>Quantitative Research</b>	is the process of collecting and analysing numerical data. It can be used to find patterns and averages, make predictions, test causal relationships, and generalize results to wider populations
<b>Regression Analysis</b>	is a set of statistical processes for estimating the relationships between a dependent variable and one or more independent variables.
<b>Religion</b>	is a specific set of organised beliefs and practices, usually shared by a community or groups and systems that most often relate to belief and worship of a controlling force such as a personal god or another supernatural being
<b>Religious Practices</b>	include rituals, sermons, commemoration, or veneration (of deities and/or saints), sacrifices, festivals, feasts, trances, initiations, funerary services, matrimonial services, meditation, prayer, music, art, dance, public service, or other aspects of human culture
<b>Resilience</b>	as the process of adapting well in the face of adversity, trauma, tragedy, threats, or significant sources of stress—such as family and relationship problems, disasters, serious health problems, or workplace and financial stressors
<b>Resourcefulness</b>	is the community's capacity to identify problems, establish priorities and mobilize resources when the existing conditions threaten to disrupt some elements, systems, or the units of analysis
<b>Social Association</b>	a group of people who come together to achieve any particular purpose or goal and these people need to be organized and should be worked according to the given specifications and rules to give the successful output in the society
<b>Social Beliefs</b>	are defined as beliefs shared by society members, that bind people together to have strong religious faith, respect for authority, and smooth interpersonal relationships.
<b>Social Capital</b>	is "the networks of relationships among people who live and work together in a group to effectively achieve a common purpose enabling that society to function effectively
<b>Social Cohesion</b>	refers to the strength of relationships and the sense of solidarity among members of a community

<b>Social Innovation</b>	refers to the design and implementation of new solutions that imply conceptual, process, product, or organisational change, which ultimately aim to improve the welfare and wellbeing of individuals and communities
<b>Social Mechanism</b>	are systems of individuals or groups of people whose connections enable them to interact in ways that produce regular changes to create and maintain social order.
<b>Social Resilience</b>	refers to a social unit or a group to collectively cope with or respond to external stresses and disturbances resulting from social, political, and environmental changes
<b>Social Structure</b>	are foundational services and structures including the maintenance of facilities that support the quality of life of a community and its social services
<b>Social Support</b>	the provision of assistance or comfort to others, typically to help them cope with biological, psychological, and social stressors, that one is part of a supportive social network. These supportive resources can be emotional, informational, or companionship, tangible, or intangible
<b>Social Equity</b>	is the fair and equitable distribution of public services, and implementation of public policy that includes a commitment to promote fairness and justice in a society
<b>Spearman Rank Correlation</b>	is a nonparametric measure of rank correlation. It assesses how well the relationship between two variables can be described using a monotonic function
<b>Spirituality</b>	can be defined generally as an individual's search for ultimate or sacred meaning and purpose in life. It also relates to the process of developing beliefs around the meaning of life and connection with others, without any set spiritual values
<b>SPSS Statistics</b>	is short for Statistical Package for the Social Sciences, and it's used by various kinds of researchers for complex statistical data analysis. The SPSS software package was created for the management and statistical analysis of social science data.
<b>Standard Deviation</b>	describes the variance, or how dispersed the data observed in that variable is distributed around its mean
<b>Structural Equation Modelling (SEM)</b>	is a multivariate statistical analysis technique that is used to analyse structural relationships. This technique is the combination of factor analysis and multiple regression analysis,

and it is used to analyse the structural relationship between measured variables and latent constructs

### **Thematic Analysis**

is a method of analysing qualitative data. It is usually applied to a set of texts, such as an interview or transcripts. The researcher closely examines the data to identify common themes – topics, ideas, and patterns of meaning that come up repeatedly

### **Theoretical Framework**

as a conceptual model that establishes a sense of structure that guides your research. It provides the background that supports the investigation and offers the reader a justification for the study of a particular research problem

### **Urban Resilience**

as the "measurable ability of any urban system, with its inhabitants, to maintain continuity through all shocks and stresses, while positively adapting and transforming towards sustainability

### **Virtual Worship**

a gathering of religious believers facilitated through the use of online video stream, audio stream and/or written messages whose primary purpose is to allow the meeting of a church body of parishioners

### **Wilcoxon Mann-Whitney**

is used to compare differences between two independent groups when the dependent variable is either ordinal or continuous, but not normally distributed

### **Worship**

is an act of religious devotion usually directed towards a deity or a recognition of a God. It can be performed individually, in an informal or formal group, or by a designated leader

## Appendix

### Appendix - A: Preliminary Interview questions based on the different dimensions of social resilience

	<b>Key indicator</b>	<b>Objective</b>	<b>Questions</b>
A	<b>Social structure</b> , mobility and access to places of worship	The social structure indicator measures the significance of mobility and accessibility of places of worship during disasters	<ul style="list-style-type: none"><li>• Do you or the community consider places of worship as an asset (e.g. emergency shelter) in your neighbourhood? Why? <b>Invalid source specified.</b></li><li>• Are places of worship effective as a place of information dissemination and assistance after a disaster?</li><li>• What characteristics do spaces in places of worship need to have to be considered a safe place and well-prepared during disasters? How? <b>Invalid source specified.</b></li><li>• How important is accessibility as a trait of places of worship in managing disasters?</li></ul>

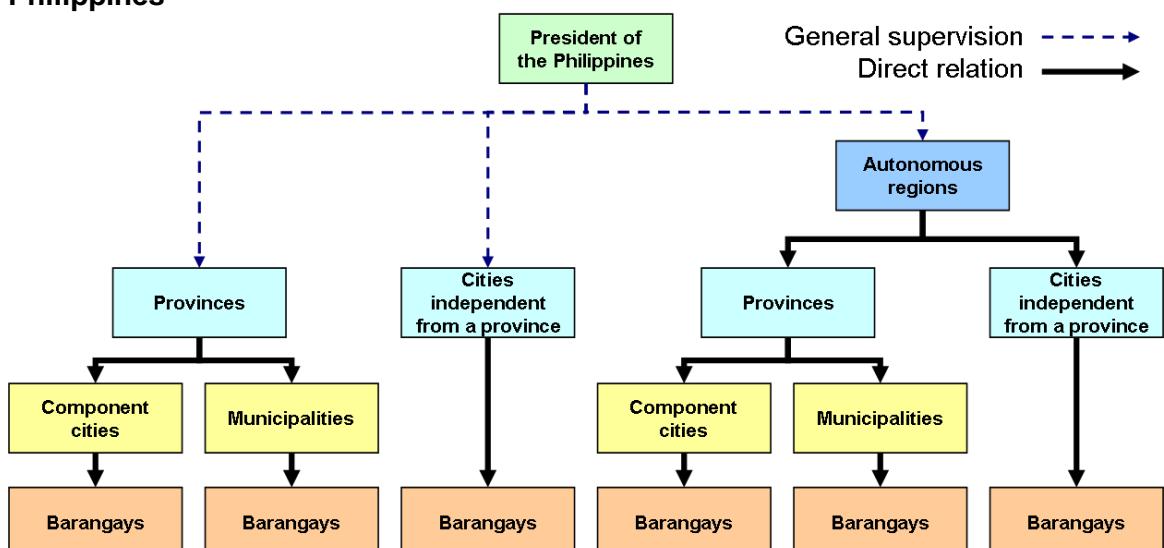
	<b>Key indicator</b>	<b>Objective</b>	<b>Questions</b>
B	<b>Social capital</b> Social values, sense of community and attachment to places of worship	The social values indicator assesses how shared values and sense of attachment influences their use of such spaces.	<ul style="list-style-type: none"><li>• How have places of worship in your area affect the social activities of the community? <b>Invalid source specified.</b></li><li>• What are the possible reasons why the community participates actively in using spaces in places of worship? <b>Invalid source specified.</b></li><li>• Are there some special or personal activities that have caused these places of worship to create some sort of value, pride or attachment to the community? <b>Invalid source specified.</b></li></ul>

	<b>Key indicator</b>	<b>Objective</b>	<b>Questions</b>
C	<b>Social competence</b> Community learnings from past disaster experiences	The social equity indicator measures how fair access and inclusive influence the use of spaces in places of worship	<ul style="list-style-type: none"> <li>• How effective are places of worship are being used in providing support in enhancing your resilience to disasters in your community? <b>Invalid source specified.</b></li> <li>• What are some of the significant activities that places of worship have provided that enhanced the communities' resilience to disasters?</li> <li>• What can be your comment on social equality with regards to how these places of worship are being used? <b>Invalid source specified.</b></li> </ul>

	<b>Key indicator</b>	<b>Objective</b>	<b>Questions</b>
D	<b>Social beliefs and culture</b> that promote or impede disaster resilience	This social indicator measures the influence and significance of religious beliefs to their use of spaces in PoW that help/impede resilience from disasters	<ol style="list-style-type: none"> <li>1. What is your perception regarding the activities that have been done by religious members of your community? What value do they bring to the community? <b>Invalid source specified.</b></li> <li>2. Can you mention any religious culture or practice that your community does in places of worship that has greatly influenced the communities' resilience to disasters? <b>Invalid source specified.</b></li> <li>3. Has the beliefs and practices of the religious members had any impact to activities related to disaster management? <b>Invalid source specified.</b></li> </ol>

	<b>Key indicator</b>	<b>Objective</b>	<b>Questions</b>
E	<b>Social innovation</b>	The social innovation indicator measures the innovativeness of the community to adapt the use of places of worship during disasters	<ul style="list-style-type: none"> <li>• Can you identify, if any, types of innovation or creativity that arose from the activities being performed in places of worship that contributes to disaster resilience?</li> <li>• How does the community deal with conflicts, if any, that deal with the use of spaces in places of worship? <b>Invalid source specified.</b></li> </ul>

**Appendix - B: Administrative structure and Local Government Units (LGUs) in the Philippines**



**Figure B.1: The local government hierarchy of the Philippines**

**Table B.1: Total number of local government units in the Philippines**

Geographic scope	Description	Head of Administration	Number
Province		Governor	81
City (6 classes)	A unit of government in the Philippines which has their own administrative and structure powers. Has more autonomous powers than municipalities and has a bigger share of	Mayor	146

	the Internal Revenue Allotment (IRA) by the national government		
Municipality** (6 classes)	Often termed as a town; A municipality has an average annual income of P15M to P55M.	Mayor	1,488
Barangay (Barrio Council)	The smallest administrative division in the country; synonymous with village, district or ward	Barangay Captain (Punong Barangay)	42,029
Zone (Sitio or purok)	A division of a barangay which serves as a unit for administrative purposes	Member of Barangay Council (Sangguniang Barangay) (Kagawad)	NA

\*\* Republic Act 7160 or the Local Government Code of 1991

## Appendix - C: Interview and Data gathering documents

Figure C.1. Interview consent form



### Participant Consent Form

#### Assessing the use of space in places of worship in disaster management: A case study of Barangay San Andres, Philippines

1. I have read and explained to me by John Ong the Information Sheet relating to research in places of worship and any questions have been answered to my satisfaction. (*Nabasa ko at ipinaliwanag sa akin ni John Ong ang Information Sheet na nauugnay sa research na ito at ang anumang mga katanungan ay nasagot sa aking kasiyahan.*)
2. I understand that my participation is entirely voluntary and that I have the right to withdraw from the research study on places of worship at any time, and that this will be without detriment. (*Naiintindihan ko na ang aking pakikilahok ay kusang-loob at may karapatang akong umalis sa research study sa anumang oras, at ito ay hindi makakasama.*)
3. I understand that my personal information will remain confidential to the researcher and his/her supervisor at the University of Reading, unless my explicit consent is given. (*Nauunawaan ko na ang aking personal na impormasyon ay mananatiling kompidensiyal sa mananaliksik at sa kanyang supervisor sa University of Reading, maliban kung aking ipapahintulot.*)

4. I understand that the pictures taken will be anonymized by the researcher, concealing any personal information of any individual or organization that was included in the pictures. (*Naiintindihan ko na ang mga larawan na kuha ay ipakikilala ng mananaliksik, itinatago ang anumang personal na impormasyon ng sinumang indibidwal o organisasyon na kasama sa mga larawan.*)
5. I understand that my organization will not be identified either directly or indirectly without my consent. (*Nauunawaan ko na ang aking organisasyon ay hindi makikilala alinman sa direkta o hindi direkta nang wala kong pahintulot.*)
6. I agree to the arrangements described in the Information Sheet in so far as they relate to my participation. (*Sumasang-ayon ako sa mga pagsasaayos na inilarawan sa Information Sheet na may kaugnayan sa aking pakikilahok.*)

**Signed:**

**Interviewee**

Date:

**Figure C.2. Interview Questions**

## **INTERVIEW ON SOCIAL RESILIENCE IN PLACES OF WORSHIP**

<b>Name (Pangalan):</b>	<b>Date(Petsa):</b>	<b>Survey ID:</b>
<b>Position (Posisyon):</b>	<b>Barangay :</b>	<b>HOA:</b>
<b>Religion (Relihiyon):</b>	<b>Gender (Kasarian):</b>	<b>Age (Edad):</b>

**Interview:**

- 1. Do you think that having a place of worship in a community is important? Why?**  
(*Sa iyong palagay, ang pagkakaroon ba ng isang "place of worship" sa isang komunidad ay mahalaga? bakit?*)
- 2. Do places of worship in your area be used in times of disaster? How?**  
(*Ang mga "places of worship" ba sa inyong lugar ay naggagamit sa panahon ng sakuna at kalamidad? paano?*)
- 3. Does the place of worship affect you a.) socially, b.) mentally, c.) physically and d.) spiritually? How?**  
(*Ang "place of worship" ba ay nakakaapekto sa iyo sa aspetong sosyal, pangkaisipan, pisikal at ispirituwal? paano?*)
- 4. Do places of worship provide assistance in the community to cope with disasters? How?**

*(Ang mga places of worship ba ay nagbibigay ng tulong sa komunidad upang makayanan ninyong harapin ang mga sakuna at kalamidad? paano?)*

**5. Do places of worship hold activities that prepare the community in facing disasters? How?**  
*(Ang mga places of worship ba sa inyong komunidad ay may mga aktibidad na naghahanda upang makayanan ninyo ang pagharap sa mga sakuna at kalamidad? paano?)*

**6. Do places of worship conducting virtual place of worship that can help the community in facing disasters? How?** *(Ang mga places of worship ba sa inyong komunidad ay nagsasagawa ng virtual na paraan ng pagsamba na makakatulong upang makayanan ninyo ang pagharap sa mga sakuna at kalamidad? paano?)*

**7. Do you think there are ways that places of worship can strengthen assistance in times of disasters? How?**

*(Sa iyong palagay may mga paraan ba upang mapalakas pa ng mga places of worship ang pagbibigay ng tulong sa panahon ng sakuna at kalamidad? paano?)*

**Thank you very much for your participation.**

*(Maraming salamat po sa inyong pakikibahagi.)*

**Figure C.3. Survey Questionnaire**

**SURVEY ON SOCIAL RESILIENCE IN PLACES OF WORSHIP**

Name (Pangalan):	Date (Petsa):	Survey ID:
Home Owners Association (HOA)	Barangay:	Alley:
Religion (Relihiyon):	Gender (Kasarian):	Age (Edad):

Your response to this survey will help us to determine the significance of place of worship to social resilience in times of disasters. Rest assured that your answers will be kept confidential. Please check [✓] the number corresponding to your choice. Please refer to the following rating guide in answering:

(Ang iyong tugon sa survey na ito ay makakatulong sa amin upang matukoy ang kahalagahan ng lugar ng pagsamba sa katatagan ng lipunan sa mga panahon ng kalamidad. Kayo po ay makakaasa na ang inyong mga sagot ay mapapanatiling lihim. Lagyan ng tsek [✓] ang numerong naaayon sa inyong sagot. Gamitin ang sumusunod na gabay sa inyong pagsagot.)

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
Mahigpit na hindi sumasang-ayon	Hindi Sumasang-ayon	Nuetral	Sumasang-ayon	Mahigpit na sumasang-ayon

**Describe how much you agree or disagree with the place of worship in times of disasters in the following statements.** (Ilarawan kung gaano ka sumasang-ayon o hindi sumasang-ayon sa "place of worship"sa panahon ng kalamidad sa mga sumusunod na pahayag.)

	1	2	3	4	5
1. Infrastructure					
a. An emergency facility (maging dagliang lugar para sa kalamidad)					
b. Near my home and accessible (malapit sa aming tahana at madaling puntahan)					
2. Supports					
a. Socially (friends/people) pakiki-pagkapwa (kaibigan/mga tao)					
b. Mentally (counselling/seminar) pang-kaisipan (pagpapayo/seminar)					
c. Physically (donations/assistance) pisikal (mga donasyon/tulong)					
d. Spiritually (prayer/bible) ispirituwal (panalangin/ bibliya)					
3. Provisions					
a. Sense of belongingness (nagbibigay ng isang pakiramdam ng pagiging kabilang sa aming komunidad)					
b. Enhanced resilience (napapahusay ang pagiging matatag)					
c. Healthy relationship with others (maayos na relasyon sa iba)					
d. Spiritual activities (mga gawaing pang-ispirituwal)					
e. Protection from disasters (proteksyon mula sa mga kalamidad)					
f. Open and accommodating to all people (bukas at tumatanggap sa lahat ng mga tao)					
g. Discusses disaster management and donation distribution (tinatalakay ang pamamahala sa sakuna at pamamahagi ng donasyon)					
h. Open and accommodating to all types of people (bukas at tumatanggap sa lahat ng mga tao)					
i. Discusses disaster management and donation distribution (tinatalakay ang pamamahala sa sakuna at pamamahagi ng donasyon)					
4. Innovations					
a. Alleys/roads for religious and relief activities (mga iskinita / kalsada para sa mga gawaing pang-relihiyon)					
b. Virtual place of worship (virtual na paraan ng pagsamba) (TV,zoom app,youtube,FB /messenger)					
c. Use of social media platform for fund-raising/donations (paggamit ng social media para makalikom ng pondo / mga donasyon)					
5. Do you have any suggestions to strengthen the assistance of the place of worship in times of disasters? (mayroon po ba kayong mungkahi upang mapalakas pa ng mga places of worship ang pagbibigay ng tulong sa panahon ng kalamidad?)					

**Thank you very much for answering this survey.**  
(Maraming salamat po sa inyong pagsagot.)

## Appendix - D: Descriptive Statistics

**Table D.2: Descriptive Statistics of the survey results on social resilience**

Code	Variables	Descriptive Statistics							
		N	Minimum	Maximum	Mean	Standard Deviation	Skewness	Kurtosis	
		Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
SS1	Emergency Facility	409	1.00	5.00	3.7704	1.02066	-1.139	1.245	
SS2	Accessibility	409	1.00	5.00	3.8490	.99415	-1.143	1.371	
SS3	Protection	409	1.00	5.00	3.7876	1.05228	-.925	.528	
SC1	Social Association	409	1.00	5.00	3.9125	.89404	-1.245	2.333	
SC2	Social Support	409	1.00	5.00	3.9496	.83438	-.891	1.465	
SC3	Social Cohesion	409	1.00	5.00	3.8900	.82454	-1.046	2.086	
SM1	Community Competence	409	1.00	5.00	3.7774	.89564	-1.067	1.827	
SM2	Community Resilience	409	1.00	5.00	3.8968	.88819	-1.075	1.866	
SB1	Spiritually	409	1.00	5.00	3.9786	.86295	-1.037	1.625	
SB2	Religious Practices	409	1.00	5.00	3.8998	.86062	-.768	.859	
SE1	Community inclusiveness	409	1.00	5.00	3.8501	.87069	-.834	1.176	
SE2	Fair Access to Basic Needs	409	1.00	5.00	3.0391	1.17925	.041	-.992	
SE3	Information Awareness	409	1.00	5.00	3.0611	1.08179	-.017	-.315	
SI1	Resourcefulness	409	1.00	5.00	3.5092	1.06322	-.535	-.242	
SI2	Ingenuity	409	1.00	5.00	3.8131	.94055	-.826	.732	
SI3	Fundraising	409	1.00	5.00	3.4944	1.02540	-.499	-.129	

## Appendix - E: Interviews

Table E.3: Sample Interview Questions

Interview Questions	Indicator
1. Do you think that having a place of worship in a community is important? Why?	Q1
2. Do places of worship in your area be used in times of disaster? How?	Q2
3. Does the place of worship affect you.....How?	
a.) socially	Q3a
b.) mentally,	Q3b
c.) physically	Q3c
d.) spiritually?	Q3d
4. Do places of worship provide assistance in the community to cope with disasters? How?	Q4
5. Do places of worship hold activities that prepare the community in facing disasters? How?	Q5
6. Do places of worship conducting virtual place of worship that can help the community in facing disasters? How?	Q6
7. Do you think there are ways that places of worship can strengthen assistance in times of disasters? How?	Q7
<b>Legend</b>	<b>Indicator</b>
YES	1
NO	2
Neutral /No Answer	3

Table E.4: Summary of Response on the Interview Questions

Questions	RESPONSES			PERCENTAGE		
	YES Reponses	NEURTAL Response	NO Reponses	YES	NEUTRAL	NO
Q1	14	2		88%	13%	0%
Q2	13	2	1	81%	13%	6%
Q3a	12	3	1	75%	19%	6%
Q3b	10	4	2	63%	25%	13%
Q3c	12	3	1	75%	19%	6%
Q3d	15	1	0	94%	6%	0%
Q4	13	0	3	81%	0%	19%
Q5	11	1	4	69%	6%	25%
Q6	13	2	1	81%	13%	6%
Q7	14	1	1	88%	6%	6%

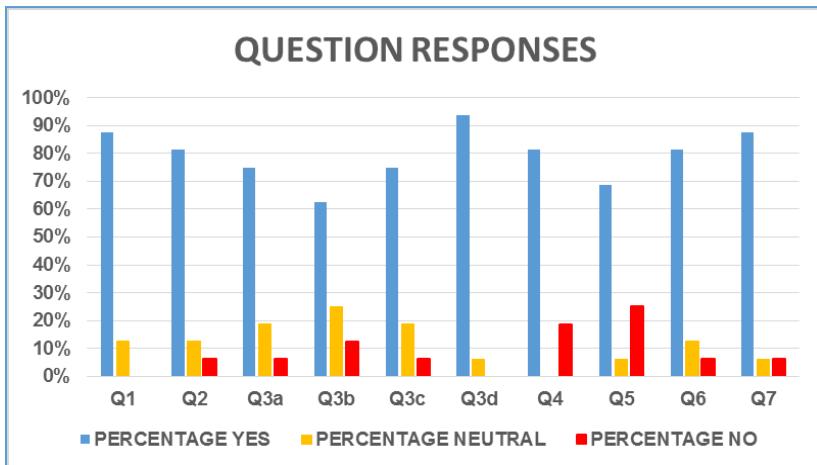


Figure E.1. A Diagram on the question responses by percentage

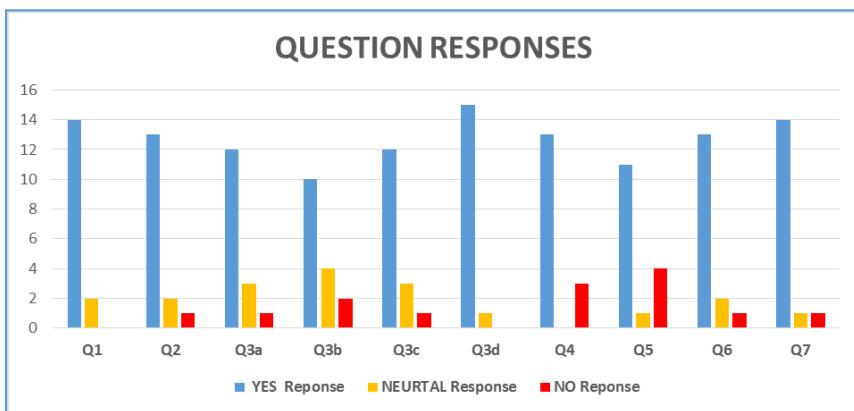


Figure E.2. A Diagram on question responses by count

Q1. There were 16 barangay and church leaders interviewed- of those respondents, 88% agreed that having a place of worship in a community is important.

Q2. Among those respondents 81% recognized that places of worship in their area could be used in times of disaster.

Q3a. 75% of respondents said places of worship could affect them socially while 6% disagreed and 19% remained neutral.

Q3b. 63% of respondents said places of worship could affect them mentally while 13% disagreed and 25% remained neutral.

Q3c. 75% of respondents said places of worship could affect them physically while 6% disagreed and 19% remained neutral.

Q3d. 94% of respondents said places of worship could affect them spiritually.

Q4. 81% of the respondents agreed that places of worship assisted their community to cope with disasters.

Q5. 69% of the respondents acknowledged that religious activities prepared the community to face the disasters while 25% did not.

Q6. Since the barangay complies with GCQ (general community quarantine) for the COVID-19 Pandemic, 81% of the respondents watched the television for the virtual place of worship which helped them in facing the disasters.

Q7. 88% of the respondents think there are ways for places of worship to strengthen assistance in times of disasters

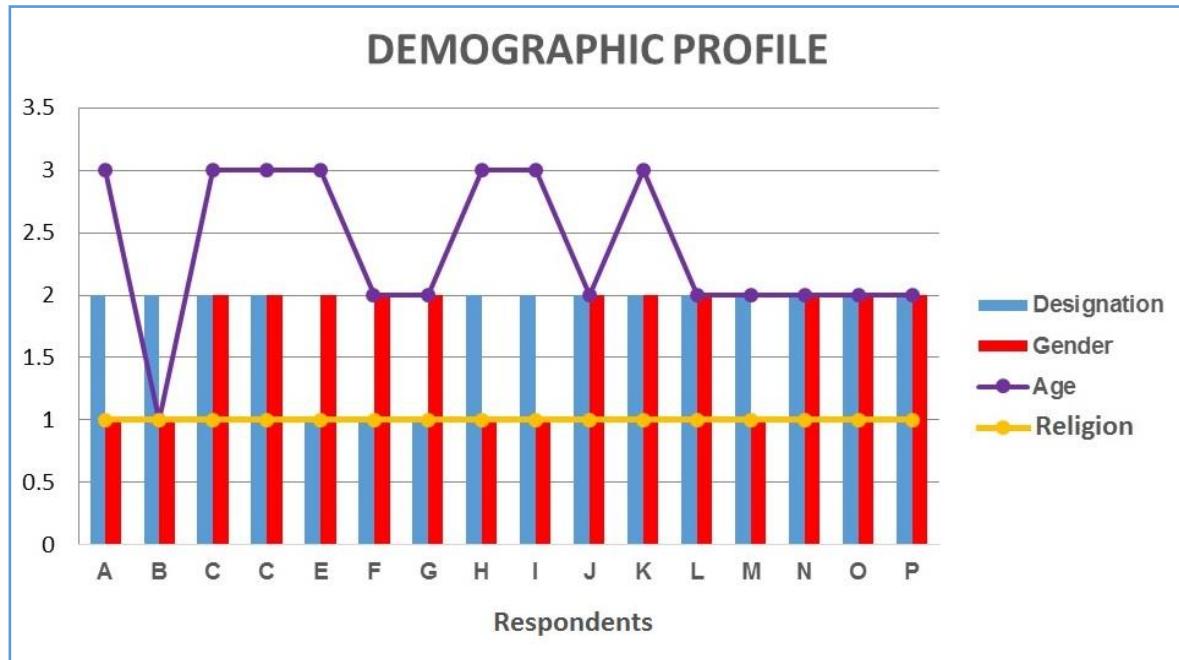
**Table E.3: Summary of Respondents and their respective answers**

Respondents	Yes	Neutral	No	TOTAL
Respondent A	9	1	0	10
Respondent B	10	0	0	10
Respondent C	10	0	0	10
Respondent D	7	3	0	10
Respondent E	8	0	2	10
Respondent F	10	0	0	10
Respondent G	8	0	2	10
Respondent H	5	2	3	10
Respondent I	5	3	2	10
Respondent J	8	0	2	10
Respondent K	10	0	0	10
Respondent L	9	1	0	10
Respondent M	4	1	5	10
Respondent N	10	0	0	10
Respondent O	7	3	0	10
Respondent P	7	3	0	10
<b>Total</b>	<b>127</b>	<b>17</b>	<b>16</b>	<b>160</b>

**Table E.4: Summary of Respondents' Designation and Demographic profile**

Respondents	Designation	Gender	Age	Religion
A	2	1	3	1
B	2	1	1	1
C	2	2	3	1
D	2	2	3	1
E	1	2	3	1
F	1	2	2	1
G	1	2	2	1
H	2	1	3	1
I	2	1	3	1
J	2	2	2	1
K	2	2	3	1
L	2	2	2	1
M	2	1	2	1
N	2	2	2	1
O	2	2	2	1
P	2	2	2	1

LEGEND	Variable		
<b>Designation</b>		<b>Gender</b>	
CL (Church Leaders)	1	Male	1
BL (Barangay Leaders)	2	Female	2
<b>Age</b>		<b>Religion</b>	
18-39 y/old =0	1	Roman Catholic	1
40-59 y/old =1	2	Other Religion	2
<60 y/old=2	3		



**Figure E.3: A Diagram on the Demographic Profile of Barangay and Church Leaders in San Andres, Cainta, Rizal**

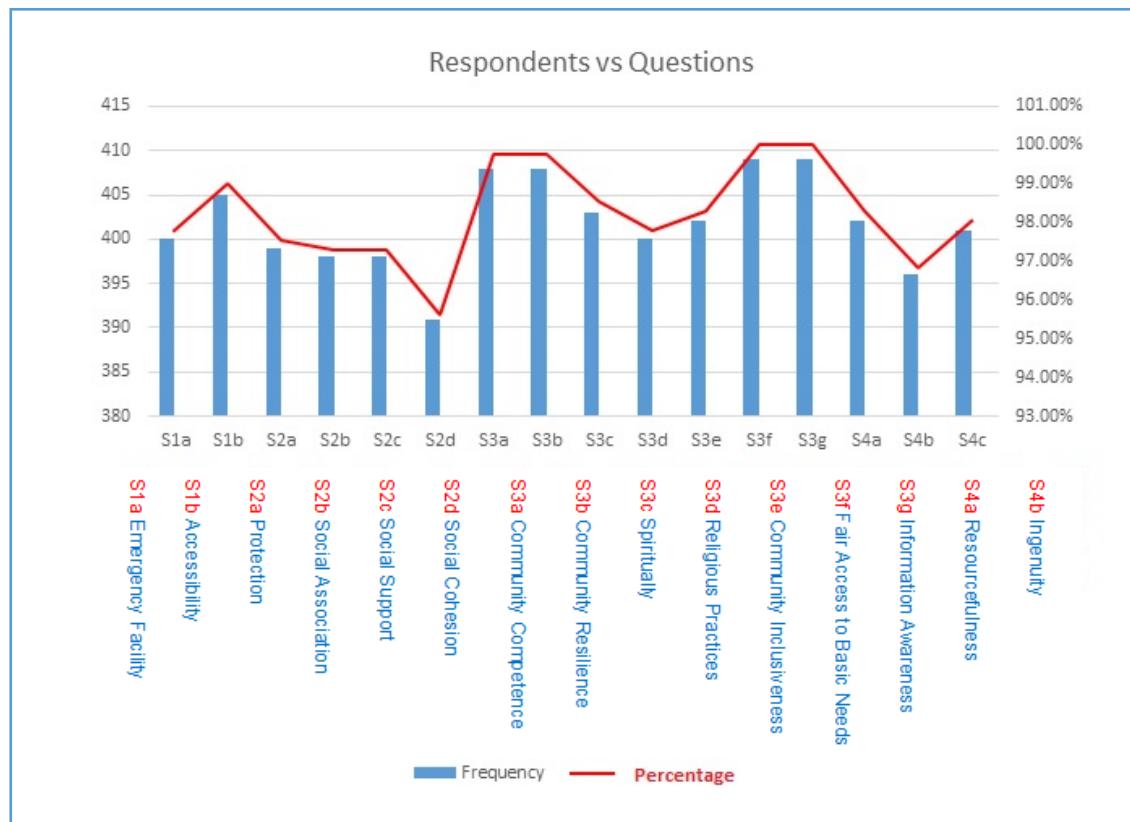
The instrument includes the demographic profile of the respondents such as name, designation, gender, age, and religion. The interviews were made in 12 barangay officials and 4 church leaders. The graph below shows that there are 5 males and 11 females' respondents ranging from 38 to 77 years of age; most of them are Roman Catholic.

**Table E.5: Summary of Respondents' Answer Cross tabulation**

Age and Gender * Respondents Answer Cross tabulation					
Demographic	Yes	Neutral	No	TOTAL	Percentage (YES)
<b>AGE</b>					
18-39 y/old =0	10			10	8%
40-59 y/old =1	63	8	9	80	50%
<60 y/old=2	54	9	7	70	43%
<b>Total</b>	<b>127</b>	<b>17</b>	<b>16</b>	<b>160</b>	
<b>GENDER</b>					
Male	33	7	10	50	21%
Female	94	10	6	110	59%
<b>Total</b>	<b>127</b>	<b>17</b>	<b>16</b>	<b>160</b>	

From the data obtained it can be seen that there are 79 % yes answers among the respondents; female (59%) gave a higher scores than the male (21%) respondents

The age group of 40-59 y/old got a 50% yes answers while the <60 y/old got 43% and 8% from 18-39 y/old age group.



**Figure E.4: A Diagram on the Frequency and Percentage of Responses**

## Appendix - F: Thematic Analysis

**Table F.6: Interview with Respondent A**

Assessing the use of space in places of worship  
through a social resilience framework

**Table F.7: Interview with Respondent B**

Coding	Barrier	Respondent B		
Social structure(shelter)		Moderator Anyways we'll start the interview questions. Do you think having a place of worship in your community is important, why? Respondent Yes..it is very important to us. Moderator Why? Respondent It's important, like me I'm a barangay councilor; we really need a place in our community that is safe. Thank you for your answer. For the second question, do places of worship in your area can be used in times of disaster? Moderator Yes Respondent So you can use it for evacuation?		
Social structure(accessibility)	families live near the river bank	Respondent Yes. Most of the time we placed families there from the lower side. Moderator I see, Third question; does the place of worship affect you socially, having friends and being human? Respondent Yes. Friends are important and social activities Moderator So socially you have a way of making friends and expanding for new friends. Respondent Yes. Leaders have Zumba		
Social capital(friends/people)		Moderator I see. Thank you for your answers. Do places of worship helps you mentally; counseling, seminar? Respondent We have our own seminars, as a kagawad we need to attend seminars. We need to study it. Moderator That's good. How do places of worship affect you physically; donations and help? Respondent We give donations to all families during disasters.		
Social mechanism (activities)		Moderator How about spiritual aspect? Respondent All of us are included; we have prayers and there was a seminar schedule in the barangay. Moderator Thank you, for question number four, do places of worship provide assistance in the community to cope with disasters? For example fiesta.		
Social mechanism (seminar)		Respondent There are catechism and seminarian that come to help. Moderator I see.		
Social capital(donation)	limited resources	Respondent There's also seminars for flood, typhoon and fire so people can be ready. Even before the pandemic. Moderator They train? Respondent Yes, so you can ready and pack things you will need. Moderator That's nice, is the venue inside the churches? Respondent No, it's in the other area or court.		
Social beliefs (prayer)		Moderator Do you have activities in your area like Holy Week, and Fiesta? Respondent Yes. Our is Saint Francis of Assisi. We have Christmas party on Friday, gift-giving. Moderator oh, I see. Do places of worship in your area conduct a virtual gathering for mass to help the community to cope with disaster; like TV, YouTube, Messenger, Facebook, was there a mass that you can attend to virtually?		
Social capital(volunteer)	for catholic only	Respondent Moderator I see.		
Social mechanism (coping mechanism)	limited participants	Respondent Moderator They train? Respondent Yes, so you can ready and pack things you will need. Moderator That's nice, is the venue inside the churches? Respondent No, it's in the other area or court.		
Social innovation (Alleys/street)	need bigger space	Respondent Moderator I think it's better if there's a continuous sponsor, we should pray for that. Moderator If there's a flood here do they evacuate?		
Social beliefs (religious activities)	pandemic/ social distancing	Respondent Moderator I see. Last question, do you think there are ways that places of worship can strengthen assistance in times of disasters, how?		
Social innovation (Social Media)	internet connection	Respondent Moderator They don't want to leave their houses. We just give them something to eat/ relief-goods. Moderator Stagnant water?		
Social capital(social supports)		Respondent Moderator Yes, but probably because of the factory. If the pandemic didn't happen they started the project in Pasig for declogging.		
Social capital(donation)	did not evacuate	Respondent Moderator I see. That's a good project. Thank you Maam for this interview.		
Social innovation (resourcefulness)	human discipline	Respondent Moderator You're welcome.		

Legend	Legend
Social structure(shelter)	Social equity (community inclusiveness)
Social structure(accessibility)	Social equity (info awareness)
Social structure(age/gender)	Social equity (unity)
Social structure(road/street)	Social equity (fair access)

Social capital(volunteer)	Social beliefs (prayer)
Social capital.community leader)	Social beliefs (religious activities)
Social capital(social trust)	Social beliefs (bible study)
Social capital(social supports)	Social beliefs (mass)
Social capital(shared assets)	Social beliefs (faith)

Social mechanism (activities)	Social innovation (virtual worship)
Social mechanism (coping mechanism)	Social innovation (Social Media)
Social mechanism (counseling)	Social innovation (TV/Radio)
Social mechanism (seminar)	Social innovation (Alleys/Street)
Social mechanism (training)	Social innovation (resourcefulness)
Social mechanism (outreach program)	

## Assessing the use of space in places of worship through a social resilience framework

**Table F.8: Interview with Respondent C**

Coding	Barrier	Respondent C	Legend	Legend				
Social beliefs (faith)		<p>Moderator</p> <p>Here is your copy; those are the questions in this interview. Before we begin please fill this out for attendance. Just like what I have mentioned, this will only take five to ten minutes, since we know that you're very busy. How many members do you have?</p> <p>The head of the family is 1800, renters are not included. From Alley 1 until 91 is the territory of Lukas Tao. We're too many, in one family there would be at least five renters. My renter is four. That's why we're only counting the head of the family.</p> <p>Respondent</p> <p>So that's 1800 households not person?</p> <p>Moderator</p> <p>Yes households not persons, those are our member that's why there's a lot here.</p> <p>Respondent</p> <p>Anyways we'll start the interview questions. Do you think having a place of worship in your community is important, why?</p> <p>Moderator</p> <p>Yes it is important so that people would be enlightened whenever there's worship. Most of the people here in our place don't go to church, that's why they lack spirituality, that's why it's important to have meetings in the church so that they can be enlightened.</p> <p>Respondent</p> <p>For our second question: do places of worship in your area can be used in times of disaster like flood?</p> <p>Moderator</p> <p>If we have a place of worship here, they can use it. For example, the can use that when explaining about the flood. A lot of people here are hard headed, they don't want to evacuate their homes and they won't listen. They need to be enlightened about the danger, and why they need to evacuate.</p> <p>Respondent</p> <p>Where is the church that people go to?</p> <p>Moderator</p> <p>Here in our place? It's in LukasBisig, that's where they go, but that place is too small so the others go to Pasig, on the other side, wherever they are comfortable I guess.</p> <p>Respondent</p> <p>Not just school and covered courts Pasig churches also?</p> <p>Moderator</p> <p>The church here is small.</p> <p>Respondent</p> <p>In our third question, does the place of worship affect you socially, making friends and being human, in your opinion?</p> <p>Moderator</p> <p>It depends on making friends, it's hard to say. There are friends that could help you, there are friends that aren't really helpful. I live here since 2002, I think I have memorized the characteristics of the people here.</p> <p>Respondent</p> <p>How about the religious organization, do they help you here?</p> <p>Moderator</p> <p>No.</p> <p>Respondent</p> <p>How about mentally, do they have seminars?</p> <p>Moderator</p> <p>They don't have.</p> <p>Moderator</p> <p>Or spiritual</p> <p>Respondent</p> <p>There's none too, they should have that supposedly; so that the people here would be enlightened. The reality in politics they only offer seminars when it's near the Election Day. They're supposed to have that.</p> <p>Moderator</p> <p>Physically, do church leaders offer or give donations during disaster?</p> <p>Respondent</p> <p>They do not for everyone, they pick the people whom they'll give. For example, the most important or priority are the people whose house is flooded. Some people say it's unfair, everyone should be given.</p> <p>Moderator</p> <p>Spiritually, do they have activities that up build the spirituality of the people here; for example procession and fiesta?</p> <p>Respondent</p> <p>We have fiesta</p> <p>Moderator</p> <p>Do church leaders take lead in that event?</p> <p>Respondent</p> <p>Yes</p> <p>Moderator</p> <p>What is your fiesta called and when do you celebrate it?</p> <p>Respondent</p> <p>We don't have a permanent date, usually June 10 and then it could start on the second week or last week of June sometimes.</p> <p>Moderator</p> <p>Who is your patron?</p> <p>Respondent</p> <p>Sacred Heart of Jesus</p> <p>Moderator</p> <p>Oh, the same with Lukas Bisig?</p> <p>Respondent</p> <p>Yes, we have the same patron</p> <p>Moderator</p> <p>Let's move on to the fourth question: Do places of worship provide assistance in the community to cope with disasters, how?</p> <p>Respondent</p> <p>No</p> <p>Moderator</p> <p>Because there's still no place of worship in Lukas Tao, right?</p> <p>Respondent</p> <p>Yes we don't have a place.</p> <p>Moderator</p> <p>So you really need an infrastructure in your area, since you still go to the next barangay.</p> <p>Respondent</p> <p>We really don't have a place; we have been requesting that, as you know this place is a danger zone.</p> <p>Moderator</p> <p>Sometimes when needed we go to Lukas Bisig and borrow their covered court, we asked for permission.</p> <p>Respondent</p> <p>How deep is the flood here main?</p> <p>Moderator</p> <p>Until here on the second house, for example this is the first row, there would be flood there.</p> <p>Respondent</p> <p>How long does the flood last?</p> <p>Moderator</p> <p>Here when there's typhoon then there's flood, the next day it subsided already. The houses in the river, that's the most destroyed, with all those thick mud, they are covered.</p> <p>Respondent</p> <p>Why do they still build houses there?</p> <p>Moderator</p> <p>They are hard headed. We have warned them not to, but they said it's hard for them to just rent. The government is not allowing them to be there, but then when there's calamity they blame the government. We can't do anything that much because it's really hard to rent.</p> <p>Respondent</p> <p>How much is the rent here?</p> <p>Moderator</p> <p>There are 2500, 3000, 2000 or 1500 those are the ranges.</p> <p>Respondent</p> <p>Do they have their own water and light connection?</p> <p>Moderator</p> <p>Yes, electric load.</p> <p>Respondent</p> <p>Do places of worship in your area conduct a virtual gathering for mass to help the community to cope with disaster; like TV, YouTube, Messenger, Facebook, was there a mass that you can attend to virtually?</p> <p>Moderator</p> <p>Yes, TV and FB Live on Sundays</p> <p>Respondent</p> <p>Last question ma'am, do you think there are ways that places of worship can strengthen assistance in times of disasters?</p> <p>Moderator</p> <p>Yes, there's still time.</p> <p>Respondent</p> <p>Are there other ways they could improve?</p> <p>Moderator</p> <p>We still have time to enlightened people's mind.</p> <p>Respondent</p> <p>What innovation or improvements do you think they need to do?</p> <p>Moderator</p> <p>Here in our place, when they are giving help, they need to explain to everyone that their help is limited to those who are really in need; so that the people won't be mad when they are not given. They need to explain to people, they lack explanation; they need to say that in worship.</p> <p>Respondent</p> <p>Okay, so they need seminar and advice. Is there anyone who conducts a mass?</p> <p>Moderator</p> <p>There is LukasBisig, but the people doesn't want to go to mass. Right now there are night masses, but you can see few people only.</p> <p>Respondent</p> <p>There's priest there?</p> <p>Moderator</p> <p>There's a priest there, but they don't go here, they only stay inside the church.</p> <p>Respondent</p> <p>They don't go house to house for communion?</p> <p>Moderator</p> <p>No</p> <p>Respondent</p> <p>There are places that do, every Sunday they go to people's house.</p> <p>Moderator</p> <p>Here they don't do that, last night I attended the night mass here because it's nearby. I'm from Alley 2, but then I only see people from Alley 2, 7 and 8 one or two people. The church should encourage people to come back to god.</p> <p>Respondent</p> <p>What do you think hinders the church leaders to extend their help to people?</p> <p>Moderator</p> <p>Not enough budgets.</p> <p>Respondent</p> <p>So for them to enhance budget they need collections.</p> <p>Moderator</p> <p>Yes, for example earlier the conducted a feeding. They collected from the people who attended the mass. They announced who wants to give help, so that they could help the people in need.</p> <p>Respondent</p> <p>Right, they need budget to help.</p> <p>Moderator</p> <p>Yes, so they could give help to those who are really in need. Here in our place there's a lot of people who are really in need, especially the one who lives on the river.</p> <p>Respondent</p> <p>Thank you ma'am Lucy for your time, we have a request, but it's for next year. Part of our research is the survey; we planned to give survey questions, is it okay if we give you the survey questions?</p> <p>Moderator</p> <p>Yes, then we'll give it to the people here, it's fine, no problem.</p> <p>Respondent</p> <p>Thank you that is what we need. Here is the example questionnaire.</p> <p>Moderator</p> <p>Oh it's just like the DPWH, they're going to remove houses under the bridge.</p> <p>Respondent</p> <p>Do they have the set time when they are going to be removed; we might not make it to them on time?</p> <p>Moderator</p> <p>No, not really, they'll be there for a while.</p> <p>Respondent</p> <p>Thank you for your time.</p> <p>Moderator</p> <p>Thank you too.</p>	<p>Social structure(shelter)</p> <p>Social structure(accessibility)</p> <p>Social structure(age/gender)</p> <p>Social structure(road/street)</p>	<p>Social equity (community inclusiveness)</p> <p>Social equity (info awareness)</p> <p>Social equity (unity)</p> <p>Social equity (fair access)</p>	<p>Social capital(volunteer)</p> <p>Social capital/community leader)</p> <p>Social capital(social trust)</p> <p>Social capital(social supports)</p> <p>Social capital(shared assets)</p> <p>Social capital(friends/people)</p> <p>Social capital(donation)</p>	<p>Social beliefs (prayer)</p> <p>Social beliefs (religious activities)</p> <p>Social beliefs (mass)</p> <p>Social beliefs (faith)</p>	<p>Social mechanism (activities)</p> <p>Social mechanism (coping mechanism)</p> <p>Social mechanism (counseling)</p> <p>Social mechanism (seminar)</p> <p>Social mechanism (training)</p> <p>Social mechanism (outreach program)</p>	<p>Social innovation (virtual worship)</p> <p>Social innovation (Social Media)</p> <p>Social innovation (TV/Radio)</p> <p>Social innovation (Alley/Stree)</p> <p>Social innovation (resourcefulness)</p>
Social capital(social trust)								
Social capital(donation)								
Social beliefs (religious activities)								
Social capital(shared assets)								
located in danger zone								
did not evacuate								
Social innovation (Social Media)								
Social mechanism (counseling)								
Social beliefs (religious activities)								
Social beliefs (mass)								
Social mechanism (outreach program)								
Social equity (fair access)								
Social structure(road/street)								

# Assessing the use of space in places of worship through a social resilience framework

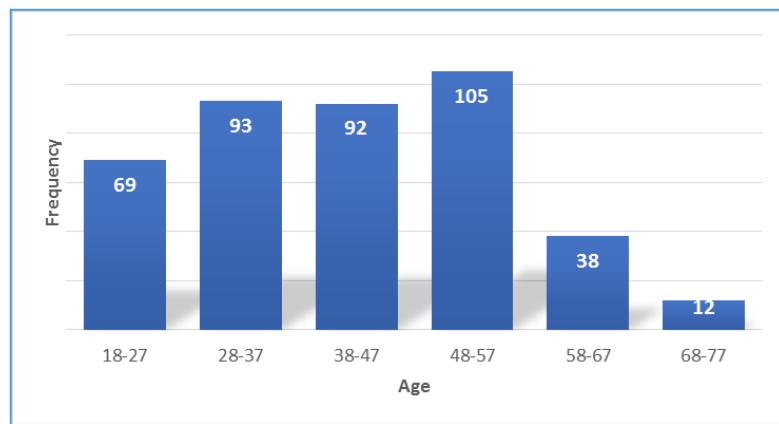
**Table F.9: Interview with Respondent D**

**Table F.10: Six Social Dimensions on the Interview Questions**

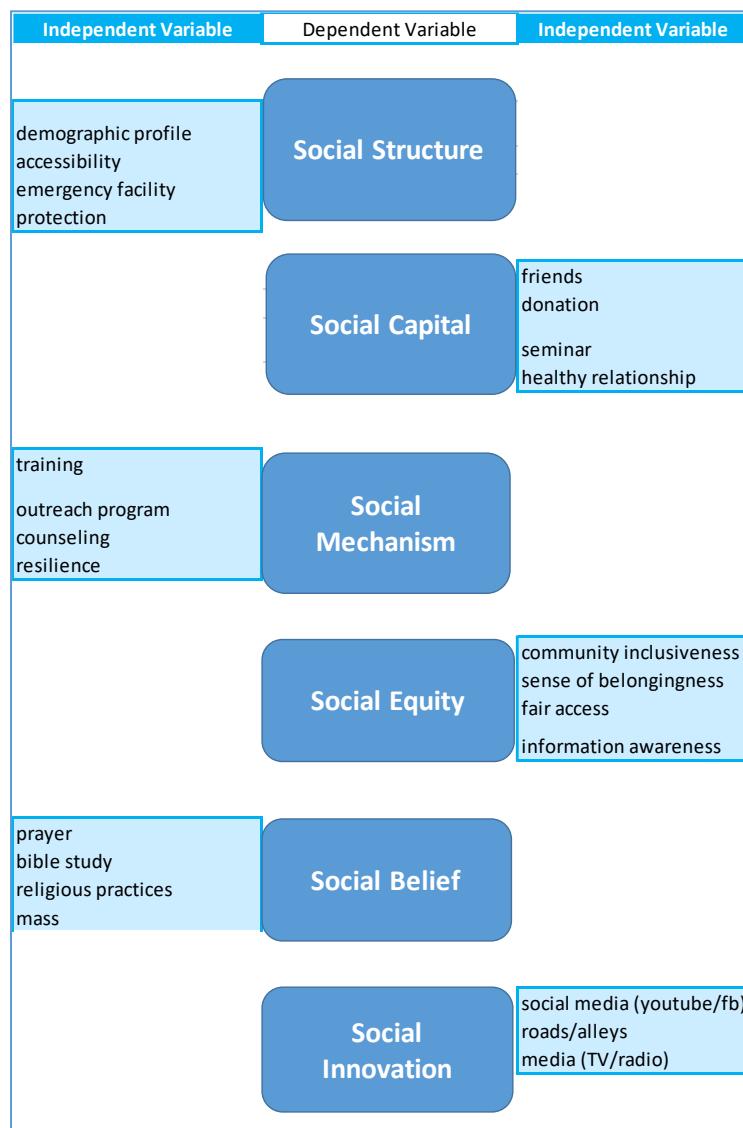
Social Resilience Framework	Describe how much you agree or disagree with the place of worship in times of disasters in the following statements. (Ilarawan kung gaano ka sumasang-ayon o hindi sumasang-ayon sa "place of worship" sa panahon ng kalamidad sa mga sumusunod na bahayag.)	1	2	3	4	5
	1. Infrastructure					
social structure	a. An emergency facility ( <i>maging dagliang lugar para sa kalamidad</i> )					
social structure	b. Near my home and accessible ( <i>malapit sa aming tahanan at madaling puntahan</i> )					
	2. Supports					
social capital	a. Socially (friends/people) <i>pakiki-pagkapwa</i> ( <i>kaibigan/mga tao</i> )					
social mechanism	b. Mentally (counselling/seminar) <i>pang-kaisipan</i> ( <i>pagpapayo/seminar</i> )					
social capital	c. Physically (donations/assistance) <i>pisikal</i> ( <i>mga donasyon/tulong</i> )					
social belief	d. Spiritually (prayer/bible) <i>ispirituwal</i> ( <i>panalangin/bibliya</i> )					
	3. Provisions					
social equity	a. Community Inclusiveness ( <i>nagbibigay ng isang pakiramdam ng pagiging kabilang sa aming komunidad</i> )					
social mechanism	b. Enhanced resilience ( <i>napapahusay ang pagiging matatag</i> )					
social capital	c. Healthy relationship with others ( <i>maayos na relasyon sa iba</i> )					
social belief	d. Spiritual activities ( <i>mga gawaing pang-ispirituwal</i> )					
social structure	e. Protection from disasters ( <i>protekasyon mula sa mga kalamidad</i> )					
social equity	f. Open and accommodating to all people ( <i>bukas at tumatanggap sa lahat ng mga tao</i> )					
social equity	g. Discusses disaster management and donation distribution ( <i>tinatalakay ang pamamahala sa sakuna at pamamahagi ng donasyon</i> )					
	4. Innovations					
social innovation	a. Alleys/roads for religious and relief activities ( <i>mga iskinita / kalsada para sa mga gawaing pang-relihiyon</i> )					
social innovation	b. Virtual place of worship ( <i>virtual na paraan ng pagsamba</i> ) (TV,zoom app,youtube,FB /messenger)					
social innovation	c. Use of social media platform for fund-raising/donations ( <i>paggamit ng social media para makalikom ng pondo / mga donasyon</i> )					
	5. Do you have any suggestions to strengthen the assistance of the place of worship in times of disasters? ( <i>mayroon po ba kayong mungkahi upang mapalakas pa ng mga places of worship ang pagbibigay ng tulong sa panahon</i> )					

**Table F.11: Summary of Respondents' Information**

Religion	Respondents	Percentage	TOTAL
Roman Catholic	343	83.9%	409
Born Again Christian	35	8.6%	
Iglesia ni Cristo	14	3.4%	
Protestant/ Evangelical	10	2.4%	
Baptist	3	0.7%	
Islam/Muslim	0	0.0%	
Jehovah's Witnesses	0	0.0%	
Gender	Respondents	Percentage	TOTAL
Female	317	77.5%	409
Male	92	22.5%	
Age	Respondents	Percentage	TOTAL
18-27	69	17%	409
28-37	93	23%	
38-47	92	22%	
48-57	105	26%	
58-67	38	9%	
68-77	12	3%	

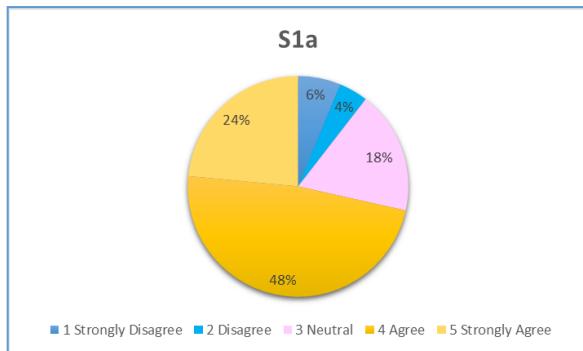


**Figure F.1: A Diagram on the Respondents' Age**

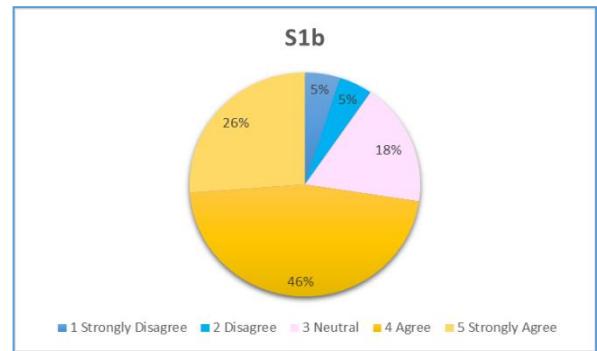


**Figure F.2: Six Social Dimensions and Independent Variables**

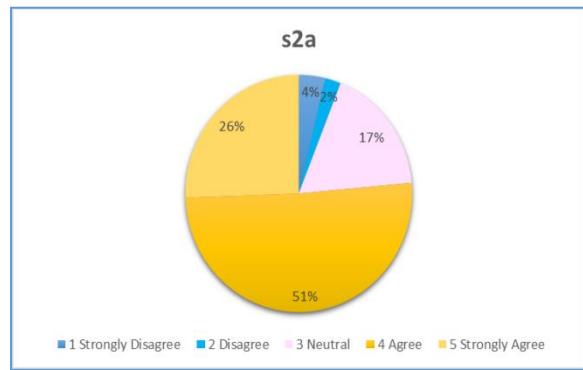
## Appendix - G: Percentage



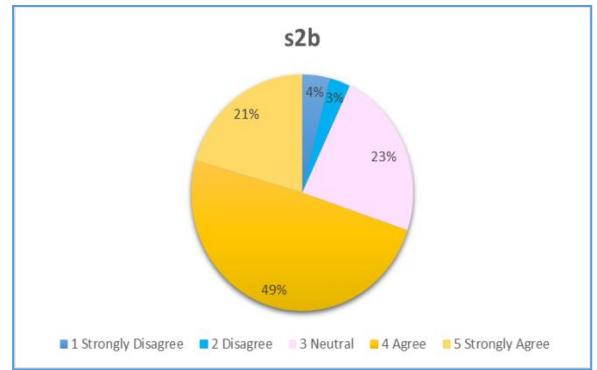
**Figure G.1: Results on Emergency Facility**



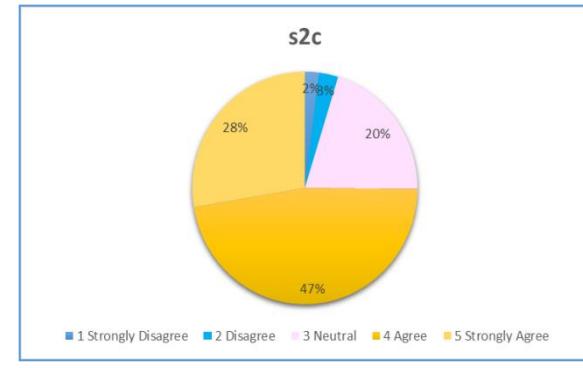
**Figure G.2: Results on Accessibility**



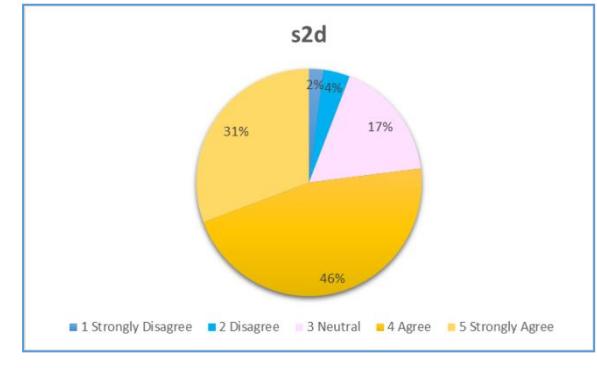
**Figure G.3: Results on Protection**



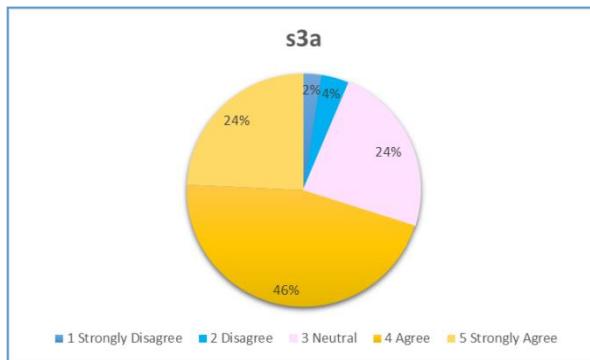
**Figure G.4: Results on Social Association**



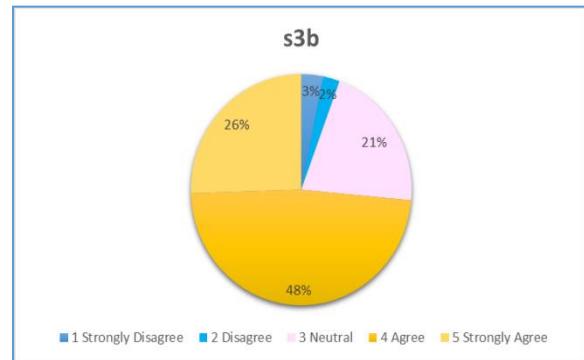
**Figure G.5: Results on Social Support**



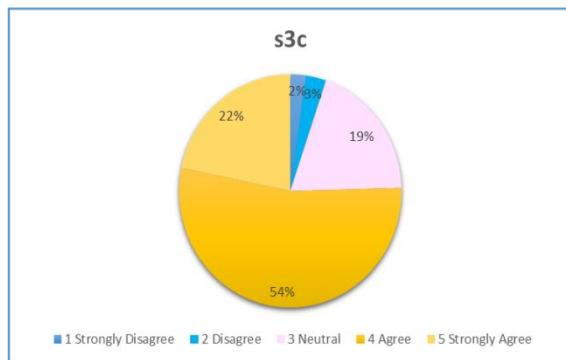
**Figure G.6: Results on Social Cohesion**



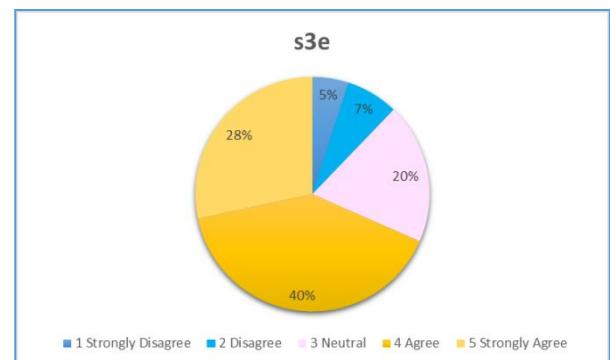
**Figure G.7: Results on Community Competence**



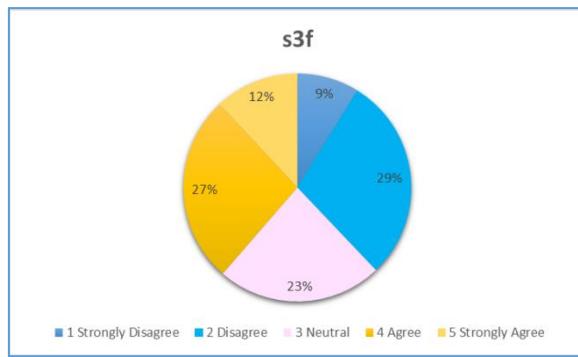
**Figure G.8: Results on Community Resilience**



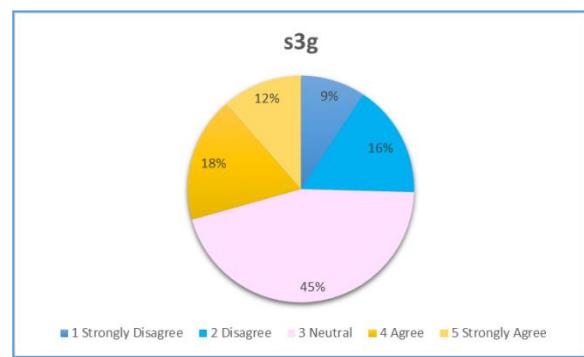
**Figure G.9: Results on Spirituality**



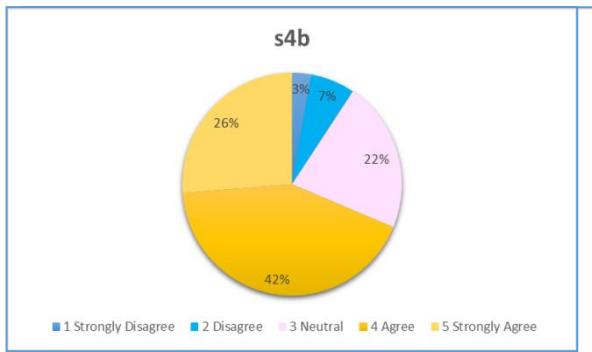
**Figure G.10: Results on Community Inclusiveness**



**Figure G.11: Results on Fair Access to Basic Needs**

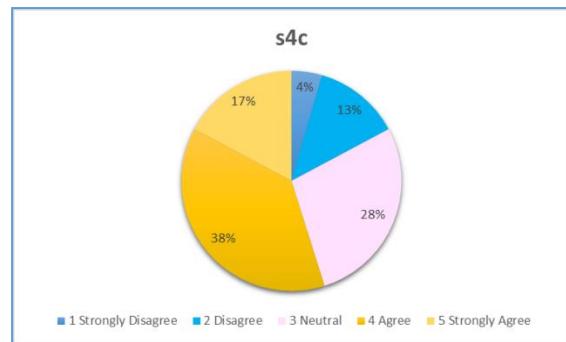


**Figure G.12: Results on Information Awareness**



**Figure G.13: Results on Inequity**

**Figure G.14: Results on Resourcefulness**



**Figure G.15: Results on Fund Raising**

## Appendix - H: Cross Tabulation

Table H.12: Cross-tabulation on Response at East Bank - ENAI

ENAI	Gender			Religion				Age		
	Questions	F	M	RC	BC	INC	BT	PR	18-39 y/o	40-59 y/o
<b>S1a</b>	116	32	133	12	2	0	0	71	66	11
<b>S1b</b>	121	37	142	12	1	0	2	77	70	11
<b>S2a</b>	113	33	132	12	0	0	0	74	62	10
<b>S2b</b>	103	33	122	12	0	0	1	68	60	8
<b>S2c</b>	106	32	123	12	0	0	1	69	58	11
<b>S2d</b>	112	33	130	12	1	0	0	70	64	11
<b>S3a</b>	115	31	130	12	2	0	0	69	67	10
<b>S3b</b>	114	33	131	12	2	0	0	71	66	10
<b>S3c</b>	114	36	135	12	1	0	1	73	68	9
<b>S3d</b>	110	35	129	12	2	0	0	69	66	10
<b>S3e</b>	113	35	132	11	2	0	1	74	66	8
<b>S4a</b>	96	30	112	10	2	0	1	60	57	9
<b>S4b</b>	96	29	109	12	2	0	0	60	57	8
<b>S4c</b>	99	26	113	8	2	0	1	57	60	8
<b>S3f</b>	50	13	56	5	1	0	1	32	25	6
<b>S3g</b>	33	3	34	1	0	0	1	20	14	2

Table H.13: Cross-tabulation on Response at East Bank - PFCI

PFCI	Gender			Religion				Age		
	Questions	F	M	RC	BC	INC	BT	PR	18-39 y/o	40-59 y/o
<b>S1a</b>	22	11	24	6	2	0	1	9	15	9
<b>S1b</b>	22	11	22	6	2	2	1	9	17	7
<b>S2a</b>	22	11	22	6	2	2	1	9	17	7
<b>S2b</b>	19	11	20	6	1	2	1	9	16	5
<b>S2c</b>	19	10	19	5	2	2	1	8	16	5
<b>S2d</b>	21	12	22	6	2	2	1	9	16	8
<b>S3a</b>	18	10	18	5	2	2	1	7	14	7
<b>S3b</b>	24	12	25	6	2	2	1	9	18	9
<b>S3c</b>	24	10	23	6	2	2	1	9	18	7
<b>S3d</b>	20	11	21	6	2	2	0	7	18	6
<b>S3e</b>	12	10	13	6	2	1	0	5	14	3
<b>S4a</b>	10	5	9	3	2	1	0	5	6	4
<b>S4b</b>	16	10	18	6	2	0	0	7	12	7
<b>S4c</b>	8	5	11	2	0	0	0	2	10	1
<b>S3f</b>	0	0	0	0	0	0	0	0	0	0
<b>S3g</b>	0	0	0	0	0	0	0	0	0	0

**Table H.14: Cross-tabulation on Response at West Bank – Buklod Maralita**

BUKLOD MARALITA	Gender			Religion				Age		
	Questions	F	M	RC	BC	INC	BT	PR	18-39 y/o	40-59 y/o
<b>S1a</b>	33	4	28	1	6	0	2	18	15	4
<b>S1b</b>	32	4	27	1	6	0	2	18	16	3
<b>S2a</b>	33	5	29	1	6	0	2	18	17	3
<b>S2b</b>	33	4	29	1	5	0	2	17	17	3
<b>S2c</b>	34	5	30	1	6	0	2	18	19	3
<b>S2d</b>	32	4	27	1	6	0	2	18	18	3
<b>S3a</b>	32	4	28	1	5	0	2	17	19	3
<b>S3b</b>	32	5	28	1	6	0	2	18	16	3
<b>S3c</b>	32	5	28	1	6	0	2	18	16	2
<b>S3d</b>	33	5	29	1	6	0	2	18	17	3
<b>S3e</b>	34	5	30	1	6	0	2	18	18	4
<b>S4a</b>	32	4	28	1	5	0	2	17	15	3
<b>S4b</b>	32	5	28	1	6	0	2	18	15	2
<b>S4c</b>	32	4	28	1	5	0	2	17	17	3
<b>S3f</b>	33	5	29	1	6	0	2	18	18	2
<b>S3g</b>	34	5	30	1	6	0	2	17	17	3

**Table H.15: Cross-tabulation on Response at West Bank – Lakas Tao**

LAKAS TAO	Gender			Religion				Age		
	Questions	F	M	RC	BC	INC	BT	PR	18-39 y/o	40-59 y/o
<b>S1a</b>	47	7	42	6	2	1	3	23	28	3
<b>S1b</b>	46	9	46	7	2	1	0	23	32	1
<b>S2a</b>	58	14	59	9	3	1	1	30	38	5
<b>S2b</b>	47	13	49	8	3	1	0	27	31	3
<b>S2c</b>	60	15	62	8	4	1	1	34	37	5
<b>S2d</b>	55	15	56	11	3	1	0	31	38	2
<b>S3a</b>	51	12	53	7	3	1	0	31	31	2
<b>S3b</b>	54	12	55	9	2	1	0	33	31	3
<b>S3c</b>	55	12	56	8	3	1	0	36	30	2
<b>S3d</b>	46	12	48	7	3	1	0	29	28	2
<b>S3e</b>	41	11	43	7	2	1	0	28	24	1
<b>S4a</b>	35	5	34	4	2	0	0	18	21	1
<b>S4b</b>	58	11	58	9	2	1	0	32	35	3
<b>S4c</b>	31	4	29	5	1	0	0	20	14	1
<b>S3f</b>	43	10	44	7	1	1	1	23	27	4
<b>S3g</b>	32	10	35	5	1	1	1	16	25	2

**Table H.16: Anova Single Factor at East Bank**

<b>Anova: Single Factor</b>						
<b>SUMMARY</b>						
Groups	Count	Sum	Average	Variance		
S1a	217	873	4.023	1.023		
S1b	220	906	4.118	1.000		
S2a	215	876	4.074	0.808		
S2b	214	838	3.916	0.960		
S2c	215	860	4.000	0.692		
S2d	212	871	4.108	0.742		
S3a	220	879	3.995	0.717		
S3b	219	888	4.055	0.685		
S3c	216	880	4.074	0.646		
S3d	211	867	4.109	0.688		
S3e	216	858	3.972	1.032		
S3f	230	635	2.761	1.248		
S3g	230	667	2.900	0.894		
S4a	219	814	3.717	1.048		
S4b	213	820	3.850	0.921		
S4c	218	806	3.697	1.069		
<b>ANOVA</b>						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	582.713	15	38.848	43.764	1.1383E-118	1.669
Within Groups	3079.297	3469	0.888			
Total	3662.01033	3484				

**Table H.17: Anova Single Factor at West Bank**

<b>Anova: Single Factor</b>						
<b>SUMMARY</b>						
Groups	Count	Sum	Average	Variance		
S1a	172	595	3.459	1.057		
S1b	172	605	3.517	0.906		
S2a	171	633	3.702	0.834		
S2b	171	615	3.596	0.689		
S2c	170	658	3.871	0.823		
S2d	167	632	3.784	0.869		

S3a	170	623	3.665	0.851		
S3b	171	630	3.684	0.947		
S3c	169	616	3.645	0.730		
S3d	170	617	3.629	0.815		
S3e	168	596	3.548	1.279		
S3f	177	596	3.367	1.313		
S3g	177	576	3.254	1.418		
S4a	170	547	3.218	1.248		
S4b	171	645	3.772	0.977		
S4c	171	557	3.257	1.063		
<b>ANOVA</b>						
<i>Source of Variation</i>	SS	df	MS	F	P-value	F crit
Between Groups	103.49	15.00	6.90	6.97	0.00	1.67
Within Groups	2695.23	2721.00	0.99			
Total	2798.72	2736				

Table H.18: t-Test on East vs West

	Mean							
	EAST	WEST						
S1a	4.023	3.459		<b>t-Test: Paired Two Sample for Means</b>				
S1b	4.118	3.517						
S2a	4.074	3.702						
S2b	3.916	3.596		Mean	3.836	3.561		
S2c	4.000	3.871		Variance	0.171	0.040		
S2d	4.108	3.784		Observations	16	16		
S3a	3.995	3.665		Pearson Correlation	0.626			
S3b	4.055	3.684		Hypothesized Mean Difference	0			
S3c	4.074	3.645		df	15			
S3d	4.109	3.629		t Stat	3.354			
S3e	3.972	3.548		P(T<=t) one-tail	0.002			
S3f	2.761	3.367		t Critical one-tail	1.753			
S3g	2.900	3.254		P(T<=t) two-tail	0.004			
S4a	3.717	3.218		t Critical two-tail	2.131			
S4b	3.850	3.772						
S4c	3.697	3.257						

**Table H.19: Chi Test of Independence on Religion vs Gender**

<b>Religion</b>	<b>Gender</b>		<b>Observed Frequency</b>	
	Female	Male	Grand Total	
<i>Roman Catholic</i>	280	69	349	
<i>Other Religion</i>	43	16	59	
<i>Grand Total</i>	323	85	408	
<b>Religion</b>	<b>Gender</b>		<b>Expected Frequency</b>	
	Female	Male	Grand Total	
<i>Roman Catholic</i>	276.29	72.71	349	
<i>Other Religion</i>	46.71	12.29	59	
<i>Grand Total</i>	323	85	408	
<i>p=0.05</i>	0.199 pValue	there is no significant value		

**Table H.20: Chi Test of Independence on Age vs Gender**

<b>Gender</b>	<b>Age</b>			<b>Observed Frequency</b>	
	18-39 y/old	40-59 y/old	<60 y/old	Grand Total	
<i>Female</i>	139	155	30	324	
<i>Male</i>	38	41	6	85	
<i>Grand Total</i>	177	196	36	409	
<b>Gender</b>	<b>Age</b>			<b>Expected Frequency</b>	
	18-39 y/old	40-59 y/old	<60 y/old	Grand Total	
<i>Female</i>	140.22	155.27	28.52	324	
<i>Male</i>	36.78	40.73	7.48	85	
<i>Grand Total</i>	177	196	36	409	
<i>p=0.05</i>	0.809 pValue	there is no significant value			

**Table H.21: Chi Test of Independence on Religion vs Age**

		Religion		Observed Frequency	
Age	Roman Catholic	Other Religion	Grand Total		
18-39 y/old	150	26	176		
40-59 y/old	168	28	196		
<60 y/old	31	5	36		
Grand Total	349	59	408		
		Religion		Expected Frequency	
Age	Roman Catholic	Other Religion	Grand Total		
18-39 y/old	150.55	25.45	176		
40-59 y/old	167.66	28.34	196		
<60 y/old	30.79	5.21	36		
Grand Total	349	59	408		
<i>p=0.05</i>	0.986 pValue	there is no significant value			

**Table H.22: Chi Test of Independence on Location vs Age**

		Age			Observed Frequency	
Location	18-39 y/old=0	40-59 y/old=1	<60 y/old=2	Grand Total		
East	101	107	24	232		
West	76	89	12	177		
Grand Total	177	196	36	409		
		Age			Expected Frequency	
Location	18-39 y/old=0	40-59 y/old=1	<60 y/old=2	Grand Total		
East	100.401	111.178	20.421	232		
West	76.599	84.822	15.579	177		
Grand Total	177	196	36	409		
<i>p=0.05</i>	0.402 pValue	there is no significant value				

**Table H.23: Chi Test of Independence on Location vs Gender**

		Gender		Observed Frequency	
Location	Female	Male	Grand Total		
East	177	55	232		
West	147	30	177		
Grand Total	324	85	409		
		Gender		Expected Frequency	
Location	Female	Male	Grand Total		
East	183.785	48.215	232		
West	140.215	36.785	177		
Grand Total	324	85	409		
<i>p=0.05</i>	0.095 pValue	there is no significant value			

**Table H.24: Chi Test of Independence on Location vs Religion**

		Religion		Observed Frequency	
Location	Roman Catholic	Others	Grand Total		
East	202	29	231		
West	147	30	177		
Grand Total	349	59	408		
		Religion		Expected Frequency	
	Roman Catholic	Others	Grand Total		
East	197.596	33.404	231		
West	151.404	25.596	177		
Grand Total	349	59	408		
<i>p=0.05</i>	0.211 pValue	there is no significant value			

## Appendix - I: Data Analysis - Parametric

**Table I.25: Distribution of Respondents according to location, religion, gender and age group**

Distribution of respondents according to location, religion, gender, and age group				
Variable	Categories of the Variable	Frequency	Percentage	
<b>Location</b>	East bank	232	56.72	
	West bank	177	43.28	
	Total	409		
<b>Religion</b>	Catholic	348	85.5	
	Others	59	14.5	
	Total	407		
<b>Gender</b>	Female	323	79.17	
	Male	85	20.83	
	Total	408		
<b>Age Group</b>	18 to 19 years	177	43.28	
	40 to 59 years	196	47.92	
	60 years and above	36	8.8	
	Total	409		

**Table I.26: Summary Statistics of Respondent scores by survey item**

Summary statistics of respondent scores by survey item						
Survey Item	No. of Observations	Mean	Standard Deviation	Median	Minimum Value	Maximum Value
S1a. An emergency facility: Social Structure Item 1	379	3.77	1.06	4	1	5
<b>Location</b>						
East bank	214	4.04	1.01	4	1	5
West Bank	165	3.42	1.03	4	1	5
<b>Religion</b>						
Catholic	321	3.76	1.06	4	1	5
Others	56	3.86	1.03	4	1	5
<b>Gender</b>						
Female	299	3.8	1.04	4	1	5
Male	79	3.67	1.13	4	1	5
<b>Age Group</b>						
18-39 years	161	3.75	1.04	4	1	5
40-59 years	183	3.73	1.11	4	1	5
60 years and above	35	4.06	0.8	4	1	5
S1b.Accessible: Social Structure Item 2	384	3.85	1.03	4	1	5
<b>Location</b>						
East bank	219	4.12	1	4	1	5
West Bank	165	3.48	0.95	4	1	5

<b>Religion</b>							
Catholic	325	3.85	1.04	4	1	5	
Others	57	3.89	0.86	4	1	5	
<b>Gender</b>							
Female	301	3.85	1.05	4	1	5	
Male	82	3.83	0.95	4	1	5	
<b>Age Group</b>							
18-39 years	165	3.81	1.02	4	1	5	
40-59 years	184	3.87	1.05	4	1	5	
60 years and above	35	3.91	0.92	4	1	5	
S3e.Protection from disasters: Social Structure Item 3	381	3.79	1.09	4	1	5	
<b>Location</b>							
East bank	214	3.98	1.02	4	1	5	
West Bank	167	3.54	1.13	4	1	5	
<b>Religion</b>							
Catholic	323	3.77	1.11	4	1	5	
Others	56	3.88	0.97	4	1	5	
<b>Gender</b>							
Female	302	3.75	1.13	4	1	5	
Male	78	3.91	0.94	4	1	5	
<b>Age Group</b>							
18-39 years	165	3.9	1.02	4	1	5	
40-59 years	182	3.71	1.13	4	1	5	
60 years and above	34	3.65	1.2	4	1	5	
S2a.Socially: Social Capital Item 1	378	3.91	0.93	4	1	5	
<b>Location</b>							
East bank	214	4.08	0.9	4	1	5	
West Bank	164	3.7	0.93	4	1	5	
<b>Religion</b>							
Catholic	321	3.88	0.96	4	1	5	
Others	55	4.13	0.72	4	2	5	
<b>Gender</b>							
Female	298	3.89	0.94	4	1	5	
Male	79	4.01	0.91	4	1	5	
<b>Age Group</b>							
18-39 years	162	3.9	0.94	4	1	5	
40-59 years	181	3.91	0.94	4	1	5	
60 years and above	35	3.97	0.86	4	1	5	
S2c.Physically: Social Capital Item 2	377	3.95	0.87	4	1	5	
<b>Location</b>							
East bank	214	4	0.83	4	1	5	
West Bank	163	3.88	0.91	4	1	5	
<b>Religion</b>							
Catholic	318	3.93	0.88	4	1	5	
Others	57	4.05	0.83	4	1	5	
<b>Gender</b>							
Female	297	3.94	0.9	4	1	5	

Male	79	4	0.73	4	2	5
<b>Age Group</b>						
18-39 years	160	3.97	0.89	4	1	5
40-59 years	182	3.91	0.88	4	1	5
60 years and above	35	4.06	0.73	4	3	5
S3c. Healthy relationship with others: Social Capital Item 3	382	3.89	0.85	4	1	5
<b>Location</b>						
East bank	214	4.08	0.8	4	1	5
West Bank	168	3.65	0.86	4	1	5
<b>Religion</b>						
Catholic	323	3.9	0.85	4	1	5
Others	57	3.89	0.82	4	1	5
<b>Gender</b>						
Female	300	3.87	0.89	4	1	5
Male	81	3.98	0.69	4	2	5
<b>Age Group</b>						
18-39 years	167	3.95	0.85	4	1	5
40-59 years	181	3.83	0.87	4	1	5
60 years and above	34	3.91	0.75	4	2	5
S2b. Mentally: Social Mechanism Item 1	377	3.78	0.93	4	1	5
<b>Location</b>						
East bank	213	3.92	0.98	4	1	5
West Bank	164	3.59	0.83	4	1	5
<b>Religion</b>						
Catholic	320	3.74	0.95	4	1	5
Others	55	4.02	0.73	4	2	5
<b>Gender</b>						
Female	296	3.74	0.97	4	1	5
Male	80	3.93	0.76	4	1	5
<b>Age Group</b>						
18-39 years	161	3.76	0.97	4	1	5
40-59 years	183	3.77	0.94	4	1	5
60 years and above	33	3.88	0.7	4	3	5
S3b. Enhanced resilience: Social Mechanism Item 2	387	3.9	0.91	4	1	5
<b>Location</b>						
East bank	217	4.06	0.83	4	1	5
West Bank	170	3.69	0.97	4	1	5
<b>Religion</b>						
Catholic	330	3.88	0.94	4	1	5
Others	55	4.02	0.78	4	1	5
<b>Gender</b>						
Female	304	3.88	0.93	4	1	5
Male	82	3.94	0.85	4	1	5
<b>Age Group</b>						
18-39 years	167	3.93	0.91	4	1	5

40-59 years	184	3.83	0.95	4	1	5
60 years and above	36	4.06	0.75	4	2	5
S2d.Spiritually: Social Belief Item 1	371	3.98	0.91	4	1	5
<b>Location</b>						
East bank	211	4.11	0.86	4	1	5
West Bank	160	3.8	0.94	4	1	5
<b>Religion</b>						
Catholic	315	3.92	0.93	4	1	5
Others	54	4.33	0.67	4	3	5
<b>Gender</b>						
Female	290	3.95	0.91	4	1	5
Male	80	4.06	0.89	4	1	5
<b>Age Group</b>						
18-39 years	158	3.97	0.93	4	1	5
40-59 years	178	3.98	0.92	4	1	5
60 years and above	35	4.03	0.75	4	2	5
S3d.Spiritual activities: Social Belief Item 2	379	3.9	0.89	4	1	5
<b>Location</b>						
East bank	210	4.11	0.83	4	1	5
West Bank	169	3.63	0.9	4	1	5
<b>Religion</b>						
Catholic	322	3.86	0.9	4	1	5
Others	55	4.13	0.82	4	1	5
<b>Gender</b>						
Female	299	3.87	0.93	4	1	5
Male	79	4.01	0.72	4	2	5
<b>Age Group</b>						
18-39 years	163	3.95	0.87	4	1	5
40-59 years	182	3.84	0.92	4	1	5
60 years and above	34	3.97	0.83	4	2	5
S3a.Community Inclusiveness: Social Equity Item 1	387	3.85	0.9	4	1	5
<b>Location</b>						
East bank	218	4	0.85	4	1	5
West Bank	169	3.66	0.92	4	1	5
<b>Religion</b>						
Catholic	330	3.83	0.93	4	1	5
Others	55	3.95	0.68	4	2	5
<b>Gender</b>						
Female	306	3.86	0.93	4	1	5
Male	80	3.83	0.78	4	1	5
<b>Age Group</b>						
18-39 years	163	3.88	0.88	4	1	5
40-59 years	188	3.79	0.89	4	1	5
60 years and above	36	4	0.99	4	1	5
S3f.Accommodating to all: Social Equity Item 2	409	3.04	1.18	3	1	5

<b>Location</b>							
East bank	232	3.17	1.29	3	1	5	
West Bank	177	2.86	0.99	3	1	5	
<b>Religion</b>							
Catholic	348	3.01	1.19	3	1	5	
Others	59	3.22	1.12	3	1	5	
<b>Gender</b>							
Female	323	3.03	1.19	3	1	5	
Male	85	3.05	1.16	3	1	5	
<b>Age Group</b>							
18-39 years	177	2.93	1.22	3	1	5	
40-59 years	196	3.08	1.12	3	1	5	
60 years and above	36	3.39	1.23	3.5	1	5	
S3g.Information Awareness: Social Equity Item 3	409	3.06	1.08	3	1	5	
<b>Location</b>							
East bank	232	3.13	1.25	3	1	5	
West Bank	177	2.97	0.81	3	1	5	
<b>Religion</b>							
Catholic	348	3.02	1.08	3	1	5	
Others	59	3.36	1.01	3	1	5	
<b>Gender</b>							
Female	323	3.05	1.1	3	1	5	
Male	85	3.11	1.04	3	1	5	
<b>Age Group</b>							
18-39 years	177	3.03	1.08	3	1	5	
40-59 years	196	3.06	1.08	3	1	5	
60 years and above	36	3.19	1.12	3	1	5	
S4a.Alleys for religious and relief activities: Social Innovation Item 1	381	3.51	1.1	4	1	5	
<b>Location</b>							
East bank	218	3.72	1.02	4	1	5	
West Bank	163	3.23	1.14	3	1	5	
<b>Religion</b>							
Catholic	324	3.52	1.11	4	1	5	
Others	55	3.49	1.05	4	1	5	
<b>Gender</b>							
Female	300	3.51	1.13	4	1	5	
Male	80	3.53	0.99	4	1	5	
<b>Age Group</b>							
18-39 years	163	3.52	1.15	4	1	5	
40-59 years	183	3.5	1.05	4	1	5	
60 years and above	35	3.51	1.15	4	1	5	
S4b.Virtual place of worship : Social Innovation Item 2	375	3.81	0.98	4	1	5	
<b>Location</b>							
East bank	211	3.85	0.96	4	1	5	
West Bank	164	3.76	1.01	4	1	5	

<b>Religion</b>							
Catholic	317	3.79	0.99	4	1	5	
Others	56	3.96	0.97	4	1	5	
<b>Gender</b>							
Female	295	3.78	1.02	4	1	5	
Male	79	3.92	0.83	4	2	5	
<b>Age Group</b>							
18-39 years	160	3.83	0.99	4	1	5	
40-59 years	182	3.81	0.95	4	1	5	
60 years and above	33	3.76	1.12	4	1	5	
S4c. Social media platform for fund-raising/donations: Social Innovation Item 3	380	3.49	1.06	4	1	5	
<b>Location</b>							
East bank	216	3.7	1.04	4	1	5	
West Bank	164	3.23	1.04	3	1	5	
<b>Religion</b>							
Catholic	323	3.5	1.09	4	1	5	
Others	55	3.49	0.9	3	1	5	
<b>Gender</b>							
Female	300	3.53	1.07	4	1	5	
Male	79	3.38	1.03	3	1	5	
<b>Age Group</b>							
18-39 years	161	3.55	1.1	4	1	5	
40-59 years	185	3.5	1.01	4	1	5	
60 years and above	34	3.18	1.17	3	1	5	

**Table I.27: Summary statistics of dimension scores by location, religion, gender and age group**

Summary statistics of dimension scores by location, religion, gender and age group						
Dimension	No. of Observations	Mean	Standard Deviation	Median	Minimum Value	Maximum Value
Social Structure	403	3.76	0.96	4	1	5
<b>Location</b>						
East bank	231	3.98	0.95	4	1	5
West Bank	172	3.46	0.88	3.67	1	5
<b>Religion</b>						
Catholic	343	3.75	0.97	4	1	5
Others	58	3.84	0.85	4	1	5
<b>Gender</b>						
Female	318	3.75	0.98	4	1	5
Male	84	3.8	0.88	4	1	5
<b>Age Group</b>						

18-39 years	175	3.76	0.96	4	1	5
40-59 years	192	3.74	0.98	4	1	5
60 years and above	36	3.87	0.85	4	1.33	5
<b>Social Capital</b>	<b>394</b>	<b>3.89</b>	<b>0.8</b>	<b>4</b>	<b>1</b>	<b>5</b>
<b>Location</b>						
East bank	224	4.02	0.78	4	1	5
West Bank	170	3.71	0.79	4	1	5
<b>Religion</b>						
Catholic	334	3.87	0.81	4	1	5
Others	58	4.01	0.71	4	1.5	5
<b>Gender</b>						
Female	310	3.86	0.83	4	1	5
Male	83	3.99	0.65	4	1.67	5
<b>Age Group</b>						
18-39 years	172	3.88	0.85	4	1	5
40-59 years	186	3.88	0.78	4	1	5
60 years and above	36	3.97	0.63	4	2.33	5
<b>Social Mechanism</b>	<b>395</b>	<b>3.82</b>	<b>0.84</b>	<b>4</b>	<b>1</b>	<b>5</b>
<b>Location</b>						
East bank	224	3.97	0.84	4	1	5
West Bank	171	3.63	0.8	4	1	5
<b>Religion</b>						
Catholic	337	3.79	0.86	4	1	5
Others	56	4.03	0.68	4	2	5
<b>Gender</b>						
Female	310	3.8	0.87	4	1	5
Male	84	3.92	0.74	4	1	5
<b>Age Group</b>						
18-39 years	171	3.83	0.85	4	1	5
40-59 years	188	3.79	0.87	4	1	5
60 years and above	36	3.97	0.62	4	3	5
<b>Social Belief</b>	<b>386</b>	<b>3.92</b>	<b>0.83</b>	<b>4</b>	<b>1</b>	<b>5</b>
<b>Location</b>						
East bank	217	4.09	0.81	4	1	5
West Bank	169	3.7	0.8	4	1	5
<b>Religion</b>						
Catholic	329	3.87	0.85	4	1	5
Others	55	4.22	0.67	4.5	3	5
<b>Gender</b>						
Female	304	3.89	0.84	4	1	5
Male	81	4.01	0.77	4	1	5
<b>Age Group</b>						
18-39 years	166	3.93	0.84	4	1	5
40-59 years	184	3.9	0.84	4	1	5
60 years and above	36	3.99	0.72	4	2.5	5

<b>Social Equity</b>	409	3.3	0.79	3.33	1	5
<b>Location</b>						
East bank	232	3.41	0.88	3.42	1	5
West Bank	177	3.14	0.63	3	1	4.67
<b>Religion</b>						
Catholic	348	3.27	0.79	3.33	1	5
Others	59	3.46	0.79	3.33	1.5	4.67
<b>Gender</b>						
Female	323	3.29	0.81	3.33	1	5
Male	85	3.3	0.73	3.33	1	4.67
<b>Age Group</b>						
18-39 years	177	3.25	0.81	3.33	1	5
40-59 years	196	3.29	0.76	3.33	1	5
60 years and above	36	3.53	0.82	3.5	2	4.67
<b>Social Innovation</b>	392	3.59	0.91	3.67	1	5
<b>Location</b>						
East bank	227	3.73	0.94	4	1	5
West Bank	165	3.4	0.84	3.33	1	5
<b>Religion</b>						
Catholic	332	3.59	0.93	3.67	1	5
Others	58	3.61	0.8	3.67	1	5
<b>Gender</b>						
Female	309	3.59	0.95	3.67	1	5
Male	82	3.61	0.76	3.67	1.67	5
<b>Age Group</b>						
18-39 years	168	3.61	0.95	4	1	5
40-59 years	189	3.59	0.87	3.67	1	5
60 years and above	35	3.5	0.94	3.67	1	5

## Appendix - J: Data Analysis - Non Parametric

Table J.28: Distribution of respondents according to location, religion, gender and age group

Distribution of respondents according to location, religion, gender, and age group			
Variable	Categories of the Variable	Frequency	Percentage
<b>Location</b>	East bank	232	56.72
	West bank	177	43.28
	Total	409	
<b>Religion</b>	Catholic	348	85.5
	Others	59	14.5
	Total	407	
<b>Gender</b>	Female	323	79.17
	Male	85	20.83
	Total	408	
<b>Age Group</b>	18 to 19 years	177	43.28
	40 to 59 years	196	47.92
	60 years and above	36	8.8
	Total	409	

Table J.29: Summary Statistics of Respondent scores by survey item

Summary statistics of respondent scores by survey item						
Survey Item	No. of Observations	Mean	Standard Deviation	Median	Minimum Value	Maximum Value
S1a. An emergency facility : Social Structure Item 1	379	3.77	1.06	4	1	5
<b>Location</b>						
East bank	214	4.04	1.01	4	1	5
West Bank	165	3.42	1.03	4	1	5
<b>Religion</b>						
Catholic	321	3.76	1.06	4	1	5
Others	56	3.86	1.03	4	1	5
<b>Gender</b>						
Female	299	3.8	1.04	4	1	5
Male	79	3.67	1.13	4	1	5
<b>Age Group</b>						
18-39 years	161	3.75	1.04	4	1	5
40-59 years	183	3.73	1.11	4	1	5
60 years and above	35	4.06	0.8	4	1	5
S1b. Accessible : Social Structure Item 2	384	3.85	1.03	4	1	5
<b>Location</b>						
East bank	219	4.12	1	4	1	5
West Bank	165	3.48	0.95	4	1	5

Religion						
Catholic	325	3.85	1.04	4	1	5
Others	57	3.89	0.86	4	1	5
Gender						
Female	301	3.85	1.05	4	1	5
Male	82	3.83	0.95	4	1	5
Age Group						
18-39 years	165	3.81	1.02	4	1	5
40-59 years	184	3.87	1.05	4	1	5
60 years and above	35	3.91	0.92	4	1	5
S3e.Protection from disasters : Social Structure Item 3	381	3.79	1.09	4	1	5
Location						
East bank	214	3.98	1.02	4	1	5
West Bank	167	3.54	1.13	4	1	5
Religion						
Catholic	323	3.77	1.11	4	1	5
Others	56	3.88	0.97	4	1	5
Gender						
Female	302	3.75	1.13	4	1	5
Male	78	3.91	0.94	4	1	5
Age Group						
18-39 years	165	3.9	1.02	4	1	5
40-59 years	182	3.71	1.13	4	1	5
60 years and above	34	3.65	1.2	4	1	5
S2a.Socially: Social Capital Item 1	378	3.91	0.93	4	1	5
Location						
East bank	214	4.08	0.9	4	1	5
West Bank	164	3.7	0.93	4	1	5
Religion						
Catholic	321	3.88	0.96	4	1	5
Others	55	4.13	0.72	4	2	5
Gender						
Female	298	3.89	0.94	4	1	5
Male	79	4.01	0.91	4	1	5
Age Group						
18-39 years	162	3.9	0.94	4	1	5
40-59 years	181	3.91	0.94	4	1	5
60 years and above	35	3.97	0.86	4	1	5
S2c.Physically: Social Capital Item 2	377	3.95	0.87	4	1	5
Location						
East bank	214	4	0.83	4	1	5
West Bank	163	3.88	0.91	4	1	5

Religion						
Catholic	318	3.93	0.88	4	1	5
Others	57	4.05	0.83	4	1	5
Gender						
Female	297	3.94	0.9	4	1	5
Male	79	4	0.73	4	2	5
Age Group						
18-39 years	160	3.97	0.89	4	1	5
40-59 years	182	3.91	0.88	4	1	5
60 years and above	35	4.06	0.73	4	3	5
S3c. Healthy relationship with others :Social Capital Item 3	382	3.89	0.85	4	1	5
Location						
East bank	214	4.08	0.8	4	1	5
West Bank	168	3.65	0.86	4	1	5
Religion						
Catholic	323	3.9	0.85	4	1	5
Others	57	3.89	0.82	4	1	5
Gender						
Female	300	3.87	0.89	4	1	5
Male	81	3.98	0.69	4	2	5
Age Group						
18-39 years	167	3.95	0.85	4	1	5
40-59 years	181	3.83	0.87	4	1	5
60 years and above	34	3.91	0.75	4	2	5
S2b. Mentally: Social Mechanism Item 1	377	3.78	0.93	4	1	5
Location						
East bank	213	3.92	0.98	4	1	5
West Bank	164	3.59	0.83	4	1	5
Religion						
Catholic	320	3.74	0.95	4	1	5
Others	55	4.02	0.73	4	2	5
Gender						
Female	296	3.74	0.97	4	1	5
Male	80	3.93	0.76	4	1	5
Age Group						
18-39 years	161	3.76	0.97	4	1	5
40-59 years	183	3.77	0.94	4	1	5
60 years and above	33	3.88	0.7	4	3	5
S3b. Enhanced resilience: Social Mechanism Item 2	387	3.9	0.91	4	1	5
Location						
East bank	217	4.06	0.83	4	1	5

West Bank	170	3.69	0.97	4	1	5
<b>Religion</b>						
Catholic	330	3.88	0.94	4	1	5
Others	55	4.02	0.78	4	1	5
<b>Gender</b>						
Female	304	3.88	0.93	4	1	5
Male	82	3.94	0.85	4	1	5
<b>Age Group</b>						
18-39 years	167	3.93	0.91	4	1	5
40-59 years	184	3.83	0.95	4	1	5
60 years and above	36	4.06	0.75	4	2	5
S2d.Spiritually: Social Belief Item 1	371	3.98	0.91	4	1	5
<b>Location</b>						
East bank	211	4.11	0.86	4	1	5
West Bank	160	3.8	0.94	4	1	5
<b>Religion</b>						
Catholic	315	3.92	0.93	4	1	5
Others	54	4.33	0.67	4	3	5
<b>Gender</b>						
Female	290	3.95	0.91	4	1	5
Male	80	4.06	0.89	4	1	5
<b>Age Group</b>						
18-39 years	158	3.97	0.93	4	1	5
40-59 years	178	3.98	0.92	4	1	5
60 years and above	35	4.03	0.75	4	2	5
S3d.Spiritual activities :Social Belief Item 2	379	3.9	0.89	4	1	5
<b>Location</b>						
East bank	210	4.11	0.83	4	1	5
West Bank	169	3.63	0.9	4	1	5
<b>Religion</b>						
Catholic	322	3.86	0.9	4	1	5
Others	55	4.13	0.82	4	1	5
<b>Gender</b>						
Female	299	3.87	0.93	4	1	5
Male	79	4.01	0.72	4	2	5
<b>Age Group</b>						
18-39 years	163	3.95	0.87	4	1	5
40-59 years	182	3.84	0.92	4	1	5
60 years and above	34	3.97	0.83	4	2	5
S3a.Community Inclusiveness : Social Equity Item 1	387	3.85	0.9	4	1	5
<b>Location</b>						

	East bank	218	4	0.85	4	1	5
	West Bank	169	3.66	0.92	4	1	5
<b>Religion</b>							
	Catholic	330	3.83	0.93	4	1	5
	Others	55	3.95	0.68	4	2	5
<b>Gender</b>							
	Female	306	3.86	0.93	4	1	5
	Male	80	3.83	0.78	4	1	5
<b>Age Group</b>							
	18-39 years	163	3.88	0.88	4	1	5
	40-59 years	188	3.79	0.89	4	1	5
	60 years and above	36	4	0.99	4	1	5
S3f.Accommodating to all: Social Equity Item 2		409	3.04	1.18	3	1	5
<b>Location</b>							
	East bank	232	3.17	1.29	3	1	5
	West Bank	177	2.86	0.99	3	1	5
<b>Religion</b>							
	Catholic	348	3.01	1.19	3	1	5
	Others	59	3.22	1.12	3	1	5
<b>Gender</b>							
	Female	323	3.03	1.19	3	1	5
	Male	85	3.05	1.16	3	1	5
<b>Age Group</b>							
	18-39 years	177	2.93	1.22	3	1	5
	40-59 years	196	3.08	1.12	3	1	5
	60 years and above	36	3.39	1.23	3.5	1	5
S3g.Information Awareness: Social Equity Item 3		409	3.06	1.08	3	1	5
<b>Location</b>							
	East bank	232	3.13	1.25	3	1	5
	West Bank	177	2.97	0.81	3	1	5
<b>Religion</b>							
	Catholic	348	3.02	1.08	3	1	5
	Others	59	3.36	1.01	3	1	5
<b>Gender</b>							
	Female	323	3.05	1.1	3	1	5
	Male	85	3.11	1.04	3	1	5
<b>Age Group</b>							
	18-39 years	177	3.03	1.08	3	1	5
	40-59 years	196	3.06	1.08	3	1	5
	60 years and above	36	3.19	1.12	3	1	5
S4a.Alleys for religious and relief activities: Social Innovation Item 1		381	3.51	1.1	4	1	5

S4b. Virtual place of worship : Social Innovation Item 2						
Location						
East bank	218	3.72	1.02	4	1	5
West Bank	163	3.23	1.14	3	1	5
Religion						
Catholic	324	3.52	1.11	4	1	5
Others	55	3.49	1.05	4	1	5
Gender						
Female	300	3.51	1.13	4	1	5
Male	80	3.53	0.99	4	1	5
Age Group						
18-39 years	163	3.52	1.15	4	1	5
40-59 years	183	3.5	1.05	4	1	5
60 years and above	35	3.51	1.15	4	1	5
S4c. Social media platform for fund-raising/donations :Social Innovation Item 3	375	3.81	0.98	4	1	5
Location						
East bank	211	3.85	0.96	4	1	5
West Bank	164	3.76	1.01	4	1	5
Religion						
Catholic	317	3.79	0.99	4	1	5
Others	56	3.96	0.97	4	1	5
Gender						
Female	295	3.78	1.02	4	1	5
Male	79	3.92	0.83	4	2	5
Age Group						
18-39 years	160	3.83	0.99	4	1	5
40-59 years	182	3.81	0.95	4	1	5
60 years and above	33	3.76	1.12	4	1	5
S4c. Social media platform for fund-raising/donations :Social Innovation Item 3	380	3.49	1.06	4	1	5
Location						
East bank	216	3.7	1.04	4	1	5
West Bank	164	3.23	1.04	3	1	5
Religion						
Catholic	323	3.5	1.09	4	1	5
Others	55	3.49	0.9	3	1	5
Gender						
Female	300	3.53	1.07	4	1	5
Male	79	3.38	1.03	3	1	5
Age Group						
18-39 years	161	3.55	1.1	4	1	5
40-59 years	185	3.5	1.01	4	1	5
60 years and above	34	3.18	1.17	3	1	5

**Table J.30: Summary Statistics of Dimension scores by location, Religion , Gender and age group**

Summary statistics of dimension scores by location, religion, gender, and age group						
Dimension	No. of Observations	Mean	Standard Deviation	Median	Minimum Value	Maximum Value
Social Structure	403	3.76	0.96	4	1	5
<b>Location</b>						
East bank	231	3.98	0.95	4	1	5
West Bank	172	3.46	0.88	3.67	1	5
<b>Religion</b>						
Catholic	343	3.75	0.97	4	1	5
Others	58	3.84	0.85	4	1	5
<b>Gender</b>						
Female	318	3.75	0.98	4	1	5
Male	84	3.8	0.88	4	1	5
<b>Age Group</b>						
18-39 years	175	3.76	0.96	4	1	5
40-59 years	192	3.74	0.98	4	1	5
60 years and above	36	3.87	0.85	4	1.33	5
Social Capital	394	3.89	0.8	4	1	5
<b>Location</b>						
East bank	224	4.02	0.78	4	1	5
West Bank	170	3.71	0.79	4	1	5
<b>Religion</b>						
Catholic	334	3.87	0.81	4	1	5
Others	58	4.01	0.71	4	1.5	5
<b>Gender</b>						
Female	310	3.86	0.83	4	1	5
Male	83	3.99	0.65	4	1.67	5
<b>Age Group</b>						
18-39 years	172	3.88	0.85	4	1	5
40-59 years	186	3.88	0.78	4	1	5
60 years and above	36	3.97	0.63	4	2.33	5
Social Mechanism	395	3.82	0.84	4	1	5
<b>Location</b>						
East bank	224	3.97	0.84	4	1	5
West Bank	171	3.63	0.8	4	1	5
<b>Religion</b>						
Catholic	337	3.79	0.86	4	1	5
Others	56	4.03	0.68	4	2	5
<b>Gender</b>						
Female	310	3.8	0.87	4	1	5
Male	84	3.92	0.74	4	1	5
<b>Age Group</b>						
18-39 years	171	3.83	0.85	4	1	5
40-59 years	188	3.79	0.87	4	1	5
60 years and above	36	3.97	0.62	4	3	5
Social Belief	386	3.92	0.83	4	1	5
<b>Location</b>						
East bank	217	4.09	0.81	4	1	5
West Bank	169	3.7	0.8	4	1	5
<b>Religion</b>						
Catholic	329	3.87	0.85	4	1	5
Others	55	4.22	0.67	4.5	3	5
<b>Gender</b>						
Female	304	3.89	0.84	4	1	5
Male	81	4.01	0.77	4	1	5

<b>Age Group</b>							
18-39 years	166	3.93	0.84	4	1	5	
40-59 years	184	3.9	0.84	4	1	5	
60 years and above	36	3.99	0.72	4	2.5	5	
Social Equity	409	3.3	0.79	3.33	1	5	
<b>Location</b>							
East bank	232	3.41	0.88	3.42	1	5	
West Bank	177	3.14	0.63	3	1	4.67	
<b>Religion</b>							
Catholic	348	3.27	0.79	3.33	1	5	
Others	59	3.46	0.79	3.33	1.5	4.67	
<b>Gender</b>							
Female	323	3.29	0.81	3.33	1	5	
Male	85	3.3	0.73	3.33	1	4.67	
<b>Age Group</b>							
18-39 years	177	3.25	0.81	3.33	1	5	
40-59 years	196	3.29	0.76	3.33	1	5	
60 years and above	36	3.53	0.82	3.5	2	4.67	
Social Innovation	392	3.59	0.91	3.67	1	5	
<b>Location</b>							
East bank	227	3.73	0.94	4	1	5	
West Bank	165	3.4	0.84	3.33	1	5	
<b>Religion</b>							
Catholic	332	3.59	0.93	3.67	1	5	
Others	58	3.61	0.8	3.67	1	5	
<b>Gender</b>							
Female	309	3.59	0.95	3.67	1	5	
Male	82	3.61	0.76	3.67	1.67	5	
<b>Age Group</b>							
18-39 years	168	3.61	0.95	4	1	5	
40-59 years	189	3.59	0.87	3.67	1	5	
60 years and above	35	3.5	0.94	3.67	1	5	

**Table J.31: Comparison of mean ranks of respondent scores according to location, religion, gender, and age group**

Comparison of mean ranks of respondent scores according to location, religion, gender, and age group					
Survey Item	Categories of Selected Variable	Number of Observations	Rank Sum of Dimension Scores	p-value(0.05 Level of Significance)	Mean Rank
S1a. An emergency facility : Social Structure Item 1					
	<b>Location</b>			<0.0001	
	East bank	214	47,286.00		220.963
	West Bank	165	24,724.00		149.842
	<b>Religion</b>			0.4642	
	Catholic	321	60,156.50		187.403
	Others	56	11,096.50		198.152
	<b>Gender</b>			0.41	
	Female	299	57,322.50		191.714
	Male	79	14,308.50		181.120
	<b>Age Group</b>			0.2477	
	18-39 years	161	30,135.00		187.174
	40-59 years	183	34,265.00		187.240
	60 years and above	35	7,610.00		217.429
S1b. Accessible : Social Structure Item 2					
	<b>Location</b>			<0.0001	
	East bank	219	49762.500		227.226
	West Bank	165	24157.500		146.409
	<b>Religion</b>			0.9084	
	Catholic	325	62,320.00		191.754
	Others	27	10,833.00		401.222
	<b>Gender</b>			0.5773	
	Female	301	58,254.00		193.535
	Male	82	15,282.00		186.366
	<b>Age Group</b>			0.7796	
	18-39 years	165	31,056.50		188.221
	40-59 years	184	36,046.00		195.902
	60 years and above	35	6,817.50		194.786
S3e. Protection from disasters : Social Structure Item 3					
	<b>Location</b>			<0.0001	
	East bank	214	45,054.50		210.535
	West Bank	167	27,716.50		165.967
	<b>Religion</b>			0.6419	

	Catholic	323	61,035.50		188.964
	Others	56	10,974.50		195.973
<b>Gender</b>				0.3968	
	Female	302	56,834.50		188.194
	Male	78	15,555.50		199.429
<b>Age Group</b>				0.2628	
	18-39 years	165	33,148.50		200.900
	40-59 years	182	33,531.50		184.239
	60 years and above	34	6,091.00		179.147
<b>S2a.Socially: Social Capital Item 1</b>					
	<b>Location</b>			<0.0001	
	East bank	214	45,025.50		210.400
	West Bank	164	26,605.50		162.229
<b>Religion</b>				0.1122	
	Catholic	321	59,423.00		185.118
	Others	55	11,453.00		208.236
<b>Gender</b>				0.2278	
	Female	298	55,369.50		185.804
	Male	79	15,883.50		201.057
<b>Age Group</b>				0.9807	
	18-39 years	162	30,651.00		189.204
	40-59 years	181	34,236.00		189.149
	60 years and above	35	6,744.00		192.686
<b>S2c.Physically: Social Capital Item 2</b>					
	<b>Location</b>			0.1918	
	East bank	214	41,716.00		194.935
	West Bank	163	29,537.00		181.209
<b>Religion</b>				0.3146	
	Catholic	318	59,080.00		185.786
	Others	57	11,420.00		200.351
<b>Gender</b>				0.8409	
	Female	297	55,824.50		187.961
	Male	79	15,051.50		190.525
<b>Age Group</b>				0.6379	
	18-39 years	160	30,876.00		192.975
	40-59 years	182	33,489.00		184.005
	60 years and above	35	6,888.00		196.800
<b>S3c.Healthy relationship with others :Social Capital Item 3</b>					
	<b>Location</b>			<0.0001	
	East bank	214	46,346.50		216.572
	West Bank	168	26,806.50		159.563
<b>Religion</b>				0.9258	

	Catholic	323	61,490.50		190.373
	Others	57	10,899.50		191.219
<b>Gender</b>				0.633	
	Female	300	56,919.00		189.730
	Male	81	15,852.00		195.704
<b>Age Group</b>				0.3619	
	18-39 years	167	33,344.50		199.668
	40-59 years	181	33,384.00		184.442
	60 years and above	34	6,424.50		188.956
<b>S2b. Mentally: Social Mechanism Item 1</b>					
	<b>Location</b>			<0.0001	
	East bank	213	44,641.50		209.585
	West Bank	164	26,611.50		162.265
<b>Religion</b>				0.0721	
	Catholic	320	58,929.50		184.155
	Others	55	11,570.50		210.373
<b>Gender</b>				0.2076	
	Female	296	54,794.00		185.115
	Male	80	16,082.00		201.025
<b>Age Group</b>				0.9757	
	18-39 years	161	30,550.50		189.755
	40-59 years	183	34,387.00		187.907
	60 years and above	33	6,315.50		191.379
<b>S3b. Enhanced resilience: Social Mechanism Item 2</b>					
	<b>Location</b>			<0.0001	
	East bank	217	46,390.00		213.779
	West Bank	170	28,688.00		168.753
<b>Religion</b>				0.332	
	Catholic	330	63,004.00		190.921
	Others	55	11,301.00		205.473
<b>Gender</b>				0.7597	
	Female	304	58,570.50		192.666
	Male	82	16,120.50		196.591
<b>Age Group</b>				0.3861	
	18-39 years	167	33,148.00		198.491
	40-59 years	184	34,409.50		187.008
	60 years and above	36	7,520.50		208.903
<b>S2d. Spiritually: Social Belief Item 1</b>					
	<b>Location</b>			0.0003	
	East bank	211	42,661.00		202.185
	West Bank	160	26,345.00		164.656
<b>Religion</b>				0.0022	

	Catholic	315	56,211.00		178.448
	Others	54	12,054.00		223.222
<b>Gender</b>				0.2881	
	Female	290	52,959.50		182.619
	Male	80	15,675.50		195.944
<b>Age Group</b>				0.9997	
	18-39 years	158	29,406.50		186.117
	40-59 years	178	33,085.00		185.871
	60 years and above	35	6,514.50		186.129
<b>S3d. Spiritual activities :Social Belief Item 2</b>					
	<b>Location</b>			<0.0001	
	East bank	210	45,440.00		216.381
	West Bank	169	26,570.00		157.219
<b>Religion</b>				0.0379	
	Catholic	322	59,408.50		184.498
	Others	55	11,844.50		215.355
<b>Gender</b>				0.3519	
	Female	299	55,908.50		186.985
	Male	79	15,722.50		199.019
<b>Age Group</b>				0.5477	
	18-39 years	163	31,823.00		195.233
	40-59 years	182	33,490.50		184.014
	60 years and above	34	6,696.50		196.956
<b>S3a. Community Inclusiveness : Social Equity Item 1</b>					
	<b>Location</b>			<0.0001	
	East bank	218	46,430.00		212.982
	West Bank	169	28,648.00		169.515
<b>Religion</b>				0.6152	
	Catholic	330	63,332.50		191.917
	Others	55	10,972.50		199.500
<b>Gender</b>				0.5101	
	Female	306	59,755.50		195.279
	Male	80	14,935.50		186.694
<b>Age Group</b>				0.2653	
	18-39 years	163	32,300.00		198.160
	40-59 years	188	35,054.00		186.457
	60 years and above	36	7,724.00		214.556
<b>S3f. Accommodating to all: Social Equity Item 2</b>					
	<b>Location</b>			0.0044	
	East bank	232	50,832.50		219.106
	West Bank	177	33,012.50		186.511
<b>Religion</b>				0.1862	

	Catholic	348	69,920.50		200.921
	Others	59	13,107.50		222.161
<b>Gender</b>				0.8496	
	Female	323	65,875.50		203.949
	Male	85	17,560.50		206.594
<b>Age Group</b>				0.0961	
	18-39 years	177	34,415.50		194.438
	40-59 years	196	40,856.50		208.452
	60 years and above	36	8,573.00		238.139
<b>S3g.Information Awareness: Social Equity Item 3</b>					
	<b>Location</b>			0.0717	
	East bank	232	49,578.50		213.700
	West Bank	177	34,266.50		193.596
<b>Religion</b>				0.021	
	Catholic	348	69,169.00		198.761
	Others	59	13,859.00		234.898
<b>Gender</b>				0.848	
	Female	323	65,878		203.957
	Male	85	17,558		206.565
<b>Age Group</b>				0.5756	
	18-39 years	177	35,877.00		202.695
	40-59 years	196	39,916.50		203.656
	60 years and above	36	8,051.50		223.653
<b>S4a.Alleys/roads for religious and relief activities: Social Innovation Item 1</b>					
	<b>Location</b>			<0.0001	
	East bank	218	45,982.00		210.927
	West Bank	163	26,789.00		164.350
<b>Religion</b>				0.8661	
	Catholic	324	61,681.50		190.375
	Others	55	10,328.50		187.791
<b>Gender</b>				0.8517	
	Female	300	57,306.50		191.022
	Male	80	15,083.50		188.544
<b>Age Group</b>				0.8659	
	18-39 years	163	31,634.50		194.077
	40-59 years	183	34,409.00		188.027
	60 years and above	35	6,727.50		192.214
<b>S4b.Virtual place of worship : Social Innovation Item 2</b>					
	<b>Location</b>			0.3636	
	East bank	211	40,560.50		192.230

	West Bank	164	29,939.50		182.558
	<b>Religion</b>			0.1576	
	Catholic	317	58,286.50		183.869
	Others	56	11,464.50		204.723
	<b>Gender</b>			0.4964	
	Female	295	54,765.00		185.644
	Male	79	15,360.00		194.430
	<b>Age Group</b>			0.8982	
	18-39 years	160	30,513.50		190.709
	40-59 years	182	33,774.50		185.574
	60 years and above	33	6,212.00		188.242
S4c. Social media platform for fund-raising/donations :Social Innovation Item 3					
	<b>Location</b>			<0.0001	
	East bank	216	45,761.50		211.859
	West Bank	164	26,628.50		162.369
	<b>Religion</b>			0.6575	
	Catholic	323	61,526.50		190.485
	Others	55	10,104.50		183.718
	<b>Gender</b>			0.1999	
	Female	300	58,063.00		193.543
	Male	79	13,947.00		176.544
	<b>Age Group</b>			0.2195	
	18-39 years	161	31,795.00		197.484
	40-59 years	185	35,049.00		189.454
	60 years and above	34	5,546.00		163.118

Table J.32: Comparison of mean ranks of dimension scores according to location, religion, gender and age group

Comparison of mean ranks of dimension scores according to location, religion, gender, and age group					
Social Dimension	Categories of Selected Variable	Number of Observations	Rank Sum of Dimension Scores	p-value(0.05 Level of Significance)	Mean Rank
Social Structure	<b>Location</b>		<0.0001		
	East bank	231	54,251.50		234.855
	West Bank	172	27,154.50		157.875
	<b>Religion</b>			0.563	
	Catholic	343	68,477.50		199.643
	Others	58	12,123.50		209.026

Social Capital	Gender	0.9398			201.278 202.340 204.306 197.844 212.958	
	Female	318	64,006.50			
	Male	84	16,996.60			
	Age Group	0.7225				
	18-39 years	175	35,753.50			
	40-59 years	192	37,986.00			
	60 years and above	36	7,666.50			
	Location	0.0001				
	East bank	224	48,394.50			
	West Bank	170	29,420.50			
Social Mechanism	Religion	0.1863			193.437 214.138 194.027 208.102 199.439 194.618 203.125	
	Catholic	334	64,608.00			
	Others	58	12,420.00			
	Gender	0.3023				
	Female	310	60,148.50			
	Male	83	17,272.50			
	Age Group	0.8728				
	18-39 years	172	34,303.50			
	40-59 years	186	36,199.00			
	60 years and above	36	7,312.50			
Social Belief	Location	<0.0001			220.094 169.058 192.432 224.491 194.615 208.149 198.789 195.149 209.139	
	East bank	224	49,301.00			
	West Bank	171	28,909.00			
	Religion	0.0424				
	Catholic	337	64,849.50			
	Others	56	12,571.50			
	Gender	0.3158				
	Female	310	60,330.50			
	Male	84	17,484.50			
	Age Group	0.7771				
	18-39 years	171	33,993.00			
	40-59 years	188	36,688.00			
	60 years and above	36	7,529.00			
	Location	<0.0001			217.668	
	East bank	217	47,234			

	West Bank	169	27,457	162.467
	<b>Religion</b>		0.0027	
	Catholic	329	61,129.50	185.804
	Others	55	12,790.50	232.555
	<b>Gender</b>		0.3222	
	Female	304	57,822.00	190.204
	Male	81	16,483.00	203.494
	<b>Age Group</b>		0.9285	
	18-39 years	166	32,358.50	194.931
	40-59 years	184	35,221.50	191.421
	60 years and above	36	7,111.00	197.528
Social Equity				
	<b>Location</b>		0.0002	
	East bank	232	51,876.00	223.603
	West Bank	177	31,929.00	180.390
	<b>Religion</b>		0.0578	
	Catholic	348	69,419.50	199.481
	Others	59	13,608.50	230.653
	<b>Gender</b>		0.953	
	Female	323	65,997.00	204.325
	Male	85	17,439.00	205.165
	<b>Age Group</b>		0.2053	
	18-39 years	177	35,381.50	199.895
	40-59 years	196	39,905.50	203.599
	60 years and above	36	8,558.00	237.722
Social Innovation				
	<b>Location</b>		<0.0001	
	East bank	227	49,114.00	216.361
	West Bank	165	27,914.00	169.176
	<b>Religion</b>		0.9724	
	Catholic	332	64,879.00	195.419
	Others	58	11,366.00	195.966
	<b>Gender</b>		0.8121	
	Female	309	60,777.00	196.689
	Male	82	15,859.00	193.402
	<b>Age Group</b>		0.7501	
	18-39 years	168	33,773.00	201.030
	40-59 years	189	36,679.00	194.069
	60 years and above	35	6,576.00	187.886

**Table J.33: Anova Single Factor on Social Structure**

ANOVA: Single Factor		SOCIAL STRUCTURE				
SUMMARY						
Groups	Count	Sum	Average	Variance		
S1a Social Structure1	389	1468	3.774	1.114		
S1b Social Structure2	392	1511	3.855	1.045		
S3e Social Structure3	384	1454	3.786	1.181		

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.475	2	0.738	0.663	0.516	3.003
Within Groups	1293.294	1162	1.113			
Total	1294.769	1164				

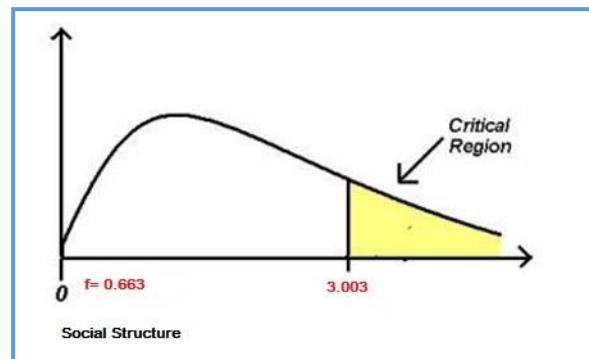
$H_0$ = There is no significant difference in the emergency facility, accessibility, and providing protection of places of worship to become a social structure.

$H_a$ =There is a significant difference in the emergency facility, accessibility, and providing protection of places of worship to become a social structure.

$p=0.05$  (alpha level)

$pValue$  is 0.516

Therefore:  $H_0$  is not rejected



**Figure J.1: A Diagram of Anova Single Factor on Social Structure**

**Table J.34: Descriptive Statistics on S1a, S1b and S3e**

Descriptive Statistics			
	S1a Social Structure1	S1b Social Structure2	S3e Social Structure3
<b>Mean</b>	3.774	3.855	3.786
<b>Standard Error</b>	0.054	0.052	0.055
<b>Median</b>	4	4	4
<b>Mode</b>	4	4	4
<b>Standard Deviation</b>	1.055	1.022	1.087
<b>Sample Variance</b>	1.114	1.045	1.181
<b>Kurtosis</b>	0.938	1.117	0.299
<b>Skewness</b>	-1.085	-1.105	-0.892
<b>Range</b>	4	4	4
<b>Minimum</b>	1	1	1
<b>Maximum</b>	5	5	5
<b>Sum</b>	1468	1511	1454
<b>Count</b>	389	392	384
<b>Confidence Level (95.0%)</b>	0.105	0.102	0.109

**Table J.35: Anova Single Factor on Social Capital**

ANOVA: Single Factor		SOCIAL CAPITAL				
SUMMARY						
Groups	Count	Sum	Average	Variance		
S2a Social Capital 1	386	1509	3.909	0.851		
S2c Social Capital 2	385	1518	3.943	0.752		
S3c Social Capital 3	385	1496	3.886	0.726		

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.635	2	0.317	0.409	0.665	3.004
Within Groups	895.541	1153	0.777			
Total	896.176	1155				

$H_0$ = There is no significant difference in the variables of Social Capital  
 $H_a$ =There is a significant difference in the variables of Social Capital  
 $p=0.05$  (alpha level)  
 $pValue$  is 0.665  
 Therefore:  $H_0$  is not rejected

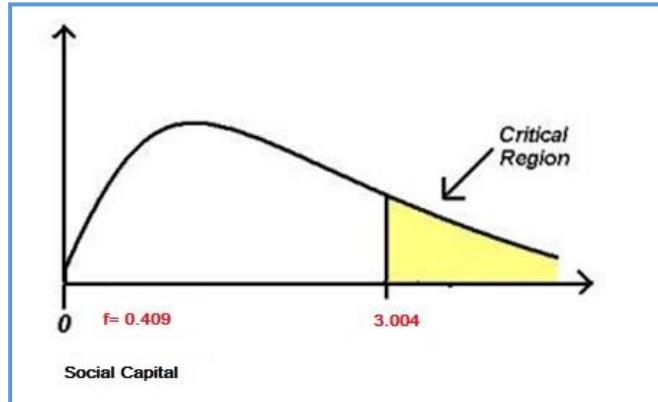


Figure J.2: A Diagram of Anova Single Factor on Social Capital

Table J.36: Descriptive Statistics on S2a, S2c and S3c

Descriptive Statistics			
	S2a Social Capital 1	S2c Social Capital 2	S3c Social Capital 3
<b>Mean</b>	3.909	3.943	3.886
<b>Standard Error</b>	0.047	0.044	0.043
<b>Median</b>	4	4	4
<b>Mode</b>	4	4	4
<b>Standard Deviation</b>	0.923	0.867	0.852
<b>Sample Variance</b>	0.851	0.752	0.726
<b>Kurtosis</b>	1.970	1.111	1.719
<b>Skewness</b>	-1.195	-0.853	-0.997
<b>Range</b>	4	4	4
<b>Minimum</b>	1	1	1
<b>Maximum</b>	5	5	5
<b>Sum</b>	1509	1518	1496
<b>Count</b>	386	385	385
<b>Confidence Level (95.0%)</b>	0.092	0.087	0.085

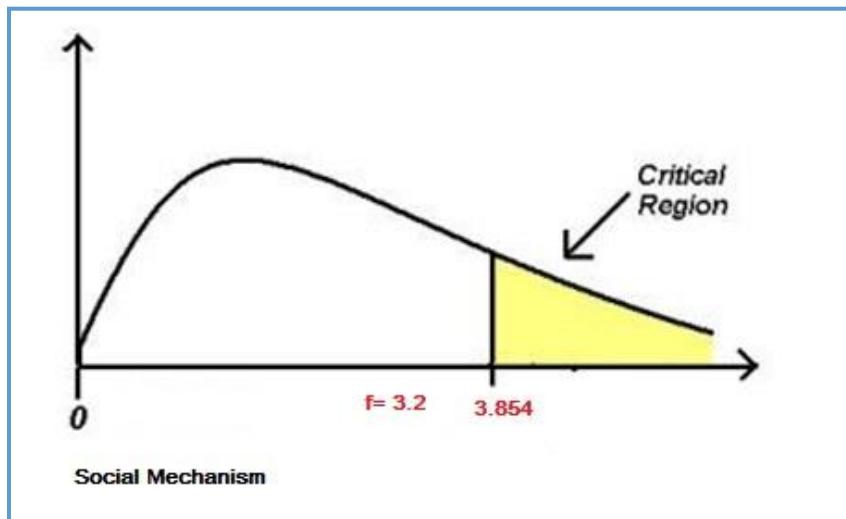
**Table J.37: Anova Single Factor on Social Mechanism**

ANOVA: Single Factor		SOCIAL MECHANISM				
SUMMARY						
Groups	Count	Sum	Average	Variance		
S2b Social Mech1	385	1453	3.774	0.863		
S3b Social Mech2	390	1518	3.892	0.832		

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	2.711	1	2.711	3.200	0.074	3.854
Within Groups	654.817	773	0.847			
Total	657.528	774				

Ho= There is no significant difference in the variables of Social Mechanism  
 Ha=There is a significant difference in the variables of Social Mechanism  
 p=0.05 (alpha level)  
 pValue is 0.074  
 Therefore: Ho is not rejected



**Figure J.3: A Diagram of Anova Single Factor on Social Mechanism**

**Table J.38: Descriptive Statistics on S2b and S3b**

Descriptive Statistics		
	S2b Social Mech1	S3b Social Mech2
<b>Mean</b>	3.774	3.892
<b>Standard Error</b>	0.047	0.046
<b>Median</b>	4	4
<b>Mode</b>	4	4
<b>Standard Deviation</b>	0.929	0.912
<b>Sample Variance</b>	0.863	0.832
<b>Kurtosis</b>	1.455	1.579
<b>Skewness</b>	-1.025	-1.033
<b>Range</b>	4	4
<b>Minimum</b>	1	1
<b>Maximum</b>	5	5
<b>Sum</b>	1453	1518
<b>Count</b>	385	390
<b>Confidence Level (95.0%)</b>	0.093	0.091

**Table J.39: Anova Single Factor on Social Belief**

ANOVA: Single Factor		SOCIAL BELIEF				
SUMMARY						
Groups	Count	Sum	Average	Variance		
S2d Social Belief 1	379	1503	3.966	0.822		
S3d Social Belief 2	381	1484	3.895	0.799		

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.949	1	0.949	1.171	0.279	3.854
Within Groups	614.355	758	0.810			
Total	615.304	759				

$H_0$ = There is no significant difference in the variables of Social Belief  
 $H_a$ =There is a significant difference in the variables of Social Belief  
 $p=0.05$  (alpha level)  
 $pValue$  is 0.279  
Therefore:  $H_0$  is not rejected

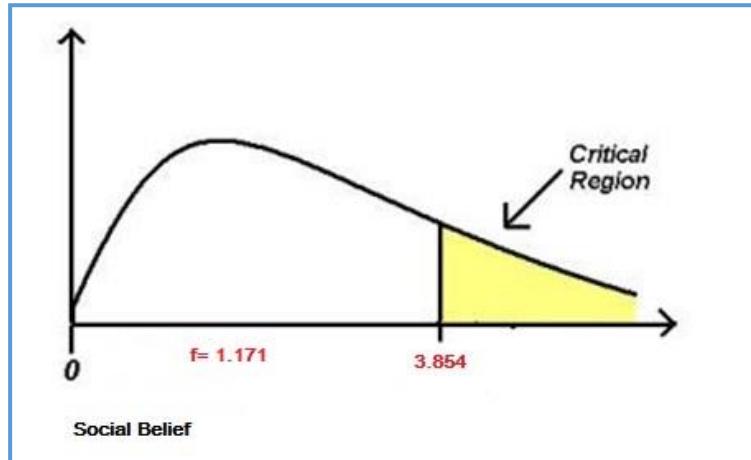


Figure J.4: A Diagram of Anova Single Factor on Social Mechanism

Table J.40: Descriptive Statistics on S2d and S3d

Descriptive Statistics		
	S2d Social Belief 1	S3d Social Belief 2
<b>Mean</b>	3.966	3.895
<b>Standard Error</b>	0.047	0.046
<b>Median</b>	4	4
<b>Mode</b>	4	4
<b>Standard Deviation</b>	0.906	0.894
<b>Sample Variance</b>	0.822	0.799
<b>Kurtosis</b>	1.117	0.547
<b>Skewness</b>	-0.961	-0.725
<b>Range</b>	4	4
<b>Minimum</b>	1	1
<b>Maximum</b>	5	5
<b>Sum</b>	1503	1484
<b>Count</b>	379	381
<b>Confidence Level (95.0%)</b>	0.092	0.090

**Table J.41: Anova Single Factor on Social Equity**

ANOVA: Single Factor		SOCIAL EQUITY				
SUMMARY						
Groups	Count	Sum	Average	Variance		
S3a Social Equity1	390	1502	3.851	0.800		
S3f Social Equity2	409	1243	3.039	1.391		
S3g Social Equity3	409	1252	3.061	1.170		

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	169.607	2	84.803	75.348	1.46905E-31	3.003
Within Groups	1356.220	1205	1.125			
Total	1525.827	1207				

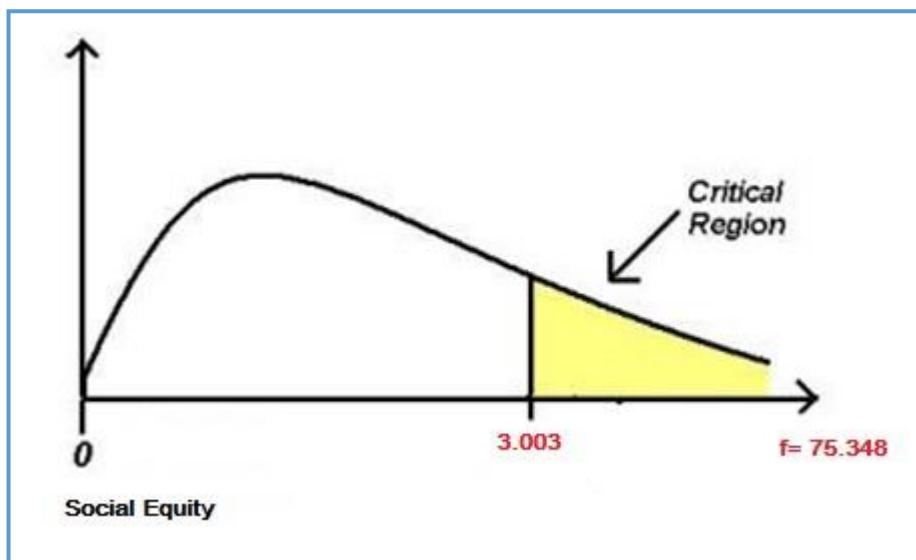
$H_0$ = There is no significant difference in the variables of Social Equity

$H_a$ =There is a significant difference in the variables of Social Equity

$p=0.05$  (alpha level)

pValue is  $1.46E-31$

Therefore:  $H_a$  is not rejected, then  $H_0$  is accepted



**Figure J.5: A Diagram of Anova Single Factor on Social Mechanism**

**Table J.42: Descriptive Statistics on S3a, S3f and S3g**

Descriptive Statistics		S3a Social Equity1	S3f Social Equity2	S3g Social Equity3
<b>Mean</b>		3.851	3.039	3.061
<b>Standard Error</b>		0.045	0.058	0.053
<b>Median</b>		4	3	3
<b>Mode</b>		4	2	3
<b>Standard Deviation</b>		0.895	1.179	1.082
<b>Sample Variance</b>		0.800	1.391	1.170
<b>Kurtosis</b>		0.943	-0.992	-0.315
<b>Skewness</b>		-0.807	0.041	-0.017
<b>Range</b>		4	4	4
<b>Minimum</b>		1	1	1
<b>Maximum</b>		5	5	5
<b>Sum</b>		1502	1243	1252
<b>Count</b>		390	409	409
<b>Confidence Level (95.0%)</b>		0.089	0.115	0.105

**Table J.43: Anova Single Factor on Social Innovation**

ANOVA: Single Factor		SOCIAL INNOVATION				
SUMMARY						
Groups	Count	Sum	Average	Variance		
S4a Social Innovation1	389	1361	3.499	1.194		
S4b Social Innovation2	384	1465	3.815	0.945		
S4c Social Innovation3	389	1363	3.504	1.111		

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	25.325	2	12.663	11.681	9.49216E-06	3.003
Within Groups	1256.366	1159	1.084			
Total	1281.691	1161				

$H_0$ = There is no significant difference in the variables of Social Innovation  
 $H_a$ =There is a significant difference in the variables of Social Innovation  
 $p=0.05$  (alpha level)  
 $pValue$  is  $9.49E-06$   
 Therefore:  $H_a$  is not rejected, then  $H_0$  is accepted

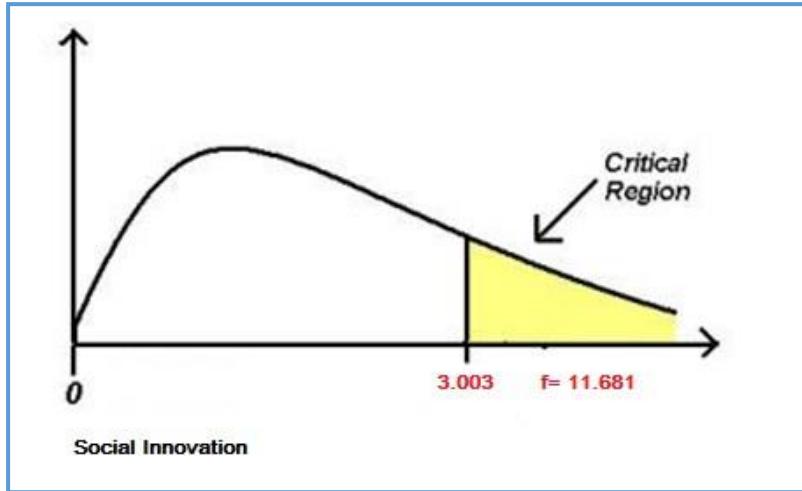


Figure J.6: A Diagram of Anova Single Factor on Social Innovation

Table J.44: Descriptive Statistics on S3a, S3f and S3g

Descriptive Statistics			
	S4a Social Innovation1	S4b Social Innovation2	S4c Social Innovation3
<b>Mean</b>	3.499	3.815	3.504
<b>Standard Error</b>	0.055	0.050	0.053
<b>Median</b>	4	4	4
<b>Mode</b>	4	4	4
<b>Standard Deviation</b>	1.093	0.972	1.054
<b>Sample Variance</b>	1.194	0.945	1.111
<b>Kurtosis</b>	-0.420	0.494	-0.280
<b>Skewness</b>	-0.491	-0.805	-0.508
<b>Range</b>	4	4	4
<b>Minimum</b>	1	1	1
<b>Maximum</b>	5	5	5
<b>Sum</b>	1361	1465	1363
<b>Count</b>	389	384	389
<b>Confidence Level (95.0%)</b>	0.109	0.098	0.105

## **Appendix - K: Journal paper for publication**

### **Social infrastructure as a coping mechanism from adversities in flood-prone areas during the COVID-19 pandemic**

#### **Abstract:**

Over the past decade or more, governments across the developed countries have been identifying the liabilities involved in failing to provide for adequate social infrastructure in particular local communities. The failure to make adequate provision for social infrastructure in the past has exacerbated problems in these areas. Klinenberg argues that social infrastructure, when robust, “fosters contact, mutual support, and collaboration among friends and neighbours; when degraded, it inhibits social activity, leaving families and individuals to fend for themselves.” The types of social infrastructure include health care, education, and public facilities.

The study is aimed at exploring how social infrastructures in the Philippines are perceived and used during disasters during the COVID pandemic. The focus of the study was at the Barangay San Andres in Cainta, Rizal, the Philippines, a community along the riverbank of Manggahan floodway that is often affected by disasters such as floods, fire, and pandemic. This study examines the use of places of worship, basketball courts, and schools as a social infrastructure and as a coping (supporting) mechanism during COVID 19 pandemic through a photo elicitation survey.

#### **Keywords:**

Social infrastructure, COVID 19 Pandemic, Church, School, Covered Court, coping mechanism