CHAPTER III
RESEARCH METHODOLOGY

This chapter presents the research methodology employed in this study. The research design is presented first, followed by the research setting. Respondents and data collection are also discussed. Lastly, data analysis techniques are also discussed briefly.

3.1. Research Design

This research made use of mixed-method approaches. All variables were operationalized with its respective indicators which were utilized as bases in making the questionnaire and interview guide. Primary data were collected using a cross-sectional survey conducted among the representative of the member-agencies of the disaster response cluster of the DRRM Councils of Region X, Province of Misamis Oriental, Cagayan de Oro and Iligan Cities that are involved in the operations.

In order to describe how the Philippine disaster management function and the performance of the network on disaster response since 2011, a self-assessment survey among implementing agencies and secondary data such as the National and Regional DRRM Plans and accomplishment reports were gathered and analyzed. Meanwhile, to empirically explain what constitute successful disaster governance in the context of the Philippines, regression analysis using Structural Equation Modelling through Partial Least Square (PLS-SEM) was used to test the relationship among variables and Social Network Analysis (SNA) was employed to understand the topographic characteristics (density, diameter, and average distance) and centrality (degree, betweenness and closeness) of the disaster management network. Also, to analyze the outcome of collaborative governance, the social capital in terms of social trust in the community and institutional support are investigated.

Further, an extensive review of the literature was made to ensure that each construct and items were fully understood and sufficiently measured. Several modifications were made to the questionnaire as each item was reviewed for its content and purpose. The researcher proposed a research model showing the relationship among variables to be tested using the structural equation model.

3.2. Research Setting

This research is conducted in the Philippines, one of the most vulnerable countries in the world where 52.46% of its population are highly exposed to natural disasters (UN-ESCAP, 2015). Among the 17 administrative regions, the focus is on Region X owing to its susceptibility to typhoons since 2011. The Philippine Atmospheric, Geophysical, and Astronomical Services Administration reported that Typhoons Washi in 2011 and Bopha in 2012 are two of the worst typhoons in the country since 1947 and have mostly affected the Province of Misamis Oriental and the Cities of Iligan and Cagayan de Oro. According to the final report of the NDRRMC, a total of 131,618 families/698,882 persons were affected by the tropical storm Sendong in 866 barangays of 60 municipalities and nine cities in the 13 provinces of Regions VI, VII, IX, X, XI, CARAGA, and ARMM. However, it was stated that Region X suffered the most which, on the other hand, affirmed that Iligan City along with Cagayan de Oro City experienced enormous infrastructure damage and loss of lives, among others (NDRRMC, 2012).

Hence, as this research primarily looks into the network structure of the Philippine disaster management, aspects of governance processes, and social capital as one of the outcomes of disaster management, Region X particularly the Cities of Iligan and Cagayan de Oro and the Province of Misamis Oriental were purposively chosen due their experiences in disaster management since Typhoons Washi in 2011 and Bopha in 2012. Typhoons Washi and Bopha have mostly affected the Province of Misamis Oriental

and the Cities of Iligan and Cagayan de Oro and are considered to be two of the worst typhoons in the country since 1947 (PAGASA).

Figure 3.1 illustrates the map of the Philippines and the area of this study.
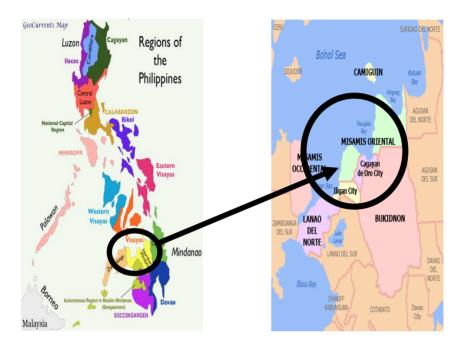

Figure 3.1. The Philippine Map showing the location of the Region X and the focus of this research: Cities of Cagayan de Oro and Iligan, Province of Misamis Oriental

3.3. Population and Sampling

3.3.1 Population

This research covers the three (3) levels of DRRM Act implementation in the Philippines: the regional, provincial and city. Agencies in the different local government levels were purposively chosen on the basis of their involvement in the disaster response activities in the Region (see Table 3.1).

Table 3.1. The Distribution of Agencies Involved Per City

Level	Iligan City	Cagayan de Oro City	No of Agencies
Region X	-	-	13
Provincial	-	-	10
City	14	14	28
CSOs	1	4	5
Total No. of Agencies in the DRRM Council			56

In Region X DRRM Council, thirteen (13) agencies are actively involved in disaster response related activities according to the Region X DRRM Plan. In the Province of Misamis Oriental, ten (10) agencies while for the Cities of Cagayan de Oro and Iligan, there are at least 14 members of the DRRM Council who were identified to have an active role during disasters. On the other hand, there are five (5) CSOs who were recognized to have significant roles in disaster management conditions.

3.3.2. Sample

From the population explained in Table 3.1, a complete enumeration was conducted among the members of the disaster response cluster of the DRRM Councils of Iligan, Cagayan de Oro, Province of Misamis Oriental and Region X. Thus, a total of 56 respondents were purposively selected for the survey (see Table 3.2).

Primarily, the Local Chief Executives (Governor and Mayors) refused the survey and the interview citing that the Local DRRM Officer is more familiar with the DRRM Operations in the LGU. Meanwhile, the AFP in Cagayan de Oro and Iligan City preferred that the Region X AFP Office answer the survey owing to their protocol. On the other hand, the Region X DPWH, PIA and DFA and the

Cagayan de Oro Veterinary Office were unable to return the survey tool and refused to be interviewed too due to their busy schedules. Thus, from a total of 56 target respondents for the survey, only 44 samples were secured.

Meanwhile, there were 18 key informants for this research. These key informants played a central role in the disaster response operation of Region X, Misamis Oriental and Cagayan de Oro and Iligan Cities (see Table 3.3).

Lastly, thirty (30) purposively chosen survivors of the 2011 Typhoon Washi were chosen based on their active involvement in the community as suggested by their respective community leaders. One rehabilitation site from Cagayan de Oro and Iligan City is selected where 15 survivors were purposively chosen. The survivors were asked through a guided survey on their experiences during the post-disaster conditions of the community in order to gather the data on social capital and how does the typhoon affect the social trust and institutional support.

Thus, this research covers the data gathered from the 92 samples (44 respondents, 18 key informants and 30 typhoon survivors) from Region X, Province of Misamis Oriental, Cagayan de Oro and Iligan City.

3.4. Data collection

All variables considered in this study were operationalized with its respective indicators which were utilized as bases in making the questionnaire and interview guide. Primary data were collected using a cross-sectional survey conducted among the representative of the member-agencies of the disaster response cluster of the DRRM Councils of Region X, Province of Misamis Oriental, Cagayan de Oro and Iligan Cities that are involved in the operations. The data gathering commenced on June until August 2017.

The survey was conducted among the target 56 identified disaster response related-agencies and organizations from the disaster management networks of the most susceptible areas in the Philippines - Cities of Cagayan de Oro and Iligan, Province of Misamis Oriental and the over-all Region X disaster response network, aimed at measuring the existing relationships among member-agencies. Forty-four (44) agencies and organizations were able to participate in the survey: Region X – 7; Misamis Oriental – 11; Cagayan de Oro City – 14; and Iligan City – 11. Also, key informant interviews were conducted among the following sector: a) representatives of the lead agencies (see Table 3.3), and b) 30 survivors, on the basis of their involvement in the disaster management operations of the region. Table 3.4 shows the summary of the data collection process.

Further, the thirty (30) purposively chosen survivors of the 2011 Typhoon Washi were made to understand on the nature of the research in order to secure their respective consent. Lastly, the research tool was translated into the vernacular language: *"Cebuano/Visayan"*.

Table 3.2. Distribution of the Respondents

Region X	Mis. Oriental	Cagayan de Oro	Iligan City
1. AFP	1. Governor	1. Mayor	1. Mayor
2. BFP	2. DRRM Officer	2. DRRM Officer	2. DRRM Officer
3. DA	3. Engineering Office	3. Engineering Office	3. Engineering Office
4. DEP.ED	4. Health Office	4. Health Office	4. Health Office
5. DILG	5. Dep.Ed	5. PRC	5. PRC
6. DOH	6. PPDO	6. PNP	6. PNP
7. DPWH	7. Agriculture Office	7. AFP	7. AFP
8. DSWD	8. Veterinary Office	8. Dep.Ed	8. Dep.Ed
9. DFA	9. Budget Officer	9. CPDO	9. CPDO
10. OCD	10. DSWD	10. BFP	10. BFP
11. Phil. Coast Guard		11. Agriculture Office	11. Agriculture Office
12. PNP		12. Veterinary Office	12. Veterinary Office
13. PIA		13. Budget Officer	13. Budget Officer
14. ECOWEB		14. CSWD	14. CSWD
		15. Faith-based CSOs	15. Faith-based CSOs
		16. Habitat for Humanity	
		17. Group Foundation	

Table 3.3. List of Key Informants

Key Informants are the DRRM Focal Person of the agencies below:
1. Archdiocese of Iligan
2. DRRM Officer Iligan City (2010)
3. DRRM Officer Iligan City (2013)
4. DRRM Officer Iligan City (2015)
5. City Planning Development Officer of Iligan
6. City Social and Welfare Development Office, Iligan City
7. MSU-Iligan Institute of Technology
8. Archdiocese of Cagayan de Oro
9. DRRM Officer Cagayan de Oro (2015)
10. City Planning Development Officer of Cagayan de Oro
11. Group Foundation Incorporated, Cagayan de Oro City
12. Habitat Foundation, Cagayan de Oro
13. Provincial Planning Development Officer, Misamis Oriental
14. Region X Department of Interior and Local Government
15. Region X Department of Social Welfare and Development
16. Region X Office of the Civil Defense
17. Region X Department of Health
18. ECOWEB – Region X

Table 3.4. Data Collection

Data	Tool	Source
Primary		
a. Informant Interview	Semi-structured	Organizations and Agency Heads
b. Survey	Questionnaire	Agencies in the Response Cluster
Secondary		
a. policies/memoranda issued by the national agency since 2010 related to Post Disaster Initiatives		DILG, DSWD, OCD
b. RDRRM Plan 2013-2016	Documents	OCD
c. Reports / Assessments published related to the post-disaster efforts in Region X	Documents	Websites of government and non-government agencies
d. Unpublished reports related to the post-disaster projects	Documents	Government agencies (local and national) and Civil Society Organizations

3.5. Data Analysis Techniques

In order to analyze how the structure and process of the Philippine disaster management affect the performance of the disaster management network, network and regression analyses were employed. Also, to further understand the outcome of disaster collaborative governance in the Philippines, a statistical analysis of social capital was conducted.

3.5.1 Network Analysis

The networks' topology and centrality measures are the main foundation for understanding the network and governance structure of the Philippine disaster management. In doing so, NodeXL

software was used in processing and analyzing the data. Primarily, the topology of the network – density, diameter, and average distance - was generated. The networks' density describes the portion of the potential connections with a network that are actual connections. A "potential connection" is a connection that could potentially exist between two "nodes" – regardless of whether or not it actually does. By contrast, an "actual connection" is one that actually exists. To assess the density of the network, the following formula is applied: Total Possible Edges: # Nodes*(# Nodes-1)/2; Density: Actual Edges/Possible Edges. The result of the formula determines if the generated density of the network is considered low or high. Moreover, network diameter is the shortest distance between the two most distant nodes in the network. In other words, once the shortest path length from every node to all other nodes is calculated, the diameter is the longest of all the calculated path lengths. Meanwhile, average distance refers to the shortest path between nodes.

On the other hand, centrality analysis gives a rough indication of the social power of a node based on how well they "connect" to the network. A highly centralized network is dominated by one person who controls information flow. A less centralized network has no single point of failure. People can still pass on information even if some communication channels are blocked. The centrality of an entity is analyzed using the network's degree, betweenness and closeness measures. Degree centrality measures how connected an entity is by counting the number of direct links each entity has to others in the network while betweenness centrality measures the number of paths that pass through each entity. Whereas, closeness centrality measures the proximity of an entity to the other entities in the social network.

This study measures the characteristics of the disaster management networks in terms of high or low density, diameter, and average distance. Also, the influence of each agency in their

respective disaster management networks is assessed based on the centrality measures – degree, betweenness, and closeness. Nodes, as referred to in this study, pertains to the disaster response related agencies and organizations. Specifically, in Table 1, "node count" refers to the actual relationships in the network while "edges" refers to the agencies and organization mentioned by each node. Meanwhile, the term lead agency/agencies refer to the authorized and mandated agencies to lead the disaster-related operations in the country as stipulated in the Philippine law on disaster management or Republic Act 10121. Also, the terms DRRM Council and DRRM network are used interchangeably in this study to refer to the set or group of agencies involved in the disaster response operations.

3.5.2 Regression Analysis

In order to explain what constitutes successful disaster governance in the context of the Philippines, regression analysis using Structural Equation Modelling through Partial Least Squares (PLS), was conducted to test the relationship among variables: previous performance, leadership, trust, initial agreement, planning, managing conflict and existing relationships. Regression analysis is applied to measure which of the independent variables has a significant effect on the dependent variables. Specifically, Partial Least Squares regression (PLS) is utilized because it is a quick, efficient and optimal regression method based on covariance. PLS is recommended in cases of regression where the number of explanatory variables is high, and where it is likely that the explanatory variables are correlated.

Moreover, as a popular rule of thumb for robust Structural Equation Modelling through Partial Least Square (PLS-SEM) estimations, Barclay et al. (1995) suggest using a minimum sample size often times the maximum number of paths aiming at any construct in the outer model" (Hair et al., 2010). Thus, with 44-

sample size and a maximum of 4 paths aiming at a construct in the outer model, the researchers believe that PLS-SEM approach is the appropriate method to analyze the data for this study.

Each variable used in this study is measured using indicators utilized by previous researchers. Primarily, the questionnaire collected data on the aspects of governance process (leadership, trust, initial agreement, planning and managing conflict), previous performance and existing relationship of the DRRM network-members.

Shortell et al., (2002) expounded the broad areas of motivations which were adopted in this study: a) altruism; and b) increasing the legitimacy of the organization. Moreover, leadership is one of the most critical aspects of intergovernmental and inter-jurisdictional cooperation (Kapucu, Arslan, & Demiroz, 2010). Thus, the capacity of the public managers to influence and motivate others were few of the measurements of leadership utilized in this study. Meanwhile, this research utilizes competence and dependability to measure trust. As equally important as trust, managing conflict is a crucial skill for network managers. Managing conflict mechanisms are measured using indicators related to personal style and official processes. On the other hand, cross-sector collaborations are most likely to succeed if deliberate and emergent planning is made (Bryson et al., 2006). For this research, strategies, plan implementation, needs assessment and evaluation are the indicators used to measure the planning aspect of the governance process. Further, previous performance is measured in terms of the targets and the performance indicators in the Regional DRRM Plan. For instance, the respondents were asked to rate the performance of their network in terms of search and rescue operations and the deployment of trained and equipped responders in affected areas. Lastly, the characteristics of the existing relationship between and among the member-agencies are measured

using the frequency of their communication and interaction and are analyzed using Social Network Analysis.

3.5.3 Statistical Analysis on Social Capital

This study adopts the Qualitative Tools designed by Dudwick et al. (2006) in measuring the six dimensions of social capital: a) groups and networks; b) trust and solidarity; c) collective action and cooperation; d) information and communication; e) social cohesion and inclusion; and f) empowerment and political action. For this research, our focus is only on the dimensions of trust and solidarity and the social cohesion and inclusion.

Trust and solidarity as a dimension of social capital pertains to "the extent to which people feel they can rely on relatives, neighbors, colleagues, key service providers, and even strangers, either to assist them or (at least) do them no harm" (Dudwick et al. 2006). Sometimes, trust reflects dependency and not just a mere choice hence, distinguishing trust from dependency is important for understanding the range of people's social relationships and the ability of these relationships to endure difficult or rapidly changing circumstances. Kuehnast and Dudwick (2004) offered two matrices in measuring social trust as they studied the social networks in the Kyrgyz Republic. The first matrix addresses the questions such as: "What do you give and to whom?" and "What do you receive and from whom?" The matrix is filled out by an interviewer using one of the following answers: "always," "most of the time," "sometimes," or "seldom or never". Moreover, the second matrix illustrates the kinds of people that are integral to one household the community, "To whom do you turn to for help or assistance?"

Moreover, social cohesion and inclusion focus on the tenacity of social bonds and their dual potential to include or exclude members of the community. Cohesion and inclusion can be

demonstrated through community events, such as weddings and funerals, or through activities that increase solidarity, strengthen social cohesion, improve communication, provide learning for coordinated activities, promote civic-mindedness and altruistic behavior, and develop a sense of collective consciousness. Meanwhile, institutional analysis can offer insight into which institutions support or undermine local cohesion from the perspective of different groups. Other studies have used such analysis to understand which institutions are the most important in helping or hindering the daily survival of poor people. This process should also be followed up with probing questions to confirm the overall rankings and understand the reasoning behind them.

Generally, this study looks into social capital in terms of the trust and solidarity as well as the social cohesion and inclusion in the community in understanding how social capital shaped the post-disaster conditions in the communities of Iligan and Cagayan de Oro after the 2011 Typhoon Washi.