International Journal of Scientific Research and Management (IJSRM)
||Volume||06||Issue||12||Pages||SH-2018-353-366||2018||
Website: www.ijsrm.in ISSN (e): 2321-3418
Index Copernicus value (2015): 57.47, (2016):93.67, DOI: 10.18535/ijsrm/v6i12.sh01

Disaster Management: Towards Building Community Resilience

Lilybeth Musong-Matunhay

Compostela Valley State College

Abstract:
Climate change is one of the major challenges faced by countries worldwide. In the Philippines, constant typhoons and flooding have exposed the vulnerability of disaster risk and reduction management of local communities, and such untold miseries increased the loss and damages of human lives and economic assets. While project management approach has been effectively applied to many fields and sectors, disaster management has yet to see its full benefits. Data from the Office of the Department of Interior and Local Government (DILG) revealed that in 2014, the Municipality of Compostela had been awarded the "Seal of Good Local Governance on Disaster Preparedness" (SGLG). Thus, this captures the interest of the researcher to determine indicators of the local government unit's disaster management that predict disaster resiliency to the major natural disasters occurring in the Municipality of Compostela for the last five years which include flooding and typhoon. This study employed a descriptive correlation design as the overall scheme in the conduct of the study. Specifically, Regression Analysis was utilized using disaster resiliency as the outcome variable and disaster management in terms of leadership structure, a guide to action management and partnerships and volunteerism as predictors. Results reveal that risk assessment and mapping, partnerships with volunteer groups, civil society organizations (CSO) and business/private sectors, institutionalized planning and budgeting and functional incident command system significantly influence LGU's resiliency towards flooding. On the other hand, partnerships with volunteer groups, CSO and business/private sectors, partnerships with other local governments and national government, institutionalized planning and budgeting and risk assessment and mapping significantly influence LGU's resiliency towards typhoon. It is recommended that there is a need to improve the local disaster risk reduction management plan with appropriate budgetary allocation and boost its Incident Command System (ICS) to efficiently respond to the community's immediate needs during a disaster.

Keywords: ***community resilience, disaster management, regression analysis, descriptive-correlational design, Philippines***

1. Introduction

Climate change is one of the major challenges faced by countries worldwide. Recent years have witnessed a noticeable increase in both the frequency and intensity of climate change phenomena **[1]**. While project management approach has been effectively applied to many fields and sectors, disaster management has yet to see its full benefits **[2]**. Disaster Risk Management (DRM) and Disaster Risk Reduction (DRR) emerged as systematic approaches to reduce the impact of climate change on the built environment **[3].**

The Asia Pacific region is the most disaster prone and most disaster-affected in the world **[4].** For the last several years, Disaster Risk Reduction (DRR) has gained its strong recognition due to the increased loss and damages of human lives and economic assets caused by the impact of natural hazards **[5].** In the Philippines, the Philippine National Risk Reduction and Management Plan 2011-2028 (NDRRMP) mentions the enactment of the Republic Act 10121 otherwise known as the Philippines Disaster Risk and Reduction Act of 2010. An act strengthening the Philippine disaster risk reduction and management system, providing for the national disaster risk reduction and management framework and institutionalizing the national disaster risk reduction and management plan, appropriating funds therefor and for other purposes **[6].** This Act recognizes local risk patterns across the country and directs the strengthening of local government capacities on disaster risk reduction and

management through decentralized powers, responsibilities and resources.

On December 4, 2012, Typhoon Bopha, locally named Typhoon Pablo hit 32 provinces in Southern Mindanao including Compostela Valley. The typhoon traversed affecting 249 barangays and 140,552 families in the province. The typhoon costs so much damage specifically when flashfloods ravaged hardly in the Municipalities of New Bataan, Compostela, and Monkayo. The total costs of damages for infrastructure, livelihood, social and settlements amounted to Php 27,459,000.00 (PDRRMC, COMVAL**) [7**]. The following year, the province again faced heavy flooding after torrential rain poured down in great quantities and soaked the townspeople brought about by Tropical Depression Lingling (TD Agaton). While the flood generally subsided, the threat of more heavy rains and renewed flooding is not over for the province and the Municipality of Compostela.

Compostela is one of the 16 municipalities sitting on the vast plains of Compostela Valley. According to the Philippine Statistics Office (PSA), the population of the municipality as of 2015 is 87,474 **[8].** In 2014, the Municipality of Compostela had been awarded with the "Seal of Good Local Governance on Disaster Preparedness" by the Department of Interior and Local Government (DILG) **[9].** The notable information captured the interest of the researcher to determine indicators of disaster management that predict disaster resiliency to the major natural disasters that occurred in the municipality for the last five (5) years, which are flooding and typhoon. Henceforth, the result of the study substantiates the DILG's information and identify issues and challenges faced during the institutionalization of the disaster management programs and provide lessons and recommendations, which could facilitate in the evidence-based planning and decision making in the locally-based disaster risk management processes of the local government unit (LGU).

2. Methodology

Descriptive correlation design was the overall scheme in the conduct of the study. Specifically, Regression Analysis was utilized using disaster resiliency as the outcome variable and disaster management in terms of leadership structure, a guide to action management, and partnerships and volunteerism as predictors. Hence, this method was utilized to come up with models as indicated in the LGU's areas of disaster management that predict disaster resiliency towards flooding and typhoon. With the aid of descriptive-correlation, the direct relation of the indicators of LGU's disaster management in terms of leadership structure, a guide to action management, and partnerships and volunteerism towards disaster resiliency in flooding and typhoon was defined. Moreover, resulting models were described based on the predictors' significant influence on the independent variable.

The survey questionnaire applied a five-point Likert Scale, where the degree to which respondents agree or disagree with the statements was measured. This five-point Likert Scale was applied to make it possible to ascribe quantitative value to qualitative variables.

The responses of the respondents in all statement indicators of the questionnaires used the following: scale (5, 4, 3, 2, 1), descriptive equivalent (very high, high, moderate, low and very low) which are further interpreted as reflected in Table 1.

Table 1: Table of Interpretation of Disaster Management and Resiliency

LEVEL	Interpretation	DESCRIPTIVE EQUIVALENT
5	Very High	Comprehensive achievement has been attained, with the commitment and capacities to sustain efforts at all levels.
4	High	Substantial achievement has been attained, but with some recognized deficiencies in commitment, financial resources or operational capacities.
3	Moderate	There is some institutional commitment and capacities to achieving DRR, but progress is not comprehensive or substantial.
2	Low	Achievements have been made but are incomplete, and while improvements are planned, the commitment and capacities are limited.
1	Very Low	Achievements are minor and there are few signs of planning or forward action to improve the situation.

Source: **[10]**

3. Results and Discussions

3.1 Level of Achievement of Leadership Structure

This section presents the level of achievement of leadership structure in terms of functional Local Disaster Risk and Reduction Management Council (LDRMMC), and Functional Incident Command System. The highest rated indicator is on the operational LDRRMC (M=4.13, SD 0.64653), composition of qualified and committed inter-agency taskforce and their civil defense/disaster risk reduction experience have relatively almost the same rate result (M=3.82, SD=0.8901; and M=3.78, SD=0.60777), and the lowest rank which has a moderate rate is the availability LDRRMC staff responsible for administration and training, research and planning and operations and planning (M=3.14, SD=0.76934). Generally, the results are described as

high which can be interpreted that substantial achievement when it comes to functional LDRRMC has been attained by LGU-Compostela but with some deficiencies in commitment, financial resources or operational capacities when disaster strikes.

It can be identified that items on operational LDRRMC, such as the composition of qualified and committed inter-agency taskforce and their civil defense/disaster risk reduction experience, respectively have high ratings. This suggests no further difference in the leadership structure when labeled as to the functionality of the LDRRMC, however, need to intensify its workforce regarding administration and training, research and planning and operations and planning. Such finding is a manifestation that the LGU has taken its proactive actions on the preparatory and necessary measures taken from the requirement of the law to carry out such basic emergency measures before and after the disaster in the context of LDRRMC operation. While it is true that the Local Disaster Risk Reduction Management Council (LDRRMC) is functional, but still the result implies that there is a need to improve and strengthen further its carrying capacity specifically on the areas of having trained LDRRMC staff and personnel that will develop capacities of communities and organizations to build a culture of disaster preparedness through planning, training, and research.

The Incident Command System (ICS) on the other hand is operational as it is highly rated (M=3.72, SD=0.77340). This projects that the LGU has attained substantial achievement when it comes to the major functions and functional units with incident management responsibilities when disaster strikes but with some recognized deficiencies in commitment, financial resources or operational capacities. On the other hand, when it comes to the availability of incident facilities and supplies in the vicinity of the incident area (M=3.38, SD=0.85474), incident communications are facilitated through emergency center (M=3.37, SD=0.85610) and clarity of reporting relationships provided by the Incident Command System (M=3.38, SD=0.85474) are moderately rated. The results emphasize that in these areas, the LGU displays some institutional commitment and capacities to achieving a functional ICS, but progress is not comprehensive or substantial. This further means that efforts and strategies to establish ICS during disaster/incident need to be defined in details. The result generally projects a moderate level of Functional ICS which can be interpreted that, coordinated incident action planning needs to be intensified to provide a concise, coherent means of capturing and communicating the overall incident priorities, objectives, strategies, and tactics in the context of both operational and support activities. Operational support activities need to be highlighted specifically in the areas of the availability of facilities and supplies in the vicinity of the incident area.

3.2 Level of Achievement of Guide to Action Management

The level of achievement of guide to action management in terms of Risk Assessment and Mapping and Institutionalized Planning and Budgeting are presented in this section.

Generally, the result indicates a high level of descriptive equivalent (M=3.60, SD=0.65711) which can be interpreted that substantial achievement has been attained in terms of identification of barangays, families, vulnerable and marginalized individuals at risks for disasters. This is further complemented through the availability of hazard and vulnerability maps. In the same manner, community assets that are susceptible to damaging effects of disasters are identified.

As noticed, availability of hazard and vulnerability maps has high descriptive equivalent (M=3.50, SD=0.73324) yet, almost in the moderate level which implies that these maps are recognized to be readily available, but further education and dissemination on its accurate interpretation need to be intensified. About the result, it is crucial to integrate local knowledge, geographic information system (GIS) and maps into the process of disaster management.

In terms of Institutionalized Planning and Budgeting, the result shows a moderate descriptive equivalent (M=3.35, SD=0.68301). While it has been recognized that Local Disaster Risk Reduction Management Plan (LDRRMP) is institutionalized, a contingency plan for a disaster of all types and climate change adaptation programs and activities that are community-based are not yet comprehensive. This could be attributed to the LGU's funding requirements. DRRM and climate change adaptation programs and activities are reflected in the LGU's annual budget, yet has the lowest descriptive equivalent (M=3.26, SD=0.89453). It can then be implicated that issues of the quantity and quality of services expected to be

provided should be discussed before the disaster, and should be considered in the budgeting processes.

Relative to such interpretation is the anecdotal accounts of the respondents that conducting customized training programs should be developed to ensure that people are trained based on the needed skills in the different DRRM aspects. Different people have different needs and capacities and developing community and competency-based capability building programs ensures that knowledge, skills, and attitudes are enhanced and built upon further.

Also, the provision of adequate funds for the requirements of relief materials when disaster strikes can already be estimated by past experiences of the LGU. Such that, identification of budgetary requirements for a disaster of all types that may beset the municipality can already be taken into account every fiscal year so that incidents of insufficiency of funds will not hamper disaster-related operations of the municipality. In this manner, the LGU might be properly and appropriately guided.

3.3 ***Level of Achievement of Partnerships and Volunteerism***

The level of achievement of LGU-Compostela in terms of partnerships with other local government units and the national government generally obtained a moderate descriptive result (M=3.42, SD=0.65788). This implies that the LGU has some institutional commitment and capacities regarding partnerships with other local government units and the national government towards disaster risk reduction and emergency response purposes but not comprehensive. What needs to be substantiated by the LGU is to foster close coordination at all times with other local government units and the national government about disaster risk reduction management related programs and activities. In this manner, LGU as an intermediary of the national government and as the first disaster responder, must strongly build up a partnership with them and likewise with other local government units especially in times of emergency responses. In terms of Partnerships with Volunteer Groups, CSO, Private/Business Sectors, it generally suggests a moderate descriptive result (M=3.17, SD=0.76772) which implicates that there are some institutional commitment and capacities of the LGU to establish partnerships with volunteer groups, CSO and private/business sectors, however, progress is not comprehensive. This further means that inclusive partnerships need to be stretched by LGU-Compostela to scale up strong ties with these sectors especially in the implementation of environmental and ecosystem management, carrying out training drills and rehearsals and in the restoration, protection and sustainable management of ecosystem services. Noteworthy to mention, for the LGU to escalate its level of disaster management in the area of partnerships and volunteerism, is through giving importance to partnerships and linkages and volunteerisms to other agencies.

3.*4* ***Level of Disaster Resiliency towards Flooding and Typhoon***

Both flooding and typhoon have the same moderate descriptive results (M=3.26, SD=0.60079) and (M=3.10, SD=0.57967) respectively (Table 2). This implies that the LGU has some institutional commitment and capacities to achieving disaster risk reduction towards flooding and typhoon, but progress is not comprehensive or substantial. As such, the result manifests that the LGU has already tried its participation specifically the local disaster risk reduction and management council (LDRRMC) who have a direct coordination with the barangays or the grassroots level together with the people themselves and the rest of the key players at the local levels however more efforts are still needed in creating a disaster resilient LGU and enabling them to the path of sustainable development **[11].**

In this context, such moderate level of resiliency challenged the disaster management efforts of LGU-Compostela that shall be constantly reviewed as deemed necessary to ensure its relevance to the times and based on the felt needs of the people. That the disaster risk reduction and management related activities shall always be integrated into the development plan that shall be based on a sound and scientific analysis of the different underlying factors which contribute to the vulnerability of the people of Compostela and eventually, their risks and exposure to hazards and disasters. In this manner, the policies, budget, and institutional mechanisms established in the areas of leadership structure, a guide to action management, and partnerships and volunteerism be further enhanced through capacity building activities, and development of coordination mechanisms to attain its maximum level of resiliency.

In this context, the stakeholder attributes of power, legitimacy, and urgency could be important in

reducing the devastating consequences of disasters [12]. Further, when a large share of the population is in practice less able to implement or afford a specific risk reduction measure, the implementation of the measure may prove to be ineffective [13]. Effectiveness is better in an area where people have more knowledge for self-protection [14].

Table 2: Level of Resiliency of LGU-Compostela towards Disaster

Indicators	N	Mean	Std. Deviation	Descriptive Equivalent
FLOODING	425	3.26	0.60079	Moderate
TYPHOON	425	3.10	0.57967	Moderate

3.5 Extent of Influence of Disaster Management to Flood Disaster Resiliency

3.5.1 ***Leadership Structure***. The result reveals that the two (2) predictor variables of leadership structure such as functional Local Disaster Risk Reduction Management Council (LDRMMC), and functional Incident Command System (ICS) significantly influence LGU's resiliency towards flooding.

Approximately, 39.9 percent of the variation in the LGU's disaster resiliency towards flooding can be explained by the indicators functional LDRRMC, and functional Incident Command System. The remaining 60.1 percent of the variation may be attributed by factors not covered in the study.

The beta coefficients of 0.265 for Functional LDRRMC and 0.074 for Functional Incident Command System suggest that these variables have a significant positive relationship with the LGU's level of disaster resiliency towards flooding. This means that for every point increase in the LGU's disaster management on Functional LDRRMC and Functional ICS, LGU's level of flood disaster resiliency will increase by 0.265, and 0.074.

From the analysis, the model for the extent of leadership structure to LGU's flood disaster resiliency would be:

$$Y^1 = 1.202 + 0.265X_1 + 0.074X_2$$

where:

Y^1 = LGU's flood disaster resiliency

X_1 = Functional LDRRMC

X_2 = Functional Incident Command System

Furthermore, the regression model is significant as indicated by the F-value of 93.207, with the corresponding probability value of 0.000.

The first predictor labeled in the model is the establishment of a functional local disaster risk reduction management council (LS_1). The model vividly reflects that the LGU fulfills the basic requirement of RA 10121. That the LDRRMC shall be composed of qualified and committed inter-agency taskforce and has civil defense or disaster risk management experience. The law (RA 10121) further stipulates that LDRRMC shall design, program and coordinate disaster risk reduction and management activities consistent with the national council's standards and guidelines.

Functional Incident Command System (LS_2) is depicted in the model as the second predictor. By the first predictor, functional LDRRMC, standardized organizational structure, functions, processes, and terminologies shall likewise be known in the incident command system. Standardized processes allow all who respond to the same incident to formulate a unified plan to manage the incident.

While the full expansion of the ICS structure may appear complex, this would occur only during complex incidents and would serve to maintain the optimum span of control by injecting appropriate supervisory levels because all events involve similar management tasks. Likewise, the local government unit must consider the areas of availability of major resources like personnel, facilities, and supplies as equally essential. Trained personnel who has the technical capability to understand DRRM concepts should always be visible and accessible along with the needed facilities and supplies for the disaster risk reduction and post-disaster activities.

Meanwhile, the model implies that the local government should take its proactive actions to be able to carry out its functions during the critical period. Such actions should be done beforehand when there is no threat yet of disaster. These actions are taken from the requirement of the law – Republic Act 10121.

Table 3: Extent of Leadership Structure to Flood Disaster Resiliency

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.202	.137		8.760	.000
	Functional LDRRMC	.265	.056	.286	4.737	.000
	Functional ICS	.074	.037	.095	2.018	.044

Dependent Variable: DR on Flooding F-value : 93.207
R^2 : 0.399 P-value : 0.000

3.5.2 ***Guide to Action Management***. The result reveals one (1) predictor variable, specifically on the institutionalized planning and budgeting of guide to action management that significantly influences LGU's resiliency towards flooding.

Approximately, 38.8 percent of the variation in the LGU's disaster resiliency towards flooding can be explained by its institutionalized planning and budgeting. The remaining 61.2 percent of the variation may be attributed by factors not covered in the study.

The beta coefficients of 0.349 for institutionalized planning and budgeting suggests that this variable has a significant positive relationship with the LGU's level of disaster resiliency towards flooding. This means that for every point increase in the LGU's guide to action management in the area of institutionalizing planning and budgeting, LGU's level of flood disaster resiliency will increase by 0.349.

From the analysis, the model for the extent of guide to action management to LGU's flood disaster resiliency would be:

$$Y^1 = 1.726 + 0.349X_1$$

where:

Y^1 = LGU's flood disaster resiliency

X_1 = Institutionalized Planning & Budgeting

Furthermore, the regression model is significant as indicated by the F-value of 107.86, with the corresponding probability value of 0.000. The model has identified the Institutionalized Planning and Budgeting (GA_2) as a predictor variable for Guide to Action Management. It implies that the LGU has institutionalized planning and budgeting for disaster which is likewise indispensable in disaster management apart from being taken as a requirement of the law. While understanding the dynamic interaction of hazard exposure and vulnerability is critical in the local government, disaster plan with corresponding budgetary requirements on how to carry out the plan is relative to disaster preparedness that would eventually lead to disaster resiliency as depicted in the model.

The model, on the other hand, emphasizes that there should be a clear and comprehensive policy that defines the objectives and commitment of the local government to disaster reduction and response efforts. This may assume the form of legislation, policy guidelines, and promulgated plans. Such policy developed through a strategic and consultative planning process could effectively address the identified gaps in the disaster management cycle along with the appropriate funds to carry out such intervention.

In this manner, relying on historical data to project the occurrence and characteristics of future hazards has its limitations since changes in the environment, and climate modifies certain hazards. For local government risk analysis, it is important to realize these limitations and to expect a certain degree of variability in hazard occurrence and behavior **[15], [16].**

In addition, hazard maps in this manner are not only a source of information for risk analysis but also a possible product. Overlaying the information on intensity, location and (potential) size of hazards on topographical base-maps with general reference information on the area allows identifying those settlements, infrastructure, and services that are in harm's way or "exposed."

In further understanding of the concept, it has been claimed that among the advantages of using the standard risk management process to disaster management are: (a) it is a formalized and systematic decision-making process; and (b) its adoption provides a common language, system, and process to all organizations and sectors involved, thereby facilitating coordination and collaboration among them and integration of actions **[17].**

Likewise, the trick to successful grant-writing for mitigation and hazard involves to essential ingredients: involving a wide range of community stakeholders into the planning process and carrying out a comprehensive risk and vulnerability assessment. While there are many issues (including conflict of interest issues) surrounding the

involvement of stakeholders in mitigation planning, a basic understanding is most important **[18].**

In general, this process aids decision makers in determining possible outcomes of risks and undertake appropriate measures to control or mitigate their impact based on reliable information and available resources. In this regard, disaster risk management promotes good disaster management practice, and therefore, should be incorporated in disaster reduction plans and programs, and implemented in all sectors with its corresponding budgetary appropriations.

Table 4: Extent of Guide to Action Management to Flood Disaster Resiliency

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.726	.133		12.958	.000
	Risk Assessment & Mapping	.103	.058	.112	1.759	.079
	Institutionalized Planning & Budgeting	.349	.046	.489	7.654	.000

Dependent Variable: DR on Flooding F-value : 107.86
R^2 : 0.338 P-value : 0.000

3.5.3 Partnerships and Volunteerism. The result reveals that the two (2) predictor variables of partnerships and volunteerism such as partnerships with other government units and national government and partnerships with volunteer groups, civil society organizations business and private sectors significantly influence LGU's resiliency towards flooding.

Approximately, 43.3 percent of the variation in the LGU's disaster resiliency towards flooding can be explained by the indicators of partnerships and volunteerism such as partnerships with other government units and national government and partnerships with volunteer groups, civil society organizations business and private sectors. The remaining 56.7 percent of the variation may be attributed by factors not covered in the study.

The beta coefficients of 0.327 for partnerships with other government units and national government and 0.290 for partnerships with volunteer groups, civil society organizations business and private sectors suggest that these variables have a significant positive relationship with the LGU's level of disaster resiliency towards flooding. This means that for every point increase in the LGU's disaster management on partnerships with other government units and national government and partnerships with volunteer groups, civil society organizations business and private sectors, LGU's level of flood disaster resiliency will increase by 0.327, and 0.290.

From the analysis, the model for the extent of partnerships and volunteerism to LGU's flood disaster resiliency would be:

$$Y^1 = 1.155 + 0.327X_1 + 0.290X_2$$

where:

Y^1 = LGU's flood disaster resiliency

X_1 = Partnerships with other government units and national government

X_2 = Partnerships with volunteer groups, civil society organizations business and private sectors

Furthermore, the regression model is significant as indicated by the F-value of 160.88, with the corresponding probability value of 0.000.

The predictors are manifestations of the continuing drive of the local government to intensify its disaster risk and reduction initiatives by staging and convincing organizations that have likewise the interest of helping especially those who are already educating the people about hazards. The LGU has already engaged in training drills and simulation exercises to schools, business establishments and in the barangays through the initiative of the Municipal Disaster Risk Reduction Office. As revealed, they are conducting drills and simulation exercises towards flooding, typhoon, earthquake, and fire.

In the area of volunteerism, the local government has been unfailing on its mandate towards environmental protection such as collaborating with the Department of Environment and Natural Resources (DENR), Civil Society Organizations and Non-governmental organizations in greening the environment such as planting trees along the watershed areas in the municipality. While efforts and initiatives are evident yet need to be improved based on its moderate descriptive level, however, the result goes to show that the local government regarded this area as fundamental in its local governance priorities.

Meanwhile, partnerships of the local government unit with other government units and national government (PV_1) which is primarily for DRRM and emergency purposes is identified as a predictor for partnerships and volunteerism in LGU's flooding disaster resiliency. Likewise, partnerships with volunteer groups, CSO, Business/Private Sectors

(PV_2) is indicated as another predictor. These predictors seem to be parallel to the generally accepted principle that there is a need to engage in partnerships and volunteerism of any organization in times of disaster.

This principle likewise strengthened the claim **[19]** that partners such as but not limited to government and non-governmental groups play some role in the end-to-end warning system chain. Effective community outreach starts with partnerships. Beginning with agencies and organizations that have an established and trusted relationship with the public can simplify the process of moving through the communications continuum and persuading the public to respond to warnings.

Further, community organizations may be better able to deliver warning messages and outreach materials directly to residents, visitors, and businesses in the community. These partners can also help create messages in formats and languages people will understand. With increased capacity, local government units can find support from their community for disaster risk reduction programs. Capacity building can only succeed if information on hazards and risks, legal implementation of the law and DRRM, in general, is easily accessible.

Table 5. Extent of Partnerships and Volunteerism to Flood Disaster Resiliency

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.155	.123		9.384	.000
	Partnerships w/ Other Govt. Units	.327	.052	.352	6.301	.000
	Partnerships with Volunteer groups, CSO and business/private sector	.290	.046	.350	6.274	.000

Dependent Variable: DR on Flooding F-value : 160.88
R^2 : 0.433 P-value : 0.000

3.6 *Regression Analysis when Disaster Management Indicators towards LGU's Disaster Resiliency in Flooding are taken Collectively*

The result reveals the four (4) predictor variables of disaster management such as Risk Assessment and Mapping (GA_1), Partnerships with volunteer groups, civil society organizations (CSO) and business/private sectors (PV_2), Institutionalized Planning and Budgeting (GA_2), and Functional ICS (LS_2), significantly influence LGU's resiliency towards flooding. Just about 60.7 percent of the variation in the LGU's disaster resiliency towards flooding can be explained by these indicators. The remaining 39.3 percent of the variation may be attributed by factors not covered in the study. These four (4) indicators have positive resulting beta coefficients which indicate a significant positive relationship with the LGU's level of disaster resiliency towards flooding. This means that for every point increase in the LGU's disaster management on risk assessment and mapping, partnerships with volunteer groups, civil society organizations (CSO) and business/private sectors, institutionalized planning and budgeting, and functional incident command system, LGU's level of flood disaster resiliency will increase by 0.489, 0.354, 0.249, and 0.196.

From the analysis, the model for the extent of LGU's disaster resiliency towards flooding would be:

$$Y^1 = 0.843 + 0.489\ X_1 + 0.354\ X_2 + 0.249\ X_4 + 0.196$$

Where:

Y^1 = LGU's Disaster Resiliency towards Flooding

X_1 = Risk Assessment and Mapping

X_2 = Partnerships with volunteer groups, civil society organizations (CSO) and business/private sectors,

X_3 = Institutionalized Planning and Budgeting

X_4 = Functional Incident Command System

Also, the regression model is significant as indicated by the F-value of 63.82 with the corresponding probability value of 0.000.

Table 6: Regression Analysis when Disaster Management Indicators towards LGU's Disaster Resiliency in Flooding are taken Collectively

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.843	.134		6.281	.000
	Functional LDRRMC	.104	.057	.0211	1.834	.067
	Functional ICS	.196	.038	.252	5.101	.000
	Risk Assessment & Mapping	.489	.071	.535	6.861	.000
	Institutionalized Planning & Budgeting	.249	.045	.348	5.488	.000
	Partnerships with other govt. units	.019	.055	.021	3.350	.727
	Partnerships w/ Volunteer groups, CSO, bus/private sector	.354	.049	.428	7.213	.000

Dependent Variable: DR on Flooding F-value : 63.82
R^2 : 0.607 P-value : 0.000

3.7 Extent of Influence of Disaster Management to Typhoon Disaster Resiliency

3.7.1 Leadership Structure. The result reveals that one (1) predictor variable of leadership structure specifically the functional Local Disaster Risk Reduction Management Council (LDRMMC) significantly influences LGU's resiliency towards typhoon. Approximately, 21.6 percent of the variation in the LGU's disaster resiliency towards typhoon can be explained by the Functional LDRRMC. The remaining 78.4 percent of the variation may be attributed by factors not covered in the study.

The remaining beta coefficients of 0.438 for Functional LDRRMC suggests that this variable has a significant positive relationship with the LGU's level of disaster resiliency towards typhoon. This means that for every point increase in the LGU's disaster management on Functional LDRRMC, LGU's level of disaster resiliency towards typhoon will increase by 0.438.

Functional LDRRMC model indicates the LGU-Compostela has to regularly monitor its institutionalized Local Disaster Risk Reduction Management Council (LDRRMC) where trained, experienced, qualified and committed inter-agency taskforce are in place. Similarly, COA Assessment added that the LDRRMC is primarily tasked to take the lead in preparing for response and recovery from any disaster and its effects based on the following criteria: Barangay Disaster Council, if a barangay is affected; City/Municipal DRRMC, if two or more barangays are affected; Provincial DRRMC, if two or more municipalities are affected; Regional DRRMC, if two or more provinces are affected; and NDRRMC, if two or more regions are affected. The NDRRMC and intermediary LDRRMCs support the LGUs who are in the frontline and have the primary responsibility of responding to disaster **[19].**

From the analysis, the model for the extent of leadership structure to LGU's disaster resiliency towards typhoon would be:

$$Y^1 = 1.556 + 0.438X_1$$

where:

Y^1 = LGU's disaster resiliency towards typhoon

X_1 = Functional LDRRMC

Furthermore, the regression model is significant as indicated by the F-value of 38.634, with the corresponding probability value of 0.000.

On the other hand, predictor variables, functional Incident Command System (ICS) when disaster strikes is insignificant due to its very low beta result (B=.010). This low beta result implies no significant relationship to disaster resiliency of the LGU in terms of the typhoon.

However, it is worth to note that functional ICS has a moderate level of achievement level as reflected, yet found out to be insignificant in the areas of disaster resiliency. This could be attributed to the frequency of typhoon that ravaged the municipality. Data revealed that for the last five (5) years, the municipality had been hit by typhoon only once (Typhoon Bopha in 2012) whereas flooding is labeled to be a serious concern in the municipality during rainy seasons.

The municipality is a flood-prone area per data from the Provincial Disaster Risk Reduction Management Council which alerted the LDRRMC to strengthen its functional structure apart from complying the basic mandate of RA 10121.

Table 7: Extent of Leadership Structure to Typhoon Disaster Resiliency

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.556	.151		10.285	.000
	Functional LDRRMC	.438	.062	.490	7.103	.000
	Functional ICS	.010	.040	.014	.261	.794

Dependent Variable: DR on Typhoon
R^2 : 0.216
F-value : 38.634
P-value : 0.000

3.7.2 Guide to Action Management. The result reveals one (1) predictor variable, specifically on the institutionalized planning and budgeting of guide to action management that significantly influences LGU's resiliency towards typhoon. Approximately, 28.6 percent of the variation in the LGU's disaster resiliency towards typhoon can be explained by its institutionalized planning and budgeting. The remaining 71.4 percent of the variation may be attributed by factors not covered in the study.

The remaining beta coefficients of 0.324 for institutionalized planning and budgeting suggests that this variable has a significant positive relationship with the LGU's level of disaster resiliency towards typhoon. This means that for every point increase in the LGU's guide to action

management in the area of institutionalizing planning and budgeting, LGU's level of disaster resiliency towards typhoon will increase by 0.324. Which further means that the more the LGU intensifies and institutionalizes its disaster plan embedded with budgetary component, the higher it will influence the disaster resiliency of the LGU towards typhoon.

From the analysis, the model for the extent of guide to action management to LGU's disaster resiliency towards typhoon would be:

$$Y^1 = 1.774 + 0.324X_1$$

where:

Y^1 = LGU's disaster resiliency towards typhoon

X_1 = Institutionalized Planning & Budgeting

Furthermore, the regression model is significant as indicated by the F-value of 84.47, with the corresponding probability value of 0.000.

Such result conforms to the fundamental requirement of the seal of disaster preparedness on operational readiness for a well-communicated contingency plan among local governments where the first phase of disaster management includes activities and measures taken in advance to ensure effective response to the impact of hazards. It also further added that it must be supported by formal institutional, legal and budgetary capacities **[20].**

In addition, RA 10121 specifies that all Local Disaster Risk Reduction Management Offices (LDRRMOs) shall develop a Local Disaster Risk Reduction Management Plan that shall be consistent and aligned with the targets set by the National Disaster Risk Reduction Management Plan (NDRRMP) which provides for a more liberal budgetary allocation for disaster risk reduction management through the Local Disaster Risk Reduction and Management Fund (LDRRMF).

Table 8: Extent of Guide to Action Management to Typhoon Disaster Resiliency

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.774	.133		13.292	.000
	Risk Assessment & Mapping	.069	.059	.079	1.185	.237
	Institutionalized Planning & Budgeting	.324	.046	.471	7.089	.000

Dependent Variable: DR on Typhoon F-value : 84.467
R^2 : 0.286 P-value : 0.000

3.7.3 ***Partnerships and Volunteerism.*** The result reveals that the two (2) predictor variables of partnerships and volunteerism specifically on partnerships with other local government units and national government and partnerships with volunteer groups, civil society organizations business and private sectors significantly influence LGU's resiliency towards typhoon. Approximately, 39.4 percent of the variation in the LGU's disaster resiliency towards typhoon can be explained by the indicators of partnerships and volunteerism such as partnerships with other local government units and national government and partnerships with volunteer groups, civil society organizations business and private sectors. The remaining 60.6 percent of the variation may be attributed by factors not covered in the study.

The beta coefficients of 0.332 for partnerships with other local government units and national government and 0.239 for partnerships with volunteer groups, civil society organizations business and private sectors suggest that these variables have a significant positive relationship with the LGU's level of disaster resiliency towards typhoon. This means that for every point increase in the LGU's disaster management on partnerships with other government units and national government and partnerships with volunteer groups, civil society organizations business and private sectors, LGU's level of disaster resiliency towards typhoon will increase by 0.332, and 0.239, respectively.

From the analysis, the model for the extent of partnerships and volunteerism to LGU's typhoon disaster resiliency would be:

$$Y^1 = 1.149 + 0.332\ X_1 + 0.239\ X_2$$

where:

Y^1 = LGU's disaster resiliency towards typhoon

X_1 = Partnerships with other government units and national government

X_2 = Partnerships with volunteer groups, civil society organizations business and private sectors

Furthermore, the regression model is significant as indicated by the F-value of 137.061, with the corresponding probability value of 0.000.

Table 9: Extent of Partnerships and Volunteerism to Disaster Resiliency Towards Typhoon

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.149	.123		9.359	.000
	Partnerships w/ other local govt. units	.332	.052	.370	6.410	.000
	Partnerships w/ volunteer groups, CSO, bus/private sector	.239	.046	.299	5.188	.000

Dependent Variable: DR on Typhoon F-value : 137.061
R^2 : 0.394 P-value : 0.000

3.8 *Regression Analysis when Disaster Management Indicators towards LGU's Disaster Resiliency in Typhoon are taken Collectively*

The result reveals the four (4) predictor variables of disaster management such as Partnerships with volunteer groups, CSO and business/private sectors (PV_2), Partnerships with other government units and national government (PV_1), Institutionalized Planning and Budgeting (GA_2, and Risk Assessment and Mapping (GA_1significantly influence LGU's resiliency towards typhoon.

Further, these indicators indicate a significant positive relationship with the LGU's level of disaster resiliency towards typhoon. This means that for every point increase in the LGU's disaster management on partnerships with volunteer groups, CSO and business/private sectors, partnerships with other government units and national government, institutionalized planning and budgeting, LGU's level of disaster resiliency towards typhoon will increase by 0.208, 0.189, 0.188, 0.168, 0.305 and 0.205 respectively.

From the analysis, the model for the extent of LGU's disaster resiliency towards typhoon would be:

$$Y^1 = 0.898 + 0.208\ X_1 + 0.189\ X_2 + 0.188\ X_3 + 0.305\ X_4$$

Where:

Y^1 = LGU's Disaster Resiliency towards Typhoon

X_1 = Partnerships with volunteer groups, CSO and business/private sectors

X_2 = Partnerships with other local governments and national government

X_3 = Institutionalized Planning and Budgeting

X_4 = Risk Assessment and Mapping

In addition, the regression model is significant as indicated by the F-value of 44.252 with the corresponding probability value of 0.000. As noticed, the resulting trend of the predictor variables is almost the same with the results in disaster resiliency towards flooding. Though almost the same predictor variables have come out to influence both disaster resiliency towards flooding and typhoon, they still quite different in the variation and beta results.

The first model predictor is the partnerships with volunteer groups, CSO and business/private sectors. This has to be strengthened by the LGU because effective community outreach starts with the development of partnerships. Collaborating with these sectors will help the LGU in a range of ways. Some of these partners will act as important bridges to the people specifically in the implementation of environmental and ecosystem management plans for sustainable management of ecosystem services which will seriously affect community resiliency towards disaster. This has been further emphasized that the more partners understand and appreciate the work that you do, the more likely they will be to the local government unit on its sustained efforts in public education for risk reduction **[21].**

The development of community partnerships and the creation of education and outreach materials emphasizes the importance of creating specialized education and outreach efforts that take local needs, characteristics, and issues into consideration **[22].** It is in this context that people want to believe that it is critical that the correct community partners are identified. They must represent a full demographic range of the community. One place to start thinking about how to target the right organizations is to consider the elements that make a community function on a day-to-day basis. If all of these day-to-day functions can continue after an event, the community will truly be disaster resilient **[23].**

In this relation, the second model predictor is partnerships with other government units and national government. It is evident in the model that the local government unit sees the significance of establishing partnerships as a good strategy in developing a consistent, harmonized and standardized information that will be scaled up to become common knowledge and gain insights and feedback in the process of developing disaster-

related intervention programs. This is also an avenue for the LGU to develop an auxiliary relationship with other government units and with the national government, to set the stage for close partnerships in public education for disaster reduction.

The third predictor to disaster resiliency towards typhoon is institutionalized planning and budgeting under the guide to action management. Since planning is a fundamental function of management, it is just vital for the LGU to institutionalize its contingency plan for disasters of all types. While part of the mandate among LGU's is to formulate and implement programs, policies, and procedures to achieve public safety especially preparedness for preventive or rescue operations during times of calamities and disasters, it should likewise allocate part of its funds for mitigation and preparedness to lessen the impact of disaster and risk of casualties. This clearly creates a situation where the impact of disaster drastically reduces revenues but at the same time expands expenditure due to response and recovery efforts. To a certain extent, effective response and recovery are dependent on the availability of financial reserves and contingency mechanisms in the LGUs. While it is also true that all local governments are not equally prone to disasters, some local governments are in areas that are highly prone to disasters, which have a serious impact on their finances. It is true that LGUs can access DRRM funds, but the delays involved in accessing the funds must be resolved as claimed by the Commission on Audit Assessment **[24].**

Risk assessment and mapping is known to be the fourth predictor of disaster management. In this manner LGU acknowledges the fact that when a disaster occurs, it is effective for municipalities to prepare beforehand, a manual explaining the criteria regarding disaster situations that require the issuance of evacuation orders or instructions. This will further increase their level of awareness to the threats and impacts of all hazards, risks, and vulnerabilities. Conforming to this model concept **[25]** postulates that linking community knowledge with techniques to record and analyze risk related data is one way of engaging and mobilizing community capacity. Community knowledge of the social and physical environment is essential for natural disaster management. People know a great deal about their surroundings and can indicate which areas are prone to typhoon damage and which families are poor and vulnerable to the disaster. It is this local knowledge that will allow planners to survey the needs and opportunities for mitigation rapidly.

The International Federation of Red Cross and Red Crescent Societies recognizes that response alone is not sufficient to meet the increasing demand caused by hazard impacts on larger populations. It bears the obligation to share knowledge that can help with identifying hazards and risks, taking action to build safety and resilience, and reducing future hazard impacts **[26].**

As a whole, the model's concept conveys that disaster resiliency of LGU-Compostela towards typhoon is best influenced through these predictors of disaster management when taken collectively: partnerships with volunteer groups, CSO and business/private sectors, partnerships with other government units and national government, institutionalized planning and budgeting indicate a significant relationship with the LGU's level of disaster resiliency towards typhoon.

4. Conclusions

Based on the implications of the data gathered, the following conclusions are formulated: Leadership Structure-related factors are rated by the respondents generally at a high level. However, its Functional Incident Command System was moderately rated. This further implies that there is more to improve in institutionalizing the Incident Command System (ICS) of LGU-Compostela to be more efficiently responsive to the community's immediate needs during a disaster. There is a high level of Guide to Action Management in terms of Risk Assessment and Mapping of LGU-Compostela which reveals that the local government indulged in the fundamental requirements for identifying risk and vulnerable areas and sectors in the municipality as manifested in the hazard maps designed by the local government. On the other hand, the indicator of institutionalized planning and budgeting is moderately rated which implicates that the local government need to improve its local disaster risk reduction management plan that shall be more responsive to the felt needs of the people and likewise institutionalized appropriate budgetary requirements that shall be in accordance with the plan;

Partnerships of LGU-Compostela with other government units and national government partnerships with volunteer groups, CSO and business/private sectors have the same moderate

level. Hence, the local government needs to build up more its linkages to external partners to get more a great deal of support towards disaster resiliency-related efforts of the LGU.

In terms of the level of achievement of disaster resiliency of LGU-Compostela towards flooding and typhoon are respectively rated as moderate. This implies that more programs and interventions have to be undertaken by the local government to scale up the community and its people's capacity to be more resilient in the face of disaster, either flood or typhoon.

5. Acknowledgments

The researcher is very much grateful to the study participants, reviewers, for sharing their time and experiences. To Hon. Lema P. Bolo & SB Officials of the Municipality of Compostela and PD. Noel C. Duarte of DILG-COMVAL and to Dr. Christie Jean V. Ganiera, College President of Compostela Valley State College for the support.

6. References

[1] M. K. T. K. Yiwen Lin a, "The role of community leadership in disaster recovery projects:," *International Journal of Project Management*, no. 35, pp. 913-924, 2016

[2] C. E. M. Nuha Etinaya, "Building Urban Resilience for Disaster Risk Management and Disaster Risk Reduction," *Procedia Engineering*, vol. 212, pp. 575-582, 2018

[3] UNISDR, U.,, "Making Disaster Risk Reduction Gender-Sensitive: Policy and Practical Guidelines," Switzerland: United Nation, 2012.

[4] K. Smith, Environmental Hazards: Assessing Risk and Reducing Disaster, Routledge, 2003

[5] K. G. D. G. Vinh H. Nguyen, "Challenges in integrating disaster risk reduction into the built environment – The Vietnam context," *Procedia Engineering*, vol. 212, pp. 316-323, 2018

[6] Republic of the Philippines, *R.A. 10121*, 2010

[7] L.M.Matunhay, "Disaster Preparedness, and Resiliency of the Local Government Unit of Compostela", *International Journal of Sciences: Basic and Applied Research (* ISJBAR), Vol. 42, no.3, pp. 56-67, 2018.

[8] Philippine Statistics Office, "Total Population by Province, City, Municipality and Barangay," Region XI, Retrieved 21 October 2018.

[9] Bureau of Local Government Supervision, "Disaster Preparedness Profile: Seal of Local Good Governance," Department of Interior and Local Government (DILG), Quezon City, Philippines, 2015.

[10] Making Cities Resilient: My City is Getting Ready," UNISDR, 2012

[11] B. L. Mohammad Mojtahedi, "The impact of stakeholder attributes on performance of disaster recovery projects: The case of transport infrastructure," *International Journal of Project Management*, vol. 35, no. 5, pp. 841-852, 2017

[12] B. J. T. H. W. B. E.E. Koks *, "Combining Hazard, Exposure and Social Vulnerability to provide lesson for flood risk management," *Environmental Science and Policy*, vol. 47, pp. 42-52, 2015.

[13] H. K. M. M. &. B. M. Annegret H. Thieken, "Coping with Flood: Preparedness, Response, and recovery of flood-affected residents in Germany in 2002," *Hydrological Sciences Journal*, vol. 52, no. 5, pp. 1016-1037, 2010.

[14] M. G. A. a. E. Holcombe, "Community-Based Landslide Risk Reduction: Managing Disaster in Small Steps," 2018.

[15] "United Nations Children's Fund (Global Headquarters, New York) (UNICEF)."

[16] J. G. L. K. e. Ben Wisner, Handbook of Hazards and Risk Reduction, London: Routledge, 2012

[17] LMMatunhay, Disaster Preparedness, and Resiliency of LGU-Compostela, IJSBAR, 2018

[18] Towards Disaster Risk Reduction Approach, United Nations Office for the Coordination of Humanitarian Affairs Asian-Asian Disaster Response Unit, 2003

[19] Commission on Audit (COA), Disaster Management Practices in the Philippines An Assessment, 2010.

[20] B. R. Tannick Hemond, "Preparedness: The State of the Art and Future Prospects," *Disaster Prevention and Management: An International Journal*, vol. 21, no. 4, pp. 404-417, 2012.

[21] M. K. C. T. &. B. I. Van Aalst, "Community level adaptation to climate change: the potential role of participatory community risk assessment.," *Global environmental change*, vol. 18, no. 1, pp. 165-179, 2008.

[22] S. P. S. B. P. F. W. L. P. Fran H. Norris, "Community Resilience as a Metaphor, Theory, Set of Capacities, and Strategy for Disaster Readiness," *American Journal of Community Psychology*, vol. 41, no. 1-2, pp. 127-150, 2008.

[23] M. Ishiwatari, "Disaster risk management at the national level," in *Disaster Risk Management in Asia and the Pacific*, vol. 232, New York, Routledge, 2013, p. 232.

[24] Commission on Audit (Republic of the Philippines), "Disaster Management Practices in the Philippines: An Assessment," 2010.

[25] P. S. R. C. G. &. N. J. Tran, "GIS and local knowledge in disaster management: a case study of flood risk mapping in Viet Nam," *Disasters*, vol. 33, no. 1, pp. 152-169, 2009.

[26] Maskrey, "Revisiting community-based disaster risk management.," *Environmental Hazards*, vol. 10, no. 1, pp. 42-52, 2011.