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RELATING EMPATHY WITH DISASTER RISK IN DONOR-PROVIDED POST-TYPHOON *DURIAN* MASS HOUSING PROGRAMS

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ABSTRACT

This paper builds on a previous study made by the same author, both focusing on determining the sustainability of donor-provided mass housing in Albay province, Philippines - considered as one of the natural disaster hotspots in the country and Asia Pacific region covering the period 2007-2012. The seven housing design variants provided by different donors and their respective beneficiaries residing among three government and one non-government organization-provided resettlement sites, were evaluated in terms of their disaster absorptive capacity and feeling of vulnerability respectively. Results show most of the dwellings physically and its beneficiaries' psychologically are considered vulnerable to future natural disaster risks, which indicate disaster risk communication gaps in a sustainable post disaster housing delivery supply chain. Thus, mutual empathy should be inculcated among donors and housing recipients, in ensuring longevity of mass housing programs through their shared sense of accountability.

Keywords: Donors; mass housing; non-government organization (NGO); absorptive capacity; feeling of vulnerability; risk communication; supply chain; mutual empathy.

INTRODUCTION

The Philippines, was ranked 12th out of 200 countries worldwide in terms of mortality rate index, or the rate of exposure of a part of its population to natural disasters (United Nations International Strategy for Disaster Reduction, *2004*), and bore witness to numerous disasters like the typhoon *Ketsana*, causing between short-term to month-long inundation in the total land area of 14.9 square miles or 85% of the National Capital Region (NCR)'s land mass (Department of Public Works and Highways, 2009), and as assessed by National Disaster Coordinating Council (NDCC), *Ketsana* left approximately over 300 dead, had displaced more than 500,000 individuals and had damaged properties, livestock and agriculture costing between six to seven billion pesos (De Vera, Villas, & Antonio, 2009).

According to World Wide Fund's (2009) findings, it has placed the city of Manila, as the third most vulnerable coastal city after Dhaka, Bangladesh and Jakarta, Indonesia, in terms of overall vulnerability to natural disasters such as earthquakes, flooding and typhoons in relation to *adaptive capacity* (in terms of GDP per capita). More recent was the tropical storm *Washi* which wiped out entire villages in northern Mindanao in December 2011, despite being rarely visited by typhoons, due to a deadly mixture of flood warning absence, high tide, and darkness. (Philippine Daily Inquirer, December 19, 2011). This paled in comparison with the hurricane *Katrina* in the U.S. whose damages incurred was the costliest in the recorded history, amounting to USD 81 billion last 2005, and the super cyclone *Nargis* in Myanmar which claimed nearly 138,000 lives in 2008. However, 97% of the global disaster mortality risk is concentrated in low-and middle-income countries. (UN/ISDR, 2010), which includes the Philippines.

Philippine *Disaster Risk Reduction and Management: The disaster case in Albay*. In response to this predicament, the enactment of the National Disaster Risk Reduction and Management Act (NDRRMA) last 2010 (Republic Act No. 10121), paved way for a radical shift from *post-disaster relief measures* to *pre-disaster planning, disaster mitigation* and *prevention* in the Philippines, coherent with the *Hyogo Framework of Action* that was unanimously approved by the United Nations member-states in the highly-industrialized Japan last 2005, after the *Kobe* earthquake (United Nations, 2006) which agreed in principle that natural disasters and climate change undermine the sustainable achievement of the 2030 United Nations Sustainable Development Goals (SDG30) and as part of the implementation of R.A. 10121, was the conduct of risk mapping analysis of the entire archipelago, the results placed Bicol as one of the most vulnerable regions, directly facing the Pacific

Ocean, particularly the Province of Albay, was assessed as having the "highest" risk to climatic disasters by the Manila Observatory and the Department of Environment and Natural Resources (2010). The most notable of these disasters were the Typhoon *Xangsane* and *Durian* last quarter of 2006, with at least 1,000 lives lost, prompting the release of USD 16.3 million for post-disaster housing construction in resettlement sites by the Philippine National government under the *housing cluster* of the Department of Social Welfare and Development (DSWD) – CARE program, alongside with the influx of international non-governmental organizations' in-kind donations. Rapid institutional response in this region was cited by the United Nations as a model for disaster risk reduction. (Sabater, 2010; Salceda, 2010), where the National Housing Authority (NHA) reported that these donor-provided dwelling units did not even secure necessary building permits prior construction due to time constraints, resulting to different shelter design variants, leaving room for possible future disaster risks for these resettlement houses.

Disaster *Risk and Vulnerability in Natural Disasters.* Disaster risk indicates the possibility of occurrence of any detrimental effects caused by natural calamities in the future, be it of wide-scale or small extent. (Vrouwenvelder, Holicky, Tanner, Lovegrove & Canisius, 2001). The risk level is dynamic, and continually evolves depending upon a myriad of factors consisting of three determinants, namely - vulnerability, hazard and exposure. If the level of these so-called "risk factors" (UN/ISDR, 2004) or "risk determinants" are high (Cardona, 2012) such as significant poverty incidence, fast urban migration and uncontrollable population increase in macro-scale (*UN/OCHA, 2006*, p.8.) and in smaller extent, unsafe pre-disaster housing in disaster-prone areas, the residents' scant knowledge on the hazard risks which they might encounter, and limited options to protect themselves (Wisner, Blaikie, Cannon and Davis, 2004) - there is a high possibility that a natural calamity (i.e., earthquakes, typhoons and flooding) will cause disaster in terms of human mortality and livelihood and physical assets damage. Vulnerability in the field of risk management originally dealt with the structural aspects of a building (UNDHA, 1992), but has evolved to cover current environmental conditions, communities' characteristics and its circumstances, and their social and political processes. All of these intertwining factors, depending on its level of exposure to natural hazards (calamities), might lead to possible negative outcomes such as disaster occurrence (like structural damage) *(United Nations - International Bank for Reconstruction and Development, 2009).* The United Nations Office for Disaster Reduction (2004) further categorizes vulnerability into physical, environmental, social and economic aspects. Bohle (2001) pointed out that vulnerability, possesses an *internal side* or the *coping* mechanism which includes the capacity to anticipate, cope with, resist and recover from the impact of hazard, and an *externa*l side, which involves *exposure* to risks and shocks, which was clearly distinguished and indicated the double structure of vulnerability in the field of social sciences. (Van Dillen, 2004). Birkmann (2005) postulated the varying dimensions of vulnerability. Beyond the first two spheres respectively (coping (*internal)* and exposure (*external*)) which are distinct from each other (Bohle, 2001), there is the third sphere which shows the *dualistic structure* of vulnerability which is influenced by both first and second sphere. (Wisner, 2002). While beyond the third sphere, Turner et al (2003) showed that vulnerability is beyond a *dualistic* structure, which is a multidimensional concept, taking it into the context of sustainability and climate change, but which also includes adaptive capacity, exposure and interaction with stresses. Lastly, UN/ISDR (2004) noted that vulnerability encompasses beyond the fourth sphere by Turner et al (2003), which needs to take into careful consideration not only the traditional engineering and structural aspects, but also various themes such as physical and spatial, social, economic, environmental and institutional features.

The *role of shelter in disaster management.* Generally, *shelter* is defined in terms of its extrinsic qualities, for the purposes of protection of humans from natural elements, which is often confused with housing, but meant differently (Quarantelli, 1995). In this paper, both shall be used interchangeably. The 1970s mainly focused on engineering and product-dominated approaches, and it has evolved to process-based in the succeeding decades thereby additionally considering culture and society. (*United Nations Office for Coordination for Humanitarian Affairs*, 2006, p. 58.). However, Davis (1978) stressed out that a shelter must be viewed as a "process," not merely as an "object," or "*product*." (*United Nations Development Programme – Shelter Working Group-Bangladesh*, 2009, p.7). Since shelter is considered a "process," it is important to identify how a "shelter" is viewed. When linking the physical attributes of a shelter to its time element, *risks,* being *uncertain,* can still occur to the structural integrity of a shelter or dwelling unit, even *after* the housing reconstruction project has been completed. Thus, a recently-completed "permanent housing" after a disaster, in the post-disaster period, can actually be a "pre-disaster" scenario to another forthcoming natural disaster in the near future, which comes in a form of *cyclical risk*. (*UN/OCHA*, 2006, p. 7; Wamsler, 2006). While the housing donors (either NGOs or government agencies) allocate majority of their resources in building post-disaster shelters, these dwelling units also have technical limitations of durability and hazard resilience if not maintained in the near future. Holling (1973) classically defines resilience as the ability of any system to absorb change and disturbance and return to its pre-disturbance state. It is then imperative to view the shelter program holistically, consisting of both a *hardware* and a *software*. *Hardware* refers to the house structure with its surrounding environmental protection which affects its absorptive capacity (stability) (Béné, Wood, Newsham, & Davis, 2012), while the *software* refers to the demonstration of technical messages through hands-on training and information campaign among both donor technical staff and housing beneficiaries. (*UNDP – Shelter Working Group-Bangladesh*, 2009, p.16). Resiliency of building stock should be addressed in order to achieve sustainability (Bocchini *et al*, 2014).

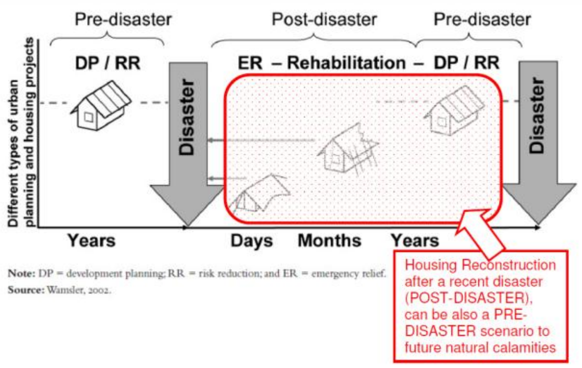

Fig. 1. Housing Reconstruction in the Context of Cyclical Risk (Adapted from Wamsler, 2006)

The successful performance of assisting natural disaster survivors-housing beneficiaries depends on the housing donors' accountability to the recipient of their aid (*United Nations Disaster Relief Coordinator*, 1982, *and revised* in Corsellis & Vitale, 2005). Moreover, donors, alongside with strategic planners and implementers, must be held responsible, in a consistent way along the *supply chain*, from donor to beneficiary, where *accountability* and *transparency* are both required. (*UN/OCHA*, 2006. p.48), even *trust* between the donor and recipient (Wachinger, Renn, Begg, & Kuhlicke, 2012; Paton, 2003). On the housing beneficiaries' end, sustainable post-disaster solutions were driven by them, with the role of the implementing agencies as "facilitators." Moreover, housing beneficiaries are bearing also increasing responsibility and involvement with project design process, but NGOs, as "facilitators," have limited understanding on how to increase housing beneficiary participation (*UN/OCHA*, p.19). in all aspects of post-disaster housing reconstruction projects. Moreover in a separate study, opinions or feedback of the house owners were not prioritized in the beginning of the design process or during the reconstruction time (*UNDP – Shelter Working Group-Bangladesh*, 2009, p.17). *Reconstruction* here means the action of constructing new buildings to replace buildings, which have suffered damage, or repair of damaged buildings (UN, 2006), which starts after the rehabilitation stage and aims to provide proper permanent housing for the victims in a short period of time. Involved stakeholders for post-disaster projects are the government, donors, lending agencies, beneficiaries, contractors, and social, environmental and religious groups.

Stakeholders *of Disaster Risk.* Going back to the project life cycle of housing projects, there is the presence of *technological hazards* (*UN/ISDR*, 2007) in any phase of the said cycle (from pre-design, design, construction up to the end) that can be either accidents, dangerous procedures, *infrastructure failures* or *specific human activities* may cause loss of life, injury, illness or other health impacts, property damage, loss of livelihoods and services, social and economic disruption or environmental damage. Human activities can also include the perception of the housing beneficiaries on their first-hand knowledge on nature of disasters and their viewpoint that they're residing in a safe and disaster-resilient dwelling (Sinha, 2007), where findings from a previous study indicated that the homeowners still lack understanding on how their dwellings behave in case of natural disasters, where there's no physical retrofitting were ever made for their dwellings despite the recurrence of natural calamities (Bencze & Tilotta, 2010), while another study indicates how ordinary people perceive a calamity, for example, an earthquake, as merely a catastrophic event that inevitably produce major damage, regardless of what people do (Turner, Nigg & Paz, 1986), where their mindset veer towards *fatalism*. It is also inevitable that the dwelling units that were turned-over to the housing beneficiaries will undergo physical changes, so as to meet the needs of residents, thus, in the context of risk management, awareness on proper way of building improvements is imperative as well. One example for this was the removal of "cross bracings', which merely compounds to risk, for no reason at all due to sheer ignorance (*UN/OCHA*, 2006, p.10).

In the context of housing delivery, these hazards include faulty engineering design for the dwelling units against natural disasters, absence or lack of briefing or training by the donors to the beneficiaries on the proper upkeep of their dwellings, absence or lack of any risk management practices and principles in the entire project life cycle (PLC). If these lapses are present in the PLC, it increases the vulnerability to disaster risk for both the dwelling and resident in the face of future natural calamities (Wamsler, 2006), despite the rare opportunity where a post-disaster environment can be the appropriate time to raise awareness on building safety issues. (*UN/OCHA*, 2006, p.8) where the donors seem to allocate insignificant attention to *vulnerability reduction*, being centered mainly on training during *construction phase*. This is attributed to the fact that there weren't any significant improvements in the policy, planning and assessment in post-disaster shelter and housing, with a still limited specialist operational capacity in the reconstruction after a disaster. (*UN/OCHA*, 2006, p.58). Moreover, there is a need to incorporate capability-building programs for disaster–preparedness for the donors' shelter assistance to project beneficiaries. (Matabang, G., Marcelo, R. & Baybay, B, 2009, p.5).

One solution is by *educating* the homeowners, thereby reducing *fatalism* (McClure, Walkey, & Allen, 1999), by clearly explaining in laymen's language how disaster risks can be minimized by understanding simply how a calamity behaves, and how it damages a building. Some examples include builders being trained in safe replication of new safe buildings (Aysan, Clayton, Cory, Davis and Sanderson, 1995), trained on construction monitoring by providing them construction checklists for quality assurance in the near future (*UNDP – Shelter Working Group-Bangladesh*, 2009, p.7), and communication with homeowners that is reinforced with classes and trainings, model buildings and posters (*UN/OCHA*, p.47). *Communication* is considered as one of the core principles for sustainable post-disaster family housing (*International Federation of Red Cross*, 2002), but communicating risks to the public is considered the most difficult (Vrouwenvelder *et al*, 2001) and often inadequate even in construction industry (Tah & Carr, 2001). Moreover, Johnson (2011) stressed out some effective building and planning regulations which facilitates disaster risk reduction are the recognition of *informal* building processes and encouragement of safe building practices through education and advocacy, where both professionals and end-users should mutually learn on both design and construction (Bosher, 2010; Petal, Green, Kelman, Shaw, & Dixit). These approaches were considered more effective than the usual negative and graphic news information through mass media on catastrophes by mass media, based from a study made (Lopes, 1992). It is also noteworthy that in order for the housing beneficiaries to be educated towards a safe building program, the detailed design for either core or transitional houses should be well thought of, and explained clearly to the implementing contractors (or donors) and field staff, where the latter should be well-trained and made aware of the strong and weak points of each design feature and quality of shelter materials. (*UNDP – Shelter Working Group-Bangladesh*, 2009, p.7). The knowledgeable donor staff will also make the housing beneficiaries aware of the limitations when their house is being described as being "hazard-resistant." NGOs' strategies for disaster risk management can be derived from exploring the beneficiary community's traditional coping strategies and indigenous know-how (Matin & Taher, 2001) but even with improving the beneficiaries' participation in post-disaster housing projects in enabling ease of technological transfer, these objectives still remain inadequately met (Lizarralde, Johnson & Davidson, 2010, p. 184).

Given extensive literature discussion above, this paper ultimately aims to shift the accountability of any donor-driven mass housing program in terms of who will deal with disaster risks, not putting the blame on either the donor or the housing recipient alone, but stress out the importance of sharing the risk among the stakeholders, where both parties are to be held accountable. If both parties are sensitive to and empathize with the needs and aspirations of each other (the donor aims to provide quality and flexible shelter responsive to the recipients' needs while the beneficiaries simply aim for a safe and sturdy house), then the result will be mutually beneficial as well, which will ensure that the finite resources extended to a housing project will not come to waste if a future natural calamity strikes, as conceptually shown in Fig.2 below. Each stakeholder (donor and housing recipients) has their own set of capacities, and when combined together, will offset the vulnerabilities of a housing project to future natural calamities thereby reducing disaster risk.

Thus, this paper focuses on two elements for disaster risk assessment: (a.) gauging the post-typhoon *Durian* (survivors, or) shelter recipients' level of psychological *vulnerability* to natural disasters based from their perception on disasters, first-hand knowledge on how these natural disasters act on a structure, and their technical know-how in the repair and upkeep of their shelters against any future natural disasters, and (b.) gauging the level of physical *vulnerability* to future natural disasters for each of the donor-provided (either coming from the NGO or from the government) post-disaster shelters. Moreover, this paper will determine if there is any possible relationship between the shelter recipients' level of vulnerability versus the level of physical vulnerability to natural disasters of the shelter units that were awarded to them.

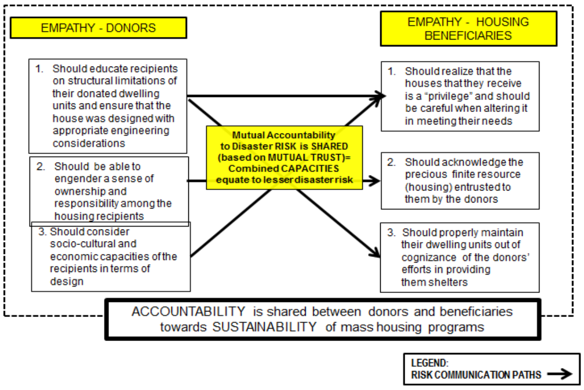

Fig. 2. Study Conceptual Framework *(Source: author)*

METHODOLOGY

Research Design. This study utilized a "mixed-methods" research design in understanding the resiliency of the respondents against natural disasters in connection with the houses they received from different housing donors. This research design was a combination of qualitative and quantitative research design wherein it helps give a holistic picture on the feelings of resiliency of the respondents associated with the houses they have received (Creswell, 2002). Each group of housing recipients was assessed for their levels of disaster resiliency as well as the structural description from each housing donor's shelter design variant. A comparative causal design would help in assessing the disaster risk of the housing recipients and comparing it with the other recipients of the other housing donors. Furthermore, possible relationship would be assessed between the psychological resiliencies of the respondents with the findings of the structural description from the donors' shelter design variants. Additional interviews were also conducted to further substantiate the findings gathered from the research instruments.

Participants. There were two (2) types of groups that were evaluated in this study: the first group consisting of shelter recipients of the various shelter design variants that were donated by the housing donors, and the second group consisting of nine (9) shelter design variants coming from the same donors.

Shelter Recipients

The shelter recipients, or housing beneficiaries, were grouped based on the shelter design variants where they were currently residing, which amounted to nine (9) shelter design variants, namely – Operation Compassion *Amore* – Concrete hollow block shelter variant, Operation Compassion *Amore* (OC Amore) – combined Ficem (fiber-cement) board and Concrete hollow block shelter variant, International Organization for Migration (IOM) shelter variant, Habitat for Humanity – load-bearing masonry shelter variant, Habitat for Humanity-Steel Frame shelter variant, *Gawad Kalinga* (GK) shelter variant, Daughters of Charity (DC) shelter variant, Community Organization of the Philippines Enterprise (COPE) shelter variant, and Department of Social Welfare and Development (DSWD) shelter variant. There were five (5) adult male and five (5) adult female study participants for each shelter design variant, amounting to ninety (90) participants that were randomly sampled based on actual location, on the shelter recipient's side. The respondents were at least eighteen years (18) of age and have been survivors of the Typhoon *Durian* in Albay last 2006.

Shelter design variants (Seño, 2014)

Nine (9) shelter design variants were evaluated. These came from seven (7) housing donors who took part in this study, and were built in four (4) Albay province-based locations (cities) – where three (3) are government-owned (NHA): Taysan (Legaspi), Camalig (Tagaytay), and Camalig (Tagaytay), and one (1) is donor-owned Anislag Phase II (Daraga) Except for Habitat for Humanity and Operation Compassion-*Amore* which have two shelter design variants each, the rest of the donors employed one shelter design variant. In terms of construction, only the Habitat shelter variants used either steel frame-and-fiber-cement board combination or load-bearing interlocking masonry blocks for walls without columns, while the rest employs traditional reinforced concrete system (normal concrete masonry walls, tied beams, tied columns, tied footings and slabs). For the roofing systems, only the IOM uses a slightly-sloped reinforced concrete slab, while the rest, either steel purlins and rafters or wooden truss members covered with corrugated galvanized steel roofs. Of the seven (7) housing donors, only one came from the government (DSWD), the rest were NGO's. Of the six (6) NGOs, only Habitat, IOM and DC were international donors. The following were the legend abbreviation of the shelter variants: Habitat for Humanity - loadbearing modified concrete hollow blocks (HAB CHB), Habitat for Humanity - Steel Frame (HAB SF), Operation Compassion-AMORE concrete hollow blocks only (OB CHB), Operation Compassion-AMORE concrete hollow blocks and fiber cement board (OB CHB/FB), Gawad Kalinga (GK), Daughters of Charity (DC), International Organization for Migration (IOM), Department of Social Welfare and Development (DSWD), and Community Organization of the Philippines Enterprises (COPE).

RESEARCH INSTRUMENTS

Homeowners' Self-Perception on Disaster-Resiliency. Based from the study conceptual framework (Fig.2.), this instrument will determine the empathy profile of the housing beneficiaries in terms of their genuine concern for the finite resource to which they were entrusted with through proper maintenance of their asset (*house maintenance*). On the other hand, based also from the beneficiaries' survey responses, this will also determine empathy profile among the housing donors if the latter sensitively considered the following aspects in their housing design and delivery (housing beneficiaries' plan of action, feeling of security, feeling of security and disaster misconception). Thus, this *Likert*-coded test instrument consists of five (5) major parts, namely – *feeling of safety* (a subjective feeling of no harm would come to the person), *plan of action* (has the ability to plan prior, during and after a disaster), *feeling of security* (a subjective feeling of the ability of the person to bounce back after disaster), *disaster misconception* (myths and wrong ideas about natural disasters) and *house maintenance* (an appraisal of one's ability to repair and rebuild their houses after a disaster). Each major part contains eight (8) rows of statements where for each statement, the respondent will choose from five (5) columns of *Likert* score-coded values (from 1 to 5) from the choices (*highly knowledgeable* to *not knowledgeable* (for *plan of action*, *disaster misconception* and *house maintenance* aspects), or *highly confident* to *not confident* (for *feeling of safety* and *feeling of security* aspects). The baseline score is between 1.00 to 1.50 which is equivalent to either *highly knowledgeable* or *highly confident*. A pilot test was conducted in another NHA resettlement site located in Cabuyao City, Province of Laguna (Southville 1), which also previously experienced natural disasters. Cronbach's Alpha reliability results were 0.921 for *feeling of safety*, 0.982 for *plan of action*, 0.945 for *feeling of security*, 0.901 for *disaster misconception* and 0.919 for *house maintenance*.

Structural Description of Housing Donor's Shelter Design (Seño, 2014). Based from this study's conceptual framework, this test instrument will be used to determine its level of disaster resistance and determine any misconceptions on the part of the housing beneficiaries by testing its relationship with their psychological feeling of vulnerability. This is a *Likert*-coded (from 1 to 4) descriptive assessment survey form, represented by four (4) descriptive sub-statements, with increasing structural resistance to natural disasters for each descriptive sub-statements 1 to 4. Each four (4) descriptive sub-statements makes up to one (1) descriptive general statement, and the entire survey kit consists of fifty-six (56) descriptive general statements, covering practically every part of the dwelling units that was divided into four (4) major parts, namely - foundation, structural frames (beams, columns and walls), trusses or rafters with purlins, and environmental factors (typhoons, earthquakes and floods). These four (4) major parts considers both (a.) the physical description of both the structure itself and (b.) the site conditions (environmental factors) where the said structure is situated. Graphic images were also provided for most of the descriptive statements. These fifty-six (56) general descriptive statements were adapted from the United Nations International Strategy for Disaster Reduction (UN/ISDR, 2009) *Guidance Notes on Safer School Construction Checklist*, the Philippines' *National Building Code* (Presidential Decree 1096), the National Structural Code of the Philippines (NSCP), the Unified Soil Classification (USC) system and other relevant literature for structural engineering. The baseline average score is 3.0 from the combined scores of all fifty-six (56) general statements where it is assumed that the minimum structural requirements for Intensity 9.0 Earthquake, NSCP Zone IV (250 Kph) wind load and 3.0 meter high flooding were *satisfactorily* met, supported by complete structural computations that were prepared by the external consultant (structural engineer). The *over-all* average score per shelter design variant does not indicate actual performance of such particular shelter design to the natural calamities, rather the said score indicate the level of vulnerability towards possible physical shelter damage due to earthquakes, typhoons and flooding

DATA GATHERING PROCEDURES

The *Homeowners' Self-Perception on Disaster-Resiliency* test was disseminated in close cooperation with the social workers from the three (3) local government units (LGUs) of Taysan, Legaspi;

Anislag, Daraga and Tagaytay, Camalig under the jurisdiction of Department of Social Welfare and Development, Field Office V - Crisis Intervention Unit (CIU) in Albay Province, Bicol Region. The participants for this instrument were randomly sampled, one respondent per shelter unit, and face-to-face interviews were conducted, for a period of almost two (2) months. The *Structural Description of Housing Donor's Shelter Design* instrument was prepared and utilized for evaluating the nine (9) shelter design variants by the author and in close collaboration with the external consultant (structural engineer). E-files or hardcopy blueprints of the complete architectural and structural drawings were provided by each of the seven (7) housing donors. Each of the housing donor were also provided with a copy of the said second test instrument for *self-assessment* purposes. Since the structures were already completed five (5) years ago, some descriptive statements were verified through actual ocular inspection by the researchers, and while some descriptive statements were verified through a descriptive documentation on actual construction practices that were previously conducted between late 2006 to 2008 by *TAO Pilipinas, Inc*. and through the self-assessment forms for second test instrument that were answered by the housing donors themselves. Frequency and percentage has been used in measuring the demographic profile of the respondents. Mean and Standard deviation has been used in presenting the current disaster resiliency and structural description of the respondents. One way ANOVA was also used to compare the significant difference in the psychological vulnerability of the respondents. Lastly, *pearson r* was used to see the significant relationship between the disaster resiliency and structural description of the respondents. All of these statistical treatments were assessed using *Statistical Package for Social Science* (SPSS) Version 19.

FINDINGS

The demographic profile of the shelter recipients (homeowners) when grouped according to age (below and above 45 years old), gender and civil status are equally distributed forty five (45) respondents (50%) apiece. As with regards to the civil status, seventy nine (79) of them are married (87.80%) while five (5) of the respondents are living-in (5.60%). Although as seen in the table that about five (5) of the respondents

Table 1. Mean and Standard Deviation on the *Homeowners' Self-Perception on Disaster-Resiliency*

Disaster Resiliency Variables		HAB SF	HAB CHB	DC	GK	COPE	OC-CHB	OC-CHB/FB	DSWD	IOM
Feeling of Safety	Mean Inter	1.98 (.52) Confident	2.60 (.51) Somewhat Confident	2.19 (.75) Confident	2.40 (.84) Confident	1.96 (.50) Confident	2.21 (.72) Confident	2.21 (.54) Confident	2.06 (.74) Confident	1.76 (.43) Confident
Plan of Action	Mean Inter	1.76 (.24) Knowledgeable	2.16 (.63) Knowledgeable	1.61 (.58) Knowledgeable	1.97 (.45) Knowledgeable	1.60 (.45) Knowledgeable	2.06 (1.07) Knowledgeable	1.54 (.40) Knowledgeable	1.96 (.64) Knowledgeable	1.52 (.64) Knowledgeable
Feeling of Security	Mean Inter	2.33 (.50) Confident	2.62 (.52) Somewhat Confident	2.17 (.44) Confident	2.68 (.46) Somewhat Confident	2.15 (.52) Confident	2.32 (.77) Confident	2.10 (.64) Confident	2.19 (.64) Confident	1.96 (1.10) Confident
Disaster Misconception	Mean Inter	2.73 (.62) Somewhat Knowledgeable	2.84 (.44) Somewhat Knowledgeable	2.47 (.49) Knowledgeable	2.95 (.44) Somewhat Knowledgeable	2.46 (.54) Knowledgeable	2.42 (.72) Knowledgeable	2.61 (.78) Somewhat Knowledgeable	2.24 (.72) Knowledgeable	2.41 (.90) Knowledgeable
House maintenance	Mean Inter	2.47 (.51) Knowledgeable	2.82 (.63) Somewhat Knowledgeable	1.91 (.67) Knowledgeable	2.47 (.78) Knowledgeable	2.07 (.32) Knowledgeable	2.46 (1.08) Knowledgeable	2.03 (.68) Knowledgeable	1.68 (.67) Knowledgeable	2.33 (.62) Knowledgeable

Legend:

Habitat for Humanity Steel Frame (HAB SF), Habitat for Humanity loadbearing modified concrete hollow blocks (HAB CHB), Operation Compassion-AMORE concrete hollow blocks (OB CHB), Operation Compassion-AMORE concrete hollow blocks and fiber cement board (OB CHB/FB), Gawad Kalinga (GK), Daughters of Charity (DC), International Organization for Migration (IOM), Department of Social Welfare and Development (DSWD), and Community Organization of the Philippines Enterprises (COPE).

INTERPRETATION:

Feelings of Safety/Feeling of Security	*Plan of Action/Disaster Misconception /House Maintenance*
1.00 - 1.50: Highly Confident	1.00 - 1.50: Highly Knowledgeable
1.51 – 2.50: Confident	1.51 – 2.50: Knowledgeable
2.51 – 3.50: Somewhat Confident	2.51 – 3.50: Somewhat Knowledgeable
3.51 – 4.50: Not so Confident	3.51 – 4.50: Not so Knowledgeable
4.51 – 5.00: Not Confident	4.51 – 5.00: Not Knowledgeable

consider themselves as single (5.60%), there is a lone one (1) respondent who declared himself as a widow (1.10%).

Table 1 below presents the *Self Perception* results *on Disaster Resiliency* as they are grouped according to the housing donors. Only respondents from the group living in the Habitat for Humanity shelter design variant with loadbearing modified concrete hollow blocks (HAB CHB) is *somewhat confident* that their house is safe (2.60 (.51)), while the rest believes they are *confident* that their house is safe to live. When natural disaster strikes, it can be seen that all of the respondents living in the houses given by different donors have a basic plan of action when the need arises. In another aspect, people living with Habitat for Humanity with a house with loadbearing modified concrete hollow blocks (HAB CHB) (2.62 (.52)) and with Gawad Kalinga (2.68 (.46)) feels *somewhat confident* secure with their houses. The rest on the other hand feels confident that their dwelling place is secure against natural disaster. Looking further in the findings, it can be seen that the respondents living in shelters constructed by Habitat for Humanity ((HAB CHB) (2.73 (.62)); (HAB SF) (2.84 (.44)), Gawad Kalinga (GK) (2.95 (.44)) and Operation Compassion-AMORE (OB CHB/FB) (2.61 (.78)) are *somewhat knowledgeable* about certain misconceptions about disasters. Interestingly enough, the other respondents are *knowledgeable* and believe many myths and misconception about natural disasters. On the area of house maintenance, individuals from Habitat for Humanity (HAB CHB) (2.82 (.63)) are *somewhat knowledgeable* about home repair and maintenance. The rest of the respondents possess basic knowledge in their ability to fix their homes in case of damage caused by natural disasters. Generally the beneficiaries are neither *highly confident* nor *highly knowledgeable* in any of the five (5) parts of this test instrument, leaving room for uncertainties in dealing with possible disaster risks.

On the other hand, Table 2 below indicates that six (6) out of nine (9) shelter design variants were considered, *over-all*, as disaster-resistant to natural disasters, garnering an average baseline score of at least 3.0 (with standard deviation ranging from .26 to .643), except for Daughters of Charity (DC) (2.964 (.54)), Gawad Kalinga (GK) (2.911(.58)) and Department of Social Welfare and Development (DSWD) (2.911 (.60)). These average scores were derived by obtaining the mean score of all fifty-six (56) general descriptive statements per shelter design variant, covering practically all areas of a structure and the site condition where the structure is situated. However, a closer look on what comprises these over-all mean scores for Structural Description indicate that only International Organization for Migration (IOM) shelter design variant had a *disaster-resistant* roofing design (under Part III. Trusses or Rafters with Purlins), while the rest did not meet the minimum satisfactory roofing design requirements that will make it resistant to NSCP Zone IV (250 Kph) typhoon. In terms of the physical description for reinforced footing slabs, wall footing slabs and structural frames such as beams, columns and exterior walls, there are mixed results, with Gawad Kalinga (GK) and Department of Social Welfare and Development (DSWD) obtaining below baseline score of 3.0 for most of the areas for evaluation, all nine (9) shelter design variants however, are considered *disaster-resistant* to flooding and earthquake occurrence *based on the environmental conditions* where these dwelling units are situated.

Table 3 below presents the significant difference results on the self-perception of the housing recipients with regards to their disaster resiliency. While related variables like *Feeling of Safety* ($F[8,81] = 1.52$, $p = .160$), *Plan of Action* ($F[8,81] = 1.59$, $p = .139$), *Feeling of Security* ($F[8,81] = 1.33$, $p = .240$) and *Disaster Misconception* ($F[8,81] = 1.27$, p = ..270) achieved a no significant result, it is just in the area of *House Maintenance* ($F[8,81] = 2.57$, $p = .015$) which has garnered a significant result at 0.05 level of significance.

While Table 4 below presents the correlational results between the psychological resiliency of the respondents with the findings from the structural description from each housing donors' shelter design variant. As seen in the table, the achieved r value in the areas of Feeling of Safety (-.159) Plan of Action (-.085) Feeling of Security (-.050) Disasters Misconception (.046) and House Maintenance (.185) connotes there is *minimal to no relationship* for the said variables ($p>0.05$), with that of the *Structural Description*.

DISCUSSION

Based from the interviews, the recipients of the donated houses were mostly families who were victims or displaced by natural calamities that hit the province of Albay; most specifically by typhoon *Durian*. Because of the hardened volcanic debris that were deposited along the slopes of *Mayon* Volcano, rains brought by the said typhoon caused severe mudslide that wiped out entire vulnerable communities near it and which have prompted local and national public officials to declare the said province in "a state of calamity." With continuous aid from local

Table 2. Mean and Standard Deviation on the *Structural Description* of the Donor-Provided Houses (Seño, 2014)

	HAB - SF	HAB CHB	DC	GK	COPE	OC-CHB	OC-CHB/FB	DSWD	IOM
I. Foundation									
A. RC Footing Slab									
Average	3.75 (0.50)	3.00 (0.00)	2.75 (0.50)	2.50 (0.58)	3.50 (0.58)	2.50 (0.58)	2.50 (0.58)	2.25 (0.50)	3.25 (0.50)
Interpretation	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Prone	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Resistant
B. Exterior RC Wall Footing Slab									
Average	3.80 (0.45)	3.00 (0.00)	2.60 (0.55)	2.20 (0.45)	3.80 (0.45)	3.00 (0.00)	3.00 (0.00)	2.60 (0.55)	2.40 (0.55)
Interpretation	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Prone	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Prone
C. Interior RC Wall Footing Slab									
Average	3.80 (0.45)	3.00 (0.00)	3.40 (0.55)	2.60 (0.55)	3.20 (0.45)	3.40 (0.55)	3.40 (0.55)	2.80 (0.45)	3.20 (0.84)
Interpretation	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Resistant
II. Structural Frames									
A. RC Column									
Average	3.80 (0.45)	3.00 (0.00)	2.60 (0.55)	2.80 (0.45)	2.80 (0.84)	3.20 (0.84)	3.20 (0.84)	2.60 (0.89)	3.20 (0.84)
Interpretation	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Prone	Disaster-Prone	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Resistant
B. R.C. Beam									
Average	3.80 (0.45)	3.00 (0.00)	2.40 (0.55)	2.20 (0.45)	2.60 (0.55)	3.40 (0.55)	3.40 (0.55)	2.60 (0.89)	3.20 (0.84)
Interpretation	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Prone	Disaster-Prone	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Resistant
C. Exterior Walls									
Average	4.00 (0.00)	3.75 (0.50)	3.50 (0.58)	3.25 (0.50)	3.75 (0.50)	3.25 (0.50)	2.50 (0.58)	3.25 (0.50)	3.50 (0.58)
Interpretation	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Resistant	Disaster-Resistant
III. Trusses or Rafters with Purlins									
Average	2.00 (0.00)	2.00 (0.00)	2.00 (0.00)	2.50 (0.71)	2.00 (0.00)	2.50 (0.71)	2.50 (0.71)	2.00 (0.00)	4.00 (0.00)
Interpretation	Disaster-Prone	Disaster-Prone	Disaster-Prone	Disaster-Prone	Disaster-Prone	Disaster-Prone	Disaster-Prone	Disaster-Prone	Disaster-Resistant
IV. Environmental Factors									
IV.1. Earthquake									
Average	3.70 (0.48)	3.30 (0.48)	3.40 (0.52)	3.60 (0.52)	3.60 (0.52)	3.40 (0.52)	3.40 (0.52)	3.30 (0.48)	3.40 (0.70)
Interpretation	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant
IV.2. Windstorm									
Average	2.80 (0.92)	3.00 (0.82)	2.80 (0.79)	3.00 (0.82)	2.80 (0.79)	2.60 (0.97)	2.60 (0.97)	3.10 (0.88)	3.20 (0.79)
Interpretation	Disaster-Prone	Disaster-Resistant	Disaster-Prone	Disaster-Resistant	Disaster-Prone	Disaster-Prone	Disaster-Prone	Disaster-Resistant	Disaster-Resistant
IV.3. Flood									
Average	3.50 (0.84)	3.50 (0.84)	3.33 (0.82)	3.33 (0.82)	3.33 (0.82)	3.67 (0.52)	3.67 (0.52)	3.33 (0.82)	3.33 (0.82)
Interpretation	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant
OVERALL AVERAGE	**3.518 (0.45)**	**3.125 (0.28)**	**2.964 (0.54)**	**2.911 (0.58)**	**3.196 (0.55)**	**3.13 (0.57)**	**3.07 (0.53)**	**2.911 (0.60)**	**3.232 (0.84)**
Interpretation	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Prone	Disaster-Resistant	Disaster-Resistant	Disaster-Resistant	Disaster-Prone	Disaster-Resistant

Legend:

Habitat for Humanity Steel Frame (HAB SF), Habitat for Humanity loadbearing modified concrete hollow blocks (HAB CHB), Operation Compassion-AMORE concrete hollow blocks (OB CHB), Operation Compassion-AMORE concrete hollow blocks and fiber cement board (OB CHB/FB), Gawad Kalinga (GK), Daughters of Charity (DC), International Organization for Migration (IOM), Department of Social Welfare and Development (DSWD), and Community Organization of the Philippines Enterprises (COPE). RC means reinforced concrete, utilizing combined structural reinforcing bars with concrete mixture of at least 3,000 pounds per square inch (psi), possessing both tensile and compressive strength properties, respectively.

INTERPRETATION:

1.00	1.99	Highly Disaster-Prone
2.00	2.99	Disaster-Prone
3.00	4.00	Disaster-Resistant

Table 3. Significant Difference Results of *Homeowners' Self-Perception on Disaster-Resiliency* when compared between the housing donors

		ANOVA				
		Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Feeling of Safety	Between Groups	4.946	8	.618	1.52	.160
	Within Groups	32.758	81	.404		
	Total	37.704	89			
Plan of Action	Between Groups	4.776	8	.597	1.59	.139
	Within Groups	30.278	81	.374		
	Total	35.055	89			
Feeling of Security	Between Groups	4.592	8	.574	1.33	.240
	Within Groups	34.945	81	.431		
	Total	39.537	89			
Disasters Misconception	Between Groups	4.225	8	.528	1.27	.270
	Within Groups	33.647	81	.415		
	Total	37.872	89			
House Maintenance	Between Groups	9.932	8	1.241	2.57*	.015*
	Within Groups	39.058	81	.482		
	Total	48.989	89			

*Difference is Significant at .05 level (2 tailed)

Table 4. Significant Relationship Results between the Homeowners' Self-Perception on Disaster-Resiliency when Related to the Structural Description

Variables	**Mean**	**Std. Deviation**	**r value**	**Sig Value**
Feelings of Safety	2.15	.65	-.159	.133
Plan of Action	1.80	.62	-.085	.428
Feeling of Security	2.28	.66	-.050	.641
Disasters Misconception	2.57	.65	.046	.664
House maintenance	2.25	.74	.185	.081

and international organizations, the people affected by the calamity were able to rebuild again and continue on with their lives. Although it has been years since the said natural catastrophe, it can be noted that these people have "certain" awareness and knowledge about natural disasters that strikes their province. Interestingly enough, they were already "used to" with the many natural occurrences like typhoons and volcanic disturbances that perennially happen in their province. They considered it as a blessing that there were organizations, aside from a government agency, whether local or international, who have generous hearts to provide them with houses in a time when they lost everything after the calamity. Even at this time, they were still thankful on the blessings they have received from these housing donors. Prior to their current shelter that they are residing, their houses were made of indigenous materials or of concrete hollow blocks which they have constructed on their own or hired some local townsmen to build for them. Now, they are amazed with the design of their dwelling units, the materials that were used in the construction, the location of the land where they are situated and the many volunteers who are willing to help them construct their new homes. Insofar, they truly believe that their house is invulnerable to any possible natural disturbances that regularly come to their province.

In another aspect, architectural and engineering designs from the donor houses were based mostly on the donors' self-perceived needs of the community or at times, the standardized designs from previous projects done by them. All of the donors (except for IOM) would ask for "sweat equity" from the recipient families and at times ask for volunteers from different people. This sensitive balancing of material cost and the quality of the shelter being delivered is one of the major challenges of all the donors who participated in this study whose mandate for most of these donors is to deliver for livable shelters for these calamity victims, and "*would just leave after doing their part.*" (*UNDP – Shelter Working Group-Bangladesh*, 2009, p.7). Each of the donor's house variant has their own kind of design that is a trademark of their organization. In other communities that they have helped, their designs were very much the same and this has been their formula in all of the communities that they have helped. The upside of this, they can maintain their cost and be able to reach out to many recipients as possible. The downside of this, each community has their own unique geographical and site-specific conditions that cannot be addressed by the same housing design. Design and construction adjustment are necessary in order to able to maintain the structural integrity of the shelter for a very long time.

Speaking of structural integrity, based from the *Structural Description* profile, it has been observed that only six (6) out of nine (9) shelter design variants from these housing donors have reached the critical baseline score in order to be considered *disaster-resistant* over-all. This can be attributed to the simple reason that the housing donors' focus is on providing decent dwelling for the indigents in so short a period of time, but of course, with basic knowledge on keeping the shelters *fairly disaster-resistant* to natural calamities. It is noteworthy that even one of the seven (7) housing donors allowed a non-professional prepare for them a complete set of engineering and architectural design, while some of the housing donors who used traditional reinforced concrete construction for their donated shelters, employed structural specifications, like the number of steel structural steel reinforcing bars and structural frame (column, beam, footing) sizes that were based from "rule-of-thumb." Moreover, ocular inspection revealed that the DSWD housing variant suffers from termite infestation while the COPE housing variant suffer rusting in its steel purlins supporting its roofing, but ironically they're both "disaster-resistant" in terms of their Structural Description profiles (Seño, 2014).
The *absence* of, or *minimal relationship* between the *Structural Description* of all nine (9) shelter design variants versus *Homeowners' Self-Perception on Disaster-Resiliency* as evidenced by their sig values, indicate that there were either disconnect, misconceptions and/or gaps in the *risk communication chain* from the housing donor to the housing recipients. Risk communication is a holistic process, which is intended to address all forms of uncertainty, thus *risks* (in this case technological hazards (*UN/ISDR*, 2007) such as probable shelter damage due to natural disasters and improper upkeep of shelter units) should be properly identified and handled properly, with utmost *transparency* and *accountability* in all levels of a housing delivery supply chain (*UN/OCHA*, 2006. p.48), from all those who were involved in the housing donor's side downwards to the housing recipients. The housing donors are thus expected to identify the structural limitations that their donated shelter units have, and be able to effectively communicate these to their shelter beneficiaries. Thus, if effective communication is present in a sustainable post-disaster shelter delivery (*International Federation of Red Cross*, 2002), the housing recipients are expected to understand the risks their dwelling units face in future natural disasters, which was however evidently *lacking* (either lack of certainty and knowledge) among the housing recipients of nine (9) shelter design variants.

This lack of knowledge and certainty in before, during and post-disaster scenarios was evidenced by statistical findings wherein the highest score for *Homeowners' Self-Perception on Disaster-Resiliency* that was garnered by a housing donor (IOM) was only 1.52 (rounded off to 2.0) or *knowledgeable*, which indicates that much needs to be done in order close the gap in order to be *highly knowledgeable*, in terms of *plan of action* (mean: 1.80), *disaster misconception* (mean: 2.57), and *house maintenance* (mean: 2.25). In terms of *feeling of safety* and *feeling of security*, the highest scores among housing donors were only 1.76 and 1.96, respectively, both under IOM, equivalent to being *confident*, leaving some feeling of insecurity and uncertainty. Of the five (5) parts of *Homeowners' Self-Perception on Disaster-Resiliency*, only knowledge levels on *house maintenance* differ *significantly* among housing beneficiaries from all housing design variants, but still fall short of being *highly knowledgeable*. This can be attributed to the varying construction methods and appearance of each of house design which can have an impact to the recipients' knowledge on properly maintaining their dwellings and to the level of house maintenance orientation that they received from their donors which imply inadequate empathy on both stakeholders.

As previously-mentioned, since these "gaps" in the *Homeowners' Self-Perception on Disaster-Resiliency* scores reflect the lack of communicating these risks clearly and completely along the post-disaster housing supply chain, the main reason for these was brought upon by the housing donors' focus on properly training these housing beneficiaries on actual construction of these dwelling units based on sweat-equity mode. This was also due to the limited time constraints in completing many dwelling units in a shorter period of time, given the exigencies of the post-disaster situation in swiftly addressing the immediate needs of sheltering the homeless victims after every natural disaster.

Thus, in order to address this *risk communication* gap, the following are recommended – *firstly*, that aside from a disaster-resistant shelter design which underwent in-depth engineering studies on the donor's side, there is a need for an honest-to-goodness participatory and hands-on training sessions, *as a community*, on familiarization with shelter design and its eventual proper maintenance that can be conducted among the different stakeholders in a post-disaster housing supply chain–from the non-technical personnel of the housing donors' side, together with the shelter recipients especially the community leaders, and under the professional guidance of an architect and a structural engineer, thereby leading to a communal sense of ownership. *Secondly*, dwelling units can also be turned-over to the beneficiaries on a renewable "conditional basis," which will require homeowners to properly take care of their houses in exchange of renewal of their extended stay where the donors can conduct periodic building inspections. *Thirdly*, a user-friendly house maintenance checklist can be prepared as well which can be utilized conveniently by the shelter recipients, coupled with strict local community building regulations and codes. In this way, any possibility of occurrences of *technological hazards* (*UN/ISDR*, 2007) due to human error can be avoided in the face of future natural calamities. The *hardware* (dwelling unit structural design) then goes hand-in-hand with the *software* (proper knowledge and maintenance) towards a sustainable post-disaster housing delivery program, leaving significantly less chances for future disasters to happen. *Fourth,* in order to ensure such, more research needs to be done in order to avoid any *risk perception paradox*. (Wachinger *et al*., 2012) where *fatalism* enters. *Lastly*, on the part of the designers, further research has to be done to arrive with cost-effective, flexible yet durable shelter variants which require almost minimal maintenance as well, given the socio-economic profile of the beneficiaries. The accountability of the housing donors does not only cover logistics, design and until dwelling turnover, it has to extend to even the beneficiaries' actual habitation of their donated units, and the responsibility has to be shared mutually between the giver and the receiver. In this way, the sustainability of post-disaster mass housing is ensured thru reinforcement of value of empathy among and between stakeholders.

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REFERENCES

Aysan, Y., Clayton, A., Cory, A., Davis, I. & Sanderson, D. (1995). *Developing Building Improvements for Safety Programmes: Guidelines for organizing safe building improvement programmes in disaster-prone areas*. London: Intermediate Technology Publications.

Bencze, O. & Tilotta, D. (2010). *Perceptions on the Natural Disaster Resilience of Homes in the Southeastern United States.* Raleigh NC USA: Carolina State University

Béné, W., Wood, R., Newsham, A. & Davis, M. (2012). *Resilience: New Utopia or New Tyranny? IDS Working Paper Vol. 12 No. 405*. UK: Institute of Development Studies (IDS). Retrieved from www.ids.ac.uk/publication/resilience-new-utopia-or-new-tyranny

Bocchini, P., Frangopol, D., Ummenholer, T., & Zinke, T. (2014). Resilience and Sustainability of Civil Infrastructure: Towards a Unified Approach. *Journal of Infrastructure Systems,* **20**(2), 04014004 © American Society of Civil Engineers (ASCE) doi: 10.1061/(ASCE)IS.943-555X.0000177

Birkmann, J. (2005). *''Danger Need Not Spell Disaster – But How Vulnerable Are We?''* Research Brief (1), Tokyo: United Nations University (ed).

Bohle, H.G. (2001). ''Vulnerability and Criticality: Perspectives from Social Geography'', *IHDP Update 2/2001*, Newsletter of the International Human Dimensions Programme on Global Environmental Change: 1–7.

Cardona, O.D. et al. (2012). Determinants of risk: exposure and vulnerability. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, & P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA.

Corsellis, T. & Vitale, A. (2005). *Transitional settlement: displaced populations. Oxford:* Oxfam Publishing.

Creswell, J.W. (2002) *Qualitative, Quantitative, and Mixed Methods Approaches*. USA: SAGE.

De Vera, E., Villas, A. & Antonio, R. (2009). Flood blamed on record rainfall. *Manila Bulletin*. Retrieved from http://www.mb.com.ph/articles/222285/flood-blamed-record-rainfall.

Department of Environment and Natural Resources. (2010). *Mapping Philippine Vulnerability to Climate Disasters*. Philippines.

Department of Social Welfare and Development. (n.d.). Retrieved from http://www.dswd.gov.ph/index.php/about-us

Holling, C. (1973). "Resilience and Stability of Ecological Systems," *Annual Review of Ecology and Systematics* **4**, p.1-23.

Johnson, C. (2011). *Creating an enabling environment for reducing disaster risk: Recent experience of regulatory frameworks for land, planning and building*. Background paper prepared for the 2011 Global Assessment Report on Disaster Risk Reduction. Geneva, Switzerland: UNISDR.

Lizarralde, G., Johnson, C. & Davidson, C. (eds.) (2010). *Rebuilding after Disasters: From Emergency to Sustainability*, Oxon: Spon Press.

Lopes, R. (1992). *Public Perception of Disaster Preparedness Presentations Using Disaster Images*. Washington, DC. The American National Red Cross.

Matin, N. & Taher, M. (2001). The Changing Emphases of Disasters in Bangladesh NGOs. Journal *Disasters*, **25**(3), p.227-239. Under Overseas Development Institute. MA, USA and Oxford UK: Blackwell Publishers

McClure, J. L., Walkey, F. H., & Allen, M. (1999). When Earthquake Damage is Seen as Preventable: Attributions, locus of control, and attitudes to risk. *Applied Psychology: an International Review*, **48**, p.239-256.

Matabang, G., Marcelo, R. & Baybay, B. (2009). *Integrating Disaster Risk Management in Site Planning and Housing Design in Resettlement Projects*. Manila: TAO Pilipinas, Inc. ISBN 978-971-94662-0-8

Paton, D. (2001). Disaster preparedness: a social-cognitive perspective. *Disaster Prevention and Management*, **12**(3), p.210-216. Emerald. ISSN 0965-3562 doi: 10.1108/09653560310480686

Petal, M., Green, R., Kelman, I., Shaw, R. & Dixit, A. (2008) Community-based construction for disaster risk reduction, in: L. S. Bosher (Ed.) *Hazards and the Built Environment: Attaining Built-in Resilience*, p.191–217 (London: Taylor and Francis). Oxford UK and MA USA: Blackwell Publishing

Philippine Daily Inquirer (2011). Deadly mix for disaster. Retrieved from http://newsinfo.inquirer.net/113597/deadly-mix-for-disaster

Philippine Disaster Risk Reduction and Management Act. (2010). Philippine Law Gazette.

Quarantelli, E.L (1995). 'Patterns of shelter and housing in US disasters'. *Disaster Prevention and Management* **4**(3), p. 43–53.

Sabater, M. (2010). UN cites Albay as a Model for Disaster Risk Reduction. *Manila Bulletin* (online). Retrieved from http://www.mb.com.ph/node/281865/un-cite

Salceda, J. (October 22, 2010). *Development Climate Change Policy: Adaptation Practices of Albay to outperform MDG by 2015.* Roundtable on Local Governance and Climate Change – Delivering on the Ground. Asia-Pacific Climate Change Adaptation Forum 2010. UN Conference Center. Bangkok, Thailand.

Seño, S. (2014). How Sustainable are the Philippines-based housing donor programs? A multi-disciplinary perspective. *Procedia Economics and Finance*, **18** 2212-5671 (2014), p.892–899. Elsevier doi: 10.1016/S2212-5671(14)01015-6

Sinha, D. (2007*). Natural disaster reduction: South East Asian realities, risk perception and global strategies*. Anthem Press ISBN: 1843317044

Tah, J. & Carr, V. (2001). Knowledge-Based Approach to Construction Project Risk Management. *Journal of Computing in Civil Engineering (J. Comput. Civ. Eng.)*, **3**(3), p.170-177. Permalink: http://dx.doi.org/10.1061/ (ASCE) 0887-3801(2001)15:3(170)

Turner, R. H., Nigg, J. M., & Paz, D. H. (1986). *Waiting for disaster: Earthquake watch in California*. Los Angeles: University of California Press.

Turner, B. L. et al. (2003). ''*A framework for vulnerability analysis in sustainability science,''* Proceedings of the National Academy of Sciences, **100**(14), p.8074–8079.

United Nations - International Bank for Reconstruction and Development (2009). *Guidance Notes for Safer School Construction.*

United Nations. (2006). *Hyogo Framework for Action 2005-2015: Building Resilience of Nations and Communities to Disasters*. Kobe, Japan. (A/CONF.2006/6) and also retrieved from http://www.unisdr.org/eng/hfa/docs/Hyogo-framework-for-action-english.pdf

United Nations-International Office for Disaster Reduction (UN/ISDR) (2010). *Accelerating MDGs by Reducing Risk to Natural Hazards-Invest Today for a Safer Tomorrow*. Background Document Draft. United Nations

United Nations-International Office for Disaster Reduction. (2007). Terminology. Retrieved from http://www.unisdr.org/we/inform/terminology

United Nations–Office for the Coordination of Humanitarian Affairs (UN/OCHA) (2006). *Exploring key changes and developments in post-disaster settlement, shelter and housing, 1982 – 2006.* Scoping study to inform the revision of 'Shelter after Disaster: Guidelines for Assistance' Geneva: UN Publications.

United Nations–Office for the Coordination of Humanitarian Affairs (UN/OCHA) (1998). *Key Principles for Decision-Making (Refugee Operations and Environmental Management).* EESS/UNHCR, Geneva.

United Nations. (2009). *UN Global Assessment Report on Disaster Risk Reduction: Risk and Poverty in a Changing Climate*

United Nations–Shelter Working Group–Bangladesh. (2009). *Post-Cyclone Sidr Family Shelter Construction in Bangladesh. Documentation of plans and processes*. Bangladesh: UNDP.

Wachinger, G., Renn, O., Begg, C. & Kuhlicke, C. (2012). The Risk Perception Paradox – Implications for Governance and Governance of Natural Hazards. *Risk Analysis*, **33**(6), June 2013, p. 1049–1065. doi: 10.1111/j.1539-6924.2012.01942.x.

Van Dillen, S. (2004). *Different Choices: Assessing Vulnerability in a South Indian Villag*e, Studien zur geographischen Entwicklungsforschung, Band 29, Saarbru ¨cken: Verlag fu¨ r Entwicklungspolitik.

Wamsler, C. (2006). “Mainstreaming risk reduction in urban planning and housing: a challenge for international aid organizations.” In *Disasters.* by Overseas Development Institute. MA USA: Blackwell Publishing. [30(2): 151−177]

Wisner, B. (2002). ‘‘Who? What? Where? When? in an Emergency: Notes on Possible Indicators of Vulnerability and Resilience: By Phase of the Disaster Management Cycle and Social Actor’’, in: E. Plate, ed., *Environment and Human Security, Contributions to a workshop* in Bonn, 23–25 October 2002, Germany, p. 12/7–12/14

Wisner, B., Blaikie, P., Cannon, T. & Davis, I. (2004). *At Risk, Natural hazards, people’s vulnerability and disasters (Second ed.).* London: Routledge.

World Wide Fund. (2009). *Mega-Stress for Mega-Cities: A Climate Vulnerability Ranking of Major Coastal Cities in Asia*. (Report). Switzerland.

Vrouwenvelder, A., Holicky, B.M., Tanner, C.P., Lovegrove, D.R., & Canisius, E.G. (2001). *Risk Communication and Risk Assessment in Civil Engineering.* CIB Working Commission TG32 Public Perception of Safety and Risks in Civil Engineering (joint CIB - IABSE Group) CIB Report. Delft Netherlands: CIB General Secretariat (International Council for Research and Innovation in Building and Construction). ISBN: 90-6363-026-3.