Rethinking Humanitarian Innovation as Social Embeddedness and Development.

A case study of Haitian Participatory approach of Vulnerable Persons affected by climate change through the Analysis of Sustainable-Livelihood and emerging ICTs.

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Abstract

This paper establishes how social embeddedness can be strengthened using two innovation ways in developing sustainable-livelihood for disaster vulnerable persons. This involves participation in shelter sites and decentralization in technological humanitarian programmes to ensure informed participation of vulnerable groups. Profoundly, it involves a participatory approach case study of the 2010 Haiti earthquake. I use an inductive approach of qualitative research methods to gather data. Key material entail secondary data using documents, internet, journals, books and scientific dissertations. In using a qualitative research methodology, I implement an inductive approach in constructing the theory of this study. Profoundly, I use grounded theory in analysing the qualitative data of this study. Moreover, contextual analysis and description of participants experience are key.

In conclusion, findings suggest that social embeddedness and moralism are beneficial in investigating sustainable-livelihood of disaster vulnerable persons and digital intervention in non-coercive humanitarian response. Notably, innovation is integral in linking human rights and emerging ICTs through design thinking. Hereby, the implications of these findings are that informed participation and communication capabilities are beneficial in sustainable-livelihood and digital intervention in humanitarian crisis response. I therefore propose that future research should focus on implementing moral principles in technology non-coercive humanitarian programmes.

Acknowledgement

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Abbreviations

ALNAP	Active Learning Network for Accountability and Performance in Humanitarian Action
CaLP	Cash Learning Partnership
CARE	Cooperative for Assistance and Relief Everywhere
CHS	Communication with Communities
CLTS	Community Led Total Sanitation
CPMS	Child Protection Minimum Standards
CRC	Convection on the rights of a Child
CROSE	Coordination Régionale des Organisations du Sud-Ouest
EMMA	Emergency Market Mapping Assessment

GBV	Gender-based violence
GIS	Geographic Information System
HDE	Humanitarian Data Exchange
HXL	Humanitarian Exchange Language
ICT	Information communication and technology
IDP	Internally Displaced Person
IFRC	International Federation of Red Cross and Red Crescent Societies
IASC	Inter-Agency Standing Committee
ICCPR	International Covenant on Civil and Political Rights
IHRC	Interim Haiti Recovery Commission
IOM	International Organisation for Migration
MFA	Ministry of foreign affairs
NUA	New Urban Agenda
OCHA	United Nations Office for Coordination of Humanitarian Affairs
PR-A	Transitional Shelter Construction Project, Sri Lanka
PR-B	Participatory Approach Durable Shelters; Traditional Technique Project, Haiti
PPP	Purchasing Power Parity
R&D	Research and Design
SDGs	Sustainable Developmental Goals
SLDI	Sustainable-led digital innovation
TWIG	Technical Working in Groups

UDHR	Universal Declaration of Human Rights
UNDP	United Nations Development Program
UNHCR	United Nations High Commissioner for Refugees
UNORC	UN Office of the Recovery Coordinator
TGLL	Tsunami Global Lessons Learnt
TWIG	Technical Working in Groups
WoS	Web of Science
WFP	World Food Program

1 INTRODUCTION

The purpose of this case study is to enhance social embeddedness in vulnerable situations and conceptualize the role of ICT in climate change to achieve sustainable livelihood for affected persons. This in turn leads to better implementation of human rights in emerging information communication and technologies (ICTs) and adequate responses in internal and external climatic shocks and predictions for future catastrophes.

I explore the relationship between humanitarian action and sustainable led digital innovation (SLDI). This involves innovative processes and technological attributes among different actors. In addition, I analyse the humanitarian ecosystem and actors involved in shelter cluster approaches. Profoundly, I explore the process of ICTs and its contribution in humanitarian response. For clarity, I research on the interdependence between technology and humanitarian response.

I focus on exploring the degree of participation between vulnerable persons, that is, individual and communities and major actors and why substantial humanitarian innovative models ought to be improved. With this, I research on the 2010 Haitian earthquake. The Haitian case focuses on a project that used participatory approach on building durable shelters in the Rural part of Southern Haiti.

I explore innovative participatory models within the humanitarian sector that are essential for affected persons in the wake of a crisis or disaster. Innovative participatory models outside the humanitarian sector ought to be further explored, with the recognition that they have already been developed for user-engagement in high-income countries hereby limiting their value. Considering that humanitarians already have participatory tools to their disposal during disasters in affected countries, I explore communication models that are essential in linking humanitarian relief to development. Vulnerable countries facing natural disasters and crisis tend to be highly dependent on external commodities which in turn worsens their vulnerability. Hereby, I outlay reconstructive models that would promote sustainable livelihood for vulnerable persons that contribute to their sustainable livelihood. This includes the role and impact of emerging ICTs in humanitarian action.

I begin this chapter with a background of the topic whereby I illustrate the framework and context of the research study. I then highlight the objectives including relationship between humanitarian action and sustainable-led digital innovation (SLDI), enhancing social

embeddedness in vulnerable situations and conceptualizing the role of ICTs in climate change. The next section involves the research problem and the operational research questions which involves one key question subdivided into two key parts. This include how social embeddedness is strengthened using innovative ways. Thereafter, I recount on previous research of the study. I then highlight on the study's research design before ending the chapter with a table presenting the main documents and analysis.

Upon analysing this study, I don't intend to appraise the ethical theories of Graham, Sen and Nussbaum. Instead, I develop their perspectives in solution of humanitarian challenges which have persisted since the 2010 Haitian earthquake. Understanding their perspectives is critical in implementing ethical values in a globalized world enhanced by expansion of emerging ICTs in the humanitarian sector.

In addition, I uphold the implementation of human rights in technological programmes.

1.1   Background of Topic

The 2010 Haiti earthquake was one of the most devastating disasters for over a century. Over 100,000 Haitians and humanitarians lost their lives. This catastrophe would change the future of humanitarian response in vulnerable regions exposed to climatic shocks and stressors.

Herein, there has been a growth of interest in improving decision making with the use of innovative models and technology in gathering and analysing of data upon which this thesis contributes. The success on this field is driven by strategic innovative ways within the humanitarian sector in addressing crisis management. This is effective through community participation where the affected person's views and actions are considered effective as part of the solution. This in turn has led to improvising solutions in dealing with challenges facing vulnerable persons living in temporary shelters.

The humanitarian sector continues to face major challenges on improving emergency relief programmes today in response to natural disasters. This is due to vulnerable conditions envisaged in low and middle income countries including poverty, inadequate infrastructure and urbanisation, leading to insufficient mobilization of resources and building resilience in preparedness and aftermath of a disaster (Department of Economic and Social Affairs (DESA), 2008). However, despite a lacklustre in implementing innovative models, the international community continues to advance in a more integrated strategy ensuring resilience of vulnerable persons in affected countries (Graham, 2008; Nations, 2010). Arguably, this constitutes of either ethical motivations and geopolitical considerations or self-interest from the international

community, which reflect to the reasons why affected communities still remain hazard-vulnerable and highly dependent on aid (J.-M. Coicaud & Warner, 2013; Graham, 2008).

Making progress requires a clear motive on humanitarian intervention in achieving success. For instance, the notion on 'responsibility to protect'(R2P) advocates that the protection of human rights ought to fall to the international community, especially if states aren't responsible enough in enforcing capacity building(Amstutz, 2013). As Bellamy and Luck point out , the notion remains a contestable issue among leaders and scholars due to the different perceptions on the role of sovereign states and whether it might undermine the norm of non-intervention (Amstutz, 2013, p. 188). Much more attention ought to be given on community participation towards preparedness and disaster management to reduce vulnerability towards future disasters. Strategies towards this resilient ought to focus on linking humanitarian relief to development in turn promoting sustainable livelihood to the disaster affected communities. An example is the UNICEF Mid-Term Strategic 2014-2018, that is involved in interventions with the aim of saving lives and assessing the causes of vulnerability to disasters and conflict in affected countries. Its measurement of success comes from the use of WASH kits designed by Oxfam, which indicates an innovative approach between humanitarian agencies and the private sector. Hereby, humanitarian innovation involves the reduction of vulnerability to disasters not only through mid-term approaches but also long-term. Arguably because a mid-term approach may possibly be a long-term investment or benefit of affected individuals in relation to the degree of disaster or socioeconomic background (current developing projects). Similarly, Singer's cost-benefit analysis on relative poverty illustrates the comparison of average income which determines the Purchasing Power Parity (PPP) (Graham, 2008).

The threat of natural disasters and poor preparedness exposes the rate of poor infrastructures in vulnerable countries. However, recent response on disasters in form of safe spaces including shelters, for example, the Lutheran World Federation (LWF) village model in Haiti are noteworthy. Another key example of response to disaster include AirBnB services which accumulates over half-million properties in 33,000 cities worldwide. As a moral approach to disaster response, their services offered housing to the Balkan floods victims in 2014.[1] This illustrates one way in which ethics and innovative use of technology improves humanitarian action and disaster management. Forward thinking under this font also presents a sense of sharing economy in disaster response. In this case, building sustainable structures not only

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[1] AirBnB welcomes evacuees from Balkan floods: https://www.airbnb.com/welcome/evacuees/balkan-floods.
See also: Provision of emergency shelter for disaster affected persons:
https://www.airbnb.com/welcome/evacuees

addresses structural vulnerabilities in affected areas, but also create safe spaces which meet the psychosocial, cognitive and physical needs of children, pregnant women and disabled persons.

The field of humanitarian innovation has created more attention on the role of technology and processes in ensuring a sustainable livelihood for vulnerable persons affected by climatic shocks and stresses (Betts & Bloom, 2014; Gigler, 2014). This comes with the rise of displaced persons due and poor information and social capabilities (See also figure 4.1). Herein, ethics and ICT research ensures that the humanitarian sector and the private sectors uphold dignity on affected persons. This not only involves a needs-based approach of addressing humanitarian crises, but also a right-based approach that ensures legitimacy of data and information of vulnerable persons (Haas, 2013; The Sphere Project, 2011). Rightly, the Signal Code states that 'dignity' involves:

> ...more than physical well-being; it demands respect for the whole person, including the values and beliefs of individuals and affected communities, and respect for their human rights, including liberty, freedom of conscience and religious observance (Greenwood et al, 2017).

Studies indicate that good communication through community engagement, not only makes humanitarian response more effective, but also leads to the recovery of livelihoods and rebuilding of social networks. A notion Mumford relates to on social innovation, upon his study of the Ten cases of Benjamin Franklin (Mumford, 2002). Contributory tools including the Core Humanitarian Standards (CHS) and Communication with Communities (CwC) are essential for a solid understanding of community approaches and activities. In this manner, vulnerable persons view themselves as essential contributors towards their recovery having a clear understanding on the role of stakeholders; an aspect upon which this thesis advocates for.

From a scholarly perspective, humanitarian modification in the networked age is a fast-developing field that ought to receive critical engagement (Gigler, 2014; Graham, 2008) .This is due to several reasons. Firstly, the cognitive capabilities[2] of technology in the humanitarian settings proves to be a challenging factor for vulnerable persons to understand. Surpassingly, nearly all technologies involve collection of data and analytics or simply algorithms[3]. In some cases, algorithms entail biased or unscrutinised information that may violate the rights of vulnerable persons(Greenwood, 2017). Secondly, does a technological approach to

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[2] Cognitive capabilities of technology involve the use of technological artifacts in different context of humanitarian work

[3] Procedures or ways involving information in order to find a solution.

humanitarian action alter the meaning of aid in projecting different perspectives of political economy; is it reliable in a favourable economic environment or does it encourage waste and reinforce corruption? For instance, adopting a decentralised system through technological innovation in addressing vulnerable persons needs continues to receive little attention. Similarly, the build environment, that is shelter clusters, has received little attention from social researchers in addressing integration models in shelters. Sustainable development of vulnerable persons is hereby achievable with the local authorities and international community's willingness in enhancing innovative and participatory programmes that reflect the affected person's views, values and needs.

Enhancing the well-being of disaster affected persons is incisive in humanitarian innovation which takes the form of Sen's capability approach in studying information communication and technologies (ICTs). In this manner, I focus on human capability, that is, vulnerable person's well-being as the main aspect on this thesis, rather technology.

1.2   Objectives

This thesis faces three main objectives in achieving success in humanitarian innovation. Firstly, I investigate the relationship between humanitarian work and sustainable-led digital innovation (SLDI). This involves the process and distribution of innovation among different kind of actors' relation to digital technology attributes. Profoundly, I analysis the humanitarian ecosystem and actors including shelters cluster approaches. In the second objective I look upon enhancing social embeddedness in vulnerable situations and conceptualizing the role of ICTs in climate change in achieving sustainable innovation including sustainable livelihood of affected persons for them to deal with disruptions and predict future catastrophes. For clarity, I research on the interdependency of technology and humanitarian action with limited focus on politics including state-led humanitarian action that has compelled sustainable livelihood of vulnerable person affected by acute and chronic climatic stressors since the 2010 Haitian disaster. Profoundly, I assert human rights and technology as key factors of this study.

1.3   Research problem and operational research question

This research study involves one key question that is subdivided into two aspect:

- How can social embeddedness be strengthened using innovative ways?

- o   How is participation implemented in shelter sites or residents?
- o   How can decentralization in technological programmes ensure informed participation of vulnerable groups?

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Addressing these questions will contribute to the future of humanitarian innovative spaces and wellbeing of individuals in receiving a better dignified reception in their settlement areas. Participation in this case involves approaches in humanitarian action including informed participation of disaster/crisis affected persons, NGOs, private sectors, international agencies and governments (Greenwood et al, 2017). Herein, informed participation of affected persons allows for transparency and consent of how their personal information is being used by the responders. Similarly, informed participation involves the disaster affected individuals' ability to delegate power or agreements between agencies that would lead to socially transformative benefits of projects unlike in pseudo-participation where the benefits does not transcend beyond the efficiency of a project.

In limiting the research question, I focus on non-coercive humanitarian action of relief efforts including technological assistance in alleviating individual suffering and developing individual well-being of vulnerable individuals/communities affected by external and internal shocks of climate change. I briefly highlight on state-led humanitarian action involving political approaches although this is not the focus of this thesis considering its limitations on directly addressing a needs-based approach.

1.4   Previous Research

The first World Humanitarian Summit took place on 2016 Istanbul, Turkey following three years of extensive consultation from more 23,000 people in 153 countries on the commitment of humanity from the international community(Agenda & Humanity, 2016; World Humanitarian Summit, 2016).

Humanitarian action has been a key factor in addressing human rights and advocating for peace within a universal perspective. According to Amstutz, humanitarianism is an integral factor of moral foreign policy within global politics (Amstutz, 2013). The tradition of global ethics is becoming a major role within the structure of international order (Graham, 2008). It has been argued that, "ethical traditions also provides moral architecture necessary to critique and assess foreign policy behaviour of state and international structure of global society." (Amstutz, 2013, p. 65).

Coicaud and Mulligan argue that globalization has triggered new social and integration models in that participation within the humanitarian sector tends to reflect the use of innovative technological structure in community building (J. M. Coicaud, 2016; Mulligan, 2015).

Scholarly work also highlights the importance of e-governance as a key method used by institutions and major actors (J. M. Coicaud, 2016).

Humanitarian innovation has also been viewed through historical insights. Mumford assesses this through Franklin's social innovations that are projected by historical documented analysis which considering the nature and the condition giving rise to the innovation (Mumford, 2002). Profoundly, in analysing historical content of humanitarian innovation, Morison also advocates upon "enlarging the spheres of our identification" to avoid missing out on life-saving technology (Meier, 2012). This indicates social innovation as key a process rather than product in humanitarian crisis.

According to Bessant, humanitarian innovation is driven by the need of relief help that has been caused by humanitarian emergencies like earthquakes, tsunamis and man-made crisis such war (Bessant, 2012). A major break-point to this was the 2010 Haiti earthquake that saw over 220, 000 people lose their lives. Since then, humanitarian innovation has been a developing factor in illustrating what technology does to humanitarian action. The use of mobile phones and social media have become trending factors in our lives not only for information storage but also in providing viewpoints to humanitarian needs. Moreover, the humanitarian sector has also been called into action due to the refugee crisis leading to debate on humanitarian innovation participatory models amongst vulnerable and crisis-affected persons.

Innovation is emerging to be a key driver in crisis management within the humanitarian sector reflecting the intercession between technology and the global society. This is due to globalization which has been a major influence within the field of humanitarian work which highlights the adaptation of new approaches in global ethics. The popularity within this field hereby generates increased scholarly debate that has developed over time. Crisis management is leading scholars to assess the role of international community in implementation of policies and ensuring those affected are involved in community building.

However, the emergence of new technology and its impact on humanitarian action also faces criticisms. Numerous humanitarian summits including Habitat III held in New York sparked debates on the lack of systematic stakeholder involvement within the humanitarian sector deterring the process of innovation (Narang Suri, 2016). This involves the development of ICTs infrastructure that lack local problematization of crisis-affected persons. For instance, mobile

phones[45] and software that cannot be embedded in different cultural settings that would lead to sustainable livelihood. The building environment also face criticisms on designing poor shelters and receptions for vulnerable persons. Improvising feedback mechanism in shelters also continues to be a debatable aspect in addressing the living conditions of vulnerable and crisis-affected persons. Similar insights also indicate that some humanitarian actors have experienced budget cuts upon which IDPs and vulnerable persons residing in camps have access to basic needs including food and shelter whereas those living in urban centres experience challenges in inclusivity within a socio-economic perspective (Charlotte Dufour, 2003).

Previous research focuses on diffusing humanitarian action through technological transfer and innovative methods. However, in this study, I focus on social embeddedness whereby I embed innovative and technological artefacts through local text of vulnerable persons affected climatic shocks and stresses. Current literature lacks deep insights on non-coercive humanitarian action relief efforts in alleviating human suffering. This requires a rethink sustainable livelihood of crisis-affected individuals hereby contributing to achieving sustainable development.

1.4.1   The development of Diffusion of Innovation

Studies on diffusion of innovation started in the United States characterised by empirical research including positivism, quantitative empiricism and functionalism (Rogers & Olaguera, 2003). According to Ryan and Gross, research traditions including classical diffusion materialised through agricultural and communication R&D organisations led by European scholars in the 1950s. In the 1960s, diffusion of innovations intensified demographically in low and middle income countries in Africa and Latin America instigated by the United States and Europeans (Rogers & Olaguera, 2003). However, this approach faced criticisms due to concerns of cultural appropriateness[6] from the United States to Africa and Latin America sociocultural contexts raising debates on equality (Rogers & Olaguera, 2003, p. 119). This influenced substantial research on diffusion of innovation methodologies from a multidisciplinary perspective.

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[4] Some technological artifacts (mobile service/software) only contain an opt-in which limits the user's discretion of using the device. Herein, users are not able to maximize on the technological artefact for a sustainable livelihood.

[5] As critical as they are in addressing climatic shocks and stresses, crisis-affected mobile users lack knowledge of how their information(data) is being used.

[6] Cultural appropriateness in this context involves innovation transfer.

Despite stereotypical criticism characterised by 'invisible college'[7] researchers, Rogers argued that diffusion processes involved a convergence model[8] of mutual understanding between participants (Rogers & Olaguera, 2003). Relatively, Rogers and Kincaid viewed diffusion as a two-way communication process unlike a linear act, generated by innovation through *uncertainty* and *information* (Rogers & Olaguera, 2003, pp. 5-25). This involved centralised and decentralised diffusion systems. The latter involves the capability of individuals to control their change agents whilst the former sees innovation as a linear process. Considering this point, I relate Roger's contribution of decentralised diffusion systems with the work of key scholars including Graham, Pogge, Sen and Nussbaum in addressing the role of global ethics in humanitarian innovation.

1.5   Research Design and Methodology

1.5.1   Research Approach

The research study in this thesis is based on an inductive approach using qualitative research methods to gather data. Thus, the framework of the collection of data will be in the form of a case study design.

Addressing the research question and its operational research questions is hereby noteworthy with this approach. In relation to this topic, I discuss the shortcomings of participation models in community development in formation of an innovative structure humanitarian innovation.

With this approach, the I tend to develop the theory and issues underlying the research study. Relating and answering the operational research questions will therefore lead to a significant model of building up the theoretical format of this research work in terms of collection and analysis of data.

Hereby in meeting the construct validity[9], the thesis involves humanitarian innovation upon focusing on participation models in for community development amongst disaster affected persons (Yin, 2009).

In using this design method, more information on the concepts will be gathered during data collection that are integral in determining the validity of the research. For instance, the research questions in this study involve strengthening of social embeddedness and sustainable livelihood

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[7] According to Price et al, invisible research "is an informal network of researchers who form around an intellectual program to study a common topic (Rogers & Olaguera, 2003, p. xvii).

[8] Communication process between two individuals from a multidisciplinary perspective.

[9] Construct validity entail the assessment of 'neighbourhood change' through concepts in relation to the objectives of a study and the identification of 'operational measures' of concepts through notification of published studies. (Yin, 2009, p. 42).

of vulnerable persons affected by climatic shocks and stresses as a key factor in assessing and improving humanitarian relief aid, that is, information, data and temporary/permanent shelters. In relation to this, the case studies I which I address involve two projects using document analysis. One involves the Haitian case that uses a participatory approach on building durable shelters in the Rural part of Southern Haiti while the other is Sri Lankan involving a transitional shelter construction recovery model whereby individuals seek assistance on building customary plots either owned or from the landowners.

As a key component of qualitative and qualitive analysis, data interpretation is fundamental in this research study. Humanitarian milieus convey data in a digital reasoning to improve feedback mechanism in humanitarian action. Initiatives such as Humanitarian Exchange Language (HXL)[10] and Humanitarian Data Exchange (HDE)[11] that involve aligning humanitarian terminological data and an open platform of sharing/compiling humanitarian data are noteworthy. For the reason of this study, I use the term data to incorporate information from an analogical and digital perspective in protecting the contours of human rights. *Profoundly, I address digital data where it is essential.*

1.5.2   Research Data Collection and Technique

This research study involves secondary data in the form of documents and (virtual) internet. I also use articles, journals, books and dissertations in discussing the data collected.

Using online documents as a means of data collection in this research is noteworthy, especially in establishing supplementary material from articles and journals.(Yin, 2009). This involves public information which involves policies and laws, publication from the government including statistics and case documents from municipalities. In using comparative case studies, I use statistics and reports from shelter clusters and disaster regions from the 2010 Haiti earthquake in assessing the gaps between humanitarian action, new ICTs, responders and affected persons.

I also use information, data and ICTs standards within the humanitarian context in understanding the feedback mechanism of disaster affected persons including communities and responders. Access to this information paves way for addressing challenges like limited satellite-based disaster damage assessment on traditional shelters and locations (inaccurate messaging and metadata used on live crisis mapping), unidentified information in referral

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[10] http://hxlstandard.org/
[11] https://data.humdata.org/

centres, misinterpretation of metadata, access of information into wrong hands during humanitarian relief efforts. Considering these factors, I adopt Scott's four criteria in establishing the quality of the documents (Bryman, 2012, pp. 546-557).

Profoundly, one of the key elements of using documents as a methodology in this study is to gain access to updated ethical and technological guidelines in non-coercive humanitarian action in response involving emerging ICTs and their impacts on disaster affected persons and communities. Merriam argues that, the ability of ones' imagination and industriousness is important in accessing credible information from public records (Bowen, 2009, p. 31). Yin is also of the opinion that documents are also conveyed in different settings and events. (Bowen, 2009, p. 31).

1.5.3   Limitation

Considering its advantageous aspect on availability and efficiency, data collection contains several limitations. Throughout the study research, some documents have been difficult to access due to security purposes or privacy. Similarly, Bowen argues that this lies as one of the key limitations especially if a research is determined to establish policy reforms used by the state. (Bowen, 2009).

In determining retrievable documents for this research study, information based on informed participation models in used in ICT programmes and communities of disaster affected areas will be noteworthy. Anna Le Gouais et al argues that the researcher limits the research work based on the end-user, that is, the IDPs and vulnerable persons (Anna Le Gouais & Ward, 2012; Benton & Glennie, 2016). The limitations will hereby be minimized by provision of different sources from the data collected through triangulation. This will entail documents from interviews, websites, and notes that negate aspects like biasness, respondent and researcher's biasness, unlike using a single method like interviews (Bowen, 2009).

1.5.4   Data Analysis

The main documents that I analyse are: Review of the International Federation of Red Cross and Red Crescent Societies (IFRC)-led Shelter Cluster Haiti 2010, United Nations Office for Coordination of Humanitarian Affairs (OCHA) Hashtags Standards for Emergencies-Retweeting during the 2010 Haiti Crisis, Norwegian humanitarian response to natural disasters. Case of Haiti Earthquake January 2010.

Unlike other research methods, one of the advantages of using this strategy entails data selection instead of data collection (Bowen, 2009, p. 31). In this manner, I will argue out how the reports

were framed in relation to this research work. Considering the decisive nature of humanitarian response to the living conditions of IDPs in reception or housing facilities, it has been argued that biasness sometimes determines the outcome of the research work. The objectivity of using content analysis will hereby avoid biasness in turn leading to the legitimacy of the thesis' argument in relation to its findings.

1.5.5 The Research Structure

The figure below projects the research structure of the of the thesis.
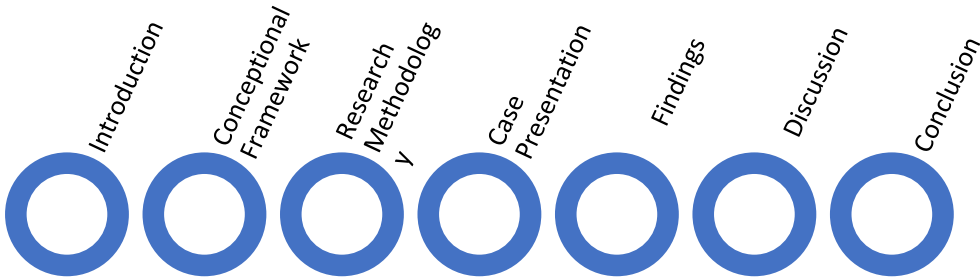
Figure 1.1 The Structure of the thesis. Source: Author's framework

I hereby organize the thesis into seven sections. The first section entails the introduction which projects the framework of the thesis. As a qualitative research study, the research strategy entails words rather than quantification through an inductive process that generates the theory from the research work (Bryman, 2012). However, I use statistical data in quantifying the number of affected persons and damages in the case study. In this manner, I focus on the aim and the objects in determining the research outcome.

In the second part, I focus on identifying and analysing the literature of the thesis. I develop a conceptual framework that focuses on the theoretical concepts of the thesis. Herein, I assess moralism in international relation projecting the scale of humanitarian intervention. I also mention the role of key stakeholders within the humanitarian sector including UNICEF and IOM in the response to disaster management. Lastly, I define key aspects of participation within humanitarian innovation focusing on social innovation, technology and community building. This include approaches in adopting different participation models in addressing vulnerable persons including the women and children. I also explain key factors on technology and global affairs whereby I focus on social constructivism. This outcome provides a framework where I address the objectives of this thesis including sustainable livelihood of vulnerable persons.

In the third section, I describe the research design and methodology in addressing the roles and objectives of this thesis. As a qualitative research study in form of case studies, I look at the reliability and validity of the research study including the data presentation and research limitation.

In scaling the research study, I analyse the documents and attend ICT and development seminars as well as hackathons subjected for sustainable livelihood of vulnerable persons affected by climatic shocks and stresses. Herein, I correlate the findings of this research with current issues on innovation and emerging ICTs used in humanitarian work. Bryman projects this as triangulation which I rely on in validating the data collection of this research. I explain this in detail in the research report.

In the fifth section, I highlight key findings based on the data analysis and objectives of the study. Thereafter, I conclude the thesis with a discussion of the study based on its objectives and future implications of relevant research.

1.5.6   Document and Data Analysis

Name of document	Data Analysis in relationship to the research question	Significance or Purpose of the Document
Review of the IFRC-led Shelter Cluster Haiti 2010	- Coordination between international and local actors, affected community. -Technical Working in Groups (TWIG) meetings. -Cluster's communication with affected persons	-Assessment and providing recommendations for the IFRC and the Shelter Cluster on coordination in future emergencies; research, interviews in Haiti and written and telephone communication with informants

Hashtag Standards for Emergencies	- humanitarian technology - social media hashtags and GPS. - data donor (participation of vulnerable communities and volunteers- locally & globally)	Forward thinking on integrating big-crisis data into emergency response going forward - Ethical guidelines in technology
Norwegian humanitarian response to natural disasters. Case of Haiti Earthquake January 2010	**-** Role of international community.	-Focuses on the decision making in Ministry of foreign affairs (MFA) but not the field work process. -To document the first phase response of the Norwegian MFA to the Haiti disaster -Assessment of response from previous experience in response to natural disaster.

Table 1.1 Document and Data Analysis. Source: Author's framework

CHAPTER TWO

2 CONCEPTIONAL FRAMEWORK

2.1 Introduction

The main aim of this chapter is to project and highlight concepts of humanitarian innovation in relation to aim and focus of this focus of this thesis. This chapter is divided into four sections including an introduction where I define the concepts of humanitarian innovation and participation of crisis-affected persons, highlight on the notion of technology and international relations and illustrate the development of the conceptual framework.

Under humanitarian innovation, I look at the difference between process and product innovation correlated to the modes of operations within the humanitarian sector. Herein, I reflect on sustainable-led innovation, social embeddedness and the building environment as example of stakeholder involvement correlated to communication and safe spaces.

In assessing community participation of disaster affected persons, I look at the concept and modes of participation of vulnerable persons under the Signal Code[12] and the Universal Declaration of Human Rights (UDHR). The Signal Code articulates human rights to information during crisis because of the impact of ICTs and digital data on humanitarian action.

The fourth section entails the notion of technology and international relations, where I briefly reflect on and social constructivism and technological determinism. In this way, I intended to create a better understanding of technology and society through systematic integration of technology in global affairs.

Lastly, I present the structure of the developmental framework that entails a diagram and a descriptive table illustrating the concepts, elements and study(scholars).

2.2 Humanitarian Innovation

The field of humanitarian innovation has been a major component in addressing some of the global crises including migration, climate change and globalization. (Graham, 2008; Nielsen, Sandvik, & Jumbert, 2016). Innovation within the humanitarian sector was first attributed by the Active Learning Network Accountability and Performance in Humanitarian Action (ALNAP), that entailed the 2009 Innovations Fair. (Betts & Bloom, 2014). ALNAP's main role is improving humanitarian performance through learning and accountability. As the ALNAP

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[12] The Signal Code: A Human Rights Approach to Information During Crisis: https://signalcodeorg.files.wordpress.com/2017/01/signalcode_final7.pdf. See also: https://signalcode.org/faq/

2008-2013 review summary shows convincingly, humanitarian participation entail participants from the UN agencies, the independent academic organisations and experts, the Red Cross/Red Crescent movement, non-governmental organisations and the private sector. (Alnap, 2016c, 2016e). Ramalingam et al. and Steed admit that, a high number of organisations are hereby investing on cost-effective solutions in tackling humanitarian challenges. (Betts & Bloom, 2014; Tidd & Bessant, 2014).

The interpretation of the term humanitarian and innovation is hereby decisive in determining the needs of the end-user. According to Nielsen, Sandvik, & Jumbert, humanitarian innovation assesses how technology and services through the private sector, helps in improving humanitarian aid in terms of process and product innovation (Nielsen et al., 2016). However, upon its conception and trend, Betts & Bloom argue that the term 'innovation' remains a contested issue within the humanitarian sector due to its interpretation by the sectors. (Betts & Bloom, 2014). However, this paper projects innovation as an 'on-going' process that seeks solutions. According to Rogers, the innovation decision process involves:

> …the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. (Rogers & Olaguera, 2003).

Process innovation involves adopted models of delivery that are established by humanitarian organisations. Examples of process innovation within the humanitarian sector entail the Community Led Total Sanitation (CLTS), Cash Programming and Emergency Market Mapping Assessment (EMMA). In the response of the 2004 Tsunami, many agencies exercised the use of cash programming which to some degree turned out to be effective. For example, the introduction of Cash Learning Partnership (CaLP) by five NGOs organisations resulted in capacity building which is a component in community participation. Another example for process innovation entails the Digital Humanitarian Group which was introduced in 2012, that involves the provision of digital services amongst volunteer groups. (Betts & Bloom, 2014). The correspondence between product and process innovation is hereby noteworthy in terms of their relation and outcome. Ramalingam et al argue that, product innovation is bound to solve process issues. (Betts & Bloom, 2014). An example of this is a study on the response of mobile

technology by Haitians, after the country was struck by the 2010 Haiti earthquake. (Alnap, 2016b).

The diagram below illustrates the correspondence between product and process innovation.
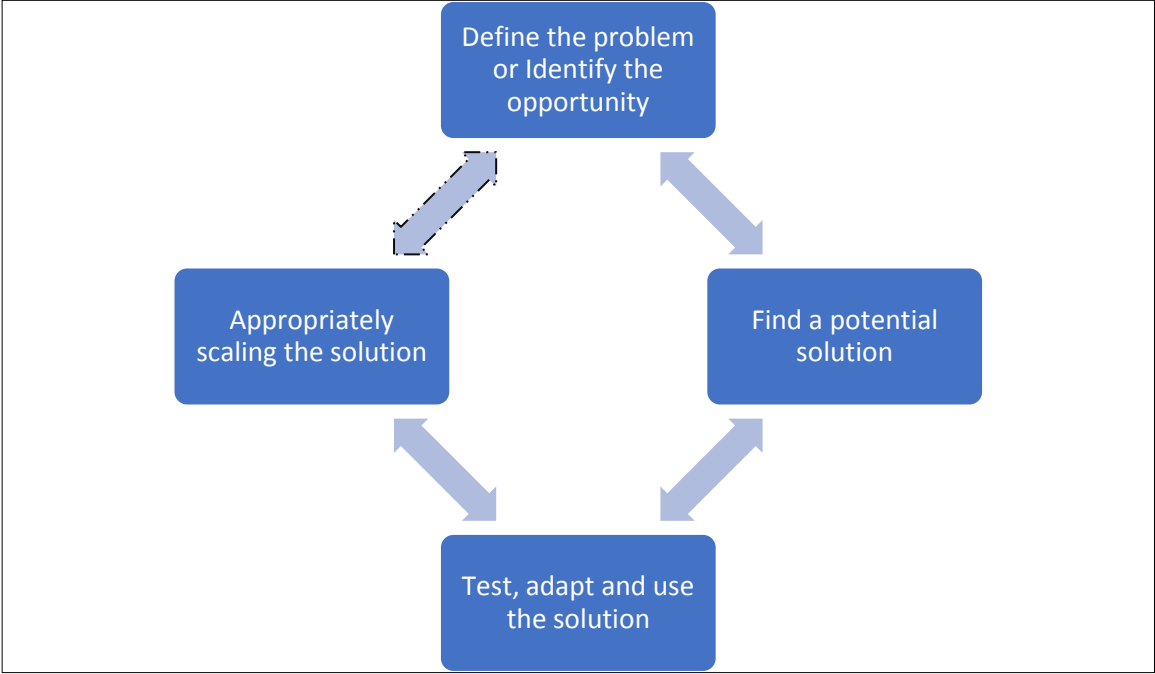
Figure 2.1 The innovation process. Source: Betts & Bloom

Betts et al is of the opinion that the innovation process above projects a cyclical movement which highlights a continuous learning and feedback mechanism.(Betts & Bloom, 2014); It entails 1) Defining the problem or identifying the opportunity;2) Finding a potential solution 3) Testing, adapting and using the solution; 4) and appropriately scaling the solution. Product innovation in this case involves a company or individuals' ability to identify a problem or opportunity for new products through R&D in turn pitching their ideas to humanitarian agencies (Betts & Bloom, 2014; Calestous, 2010). Nevertheless, one of the barriers facing R&D within the humanitarian sector is tender procurement which is a challenging factor for both suppliers and tender holders within the private sector.

In relation to innovation process, I look at sustainable led-innovation as a link in illustrating process and product innovation in the case of sustainable livelihood of vulnerable persons. The importance in this scenario is to administer participation as a key element within this structure.

2.2.1.1   Social Embeddedness

Social embeddedness involves the construction of new techno-organizational arrangements through local context. It emphasizes on local development including social and political

capacities and how innovation and change emerge amidst the local dynamics (Avgerou, 2010). Unlike diffusion, social embeddedness involves socially constructed entities, for instance in disaster management and development through the relationship of technology and society. In this case, the ICT innovation arises from local problematization that is shaped by local actors eventually meeting their needs (Avgerou, 2010). Nussbaum and Amartya Sen, the economist-philosopher and Nobel Prize Laureate, offer similar insights through their concept on human needs approach through their 'capabilities' (J.-M. Coicaud & Warner, 2013; *Sen*, 1982). Herein, Sen argues that capability involves "alternative combinations of functionings that are feasible" for a vulnerable person to achieve their kind of lifestyle (Gigler, 2014). Profoundly, this approach focuses on the non-material aspects of human wellbeing including culture, norms, political affairs and social attributes of vulnerable persons(individuals/communities) affected by climate change hazards(stressors) amongst them acute[13] and chronic[14] change causing developmental challenges.

Herein, ICTs are not a means of communication for disaster recovery but a link to the chain of sustainable livelihood of vulnerable persons. See also figure 2.3.
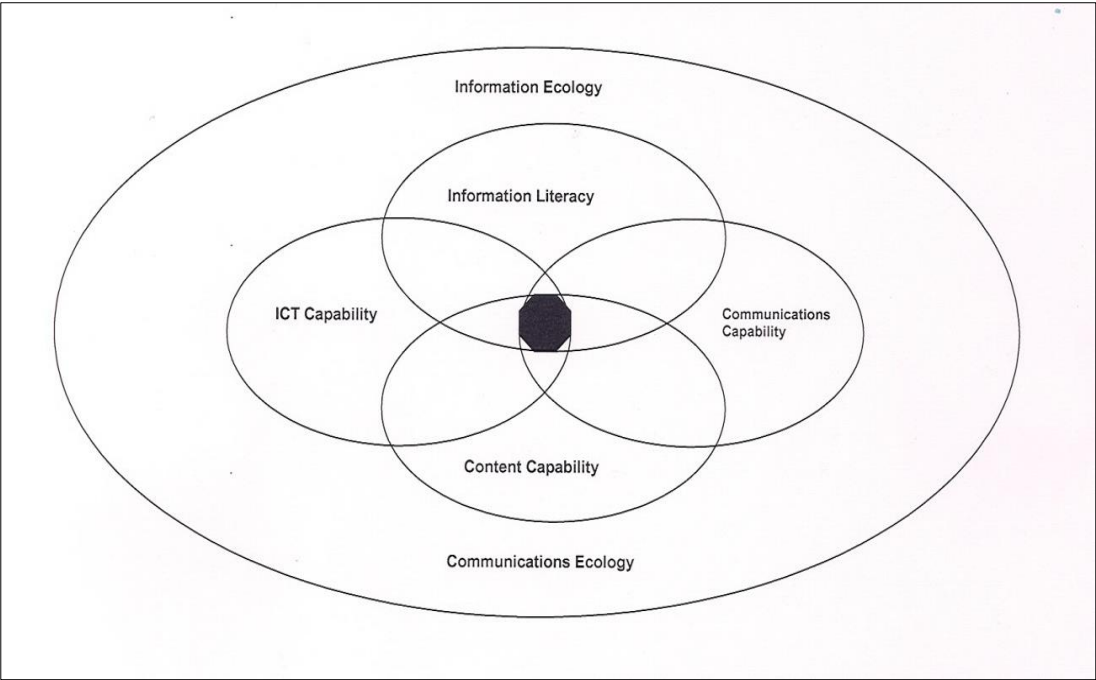
Figure 2.2 The concept of information capabilities. Source: (Gigler, 2014)

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[13] Acute impact involves rapid effects of 'shocks' that include natural disasters, climate (earthquake, El Nino, landslides), migration (rural urban), security.
[14] Chronic climatic changes involve seasonality as well as technical, social, infrastructural aspects, that ought to cope with the impact of the stressors

Herein, in relation to Sen's capability approach and Nussbaum's ethical perspectives, information capability involves a person's freedom to access ICTs to improve their livelihood in which I use analyse the data, findings and discussion of this study.

2.2.2 Sustainable Led Digital Innovation

Sustainability involves merging of long-term ideas that lead to both trust and development herein establishing a formidable relationship between the different sectors. In this case, C.K Prahalad refers to sustainability as, "a mother lode of organisational and technological innovations that yield both bottom-line and top-line innovations."(Tidd & Bessant, 2014, p. 390). Innovation hereby acts as a component in the assessment of sustainability. It is hereby noteworthy to understand how innovation is formed and its implication to an organization or community. An implication to consider within this point is crisis management and sustainable development within a global scale. (Wijen, Zoeteman, & Pieters, 2011, pp. 110-116).

Figure 2.2 projects Tedd & Bessant's perception on the phases within the evolution model of Sustainable Led-Innovation that entail: 1) Operation Optimization 2) Organization Transformation and 3) System Building. Operation optimization focuses on technology on tackling issues while it maintains a business model. Innovation is inward-focused in both development and outcome. Innovation is based on doing less harm. For example, renewable energy, pollution control and hybrid electric vehicles. Organization transformation on the other hand is based on poverty reduction and uplifting people's standard of living. The innovation structure is based on both technology and social- technical issues. Rather than doing 'less harm', the organisation benefits from 'doing good' upon focusing on sustainability as its main model. System building is based on the interdependency with other organizations. Its sustainable goal is based on cooperation with private actors[15] in achieving sustainable goals. Its design is hereby based on 'doing good by doing new things with others.'

Figure 2.2 projects the adaptation of process and product innovation in the applicability of humanitarian innovation. (Betts & Bloom, 2014; Tidd & Bessant, 2014, pp. 393-399). It is through these processes (humanitarian programming), that humanitarian innovation attains more ideas, acquire subsequent planning and be tested out in determining reliability, that is,

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[15] According to the OECD Guidelines, stakeholders and right-holders are essential within the grass-root level including indigenous people, farmers and local communities who reside near these projects; Right-holders entail human rights upon which stakeholders are entitled to have.(Smiley Edward, 2016).

impact and efficiency. (Betts & Bloom, 2014). In limiting the research content of this thesis, I focus more on social embeddedness in relation to Sen and Nussbaum's capability approach.

System buildings is based on the interdependency with other organisations. In other words, better solutions are not only achieved within one field or sector but through cooperation and coordination of different organisations and sectors.

OPERATIONAL OPTIMIZATION
- Entail regulations by increasing efficiency
- Innovates to 'do less harm'
- Focus on technology on tackling issues while mainting a business model
- Innovation is inward- focused in both development & outcome
- Examples: Renewable energy, pollution control, hybrid electric vehicles

ORGANIZATION TRANFORMATION
- Sustainabilty as the model
- Rather than doing 'less harm' the organization benefits from 'doing good'
- Innovation based on both technology and social- technical issues
- Based on poverty reduction and uplifting people's standard of living.

SYSTEM BUILDINGS
- Based on interdepency with other organisations
- 'Doing good by doing new things with others'
- Cooperation with stakeholders in achieving sustainable goals
- Examples: Industrial Symbiosis- Both local and international organisations benefit. ie thinking across boarders.

Figure 2.3 Evolution model in Sustainable-led Innovation (SLD). (Tidd & Bessant, 2014, pp. 393-399)

On the other hand, digital innovation involves "breaking up of vertical industry silos and the creation of networks where different actors come together and innovate by combining and recombining their digital technology components" (Nielsen, 2017). The varieties of these technologies involve reprogrammable landscape that allows flexibility for its function, data homogeneity that allows access to digital data including images and videos through transmission and processing, and finally the use of digital technology (for example, computers) for sufficient diffusion of tasks (Nielsen, 2017; Youngjin Yoo, 2010, p. 276).

Based on different varieties including distribution, layered architect and innovation processes, digital technology presents fundamental changes in innovation. Yoo et al reaches similar insights noting that, "digital technology, therefore, has democratized innovation and almost anyone can participate"(Nielsen, 2017). This means that digital innovation comprises of

separation between different networks and contents as well as devices that allow flexibility amongst actors during innovation processes. Hereby, innovation processes mobilizes actors with a potential of creating value to credible platforms, responds to changes within the components including actors and opportunities, and adopting to settings of existing technologies (Nielsen, 2017).

1- Innovation Distribution	• innovation distributed among different kinds of actors • Opportunities in combining a variety on different levels
2- Digital Technology Attributes	• Layered architectures comprising of: - core components - complementary components - interfaces between these components
3- Innovation Processes	• The control over and the knowledge about the different components are distributed among different actors • Require the ability to mobilize other actors to release the potential of platforms, to combine and recombine components, rapidly respond to changes in constellations of components and attribute new meanings and usages to existing technologies

Figure 2.4 Figure 1: Components of Digital Innovation. Source: (Nielsen, 2017; Youngjin Yoo, 2010). Author's framework

Digital innovation creates an arena where actors assemble and interlink digital components that allows for ideation and creativity. The critical notion about this aspect lies on bridging the user-innovator relationship. Initially, user involvement is a flourishing aspect in innovation, whereas disruptive technology (gaining popularity) presents a new factor in innovation. Digital innovation involves a combination of how firms, organizations and industries collaborate within a competitive nature through innovative ideas (Nielsen, 2017). In addition, it also offers an arena for actors who are vulnerable to natural disaster (acute shocks and chronic stresses) to participate; an aspect that is slowly being recognized but hardly exploited. Herein, I apply this in assessing the capability change of vulnerable persons. That is, measuring the human impact.

2.2.3   Social Innovation

Engagement of crisis affected persons in community development is an incisive factor in realising their full potential leading to creativity and generating ideas. One of the key strategies in administering this aspect is through social innovation. In his study of the ten cases of Benjamin Franklin, Mumford defines social innovation as:

> ...generation and implementation of new ideas about how people should organize interpersonal activities, or social interactions, to meet one or more common goals; …development of new ideas about social organization, or social relationships, might involve the creation of new kinds of social institution, the formation of new ideas about government, or the development of new social movement; …creation of new processes and procedures for structuring collaborative work, the introduction of new social practices in a group, or the development of new business practices. (Mumford, 2002, p. 253).

The write presents a socioeconomic perspective of social innovation administered by new ideas and a substantial 'on going' structure or system. Profoundly, Betts et al, relates to the livelihoods of crisis affected persons(IDPs) and the impact of social innovation and change.(Brennan, 2016, pp. 63-65). The description of the 'bottom-up' approach is a fundamental issue that Betts et al presents in addressing the aspect of PRSs.[16]

As a key perspective of ICT and development in the networked age, social embeddedness involves socioeconomic improvements through locally situated action. (Gigler). In this case, social innovation mainly focuses on informed consent or participation of crisis affected persons in adapting or using ICT data products. In addition, unlike social refinement that relies on the active role of stakeholders, this point configures with a psychometric approach of leadership (going outside themselves) and solving problems through interaction and integration means.

The focus hereby is effective communication with crisis affected population and leadership performance. (See also section 4.4.1.2).

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[16] Crisp et al's notion on protracted refugee situations(PRSs) is that, "refugees find themselves in an intractable state of limbo for more than five years, frequently confined to refugee camps in which they have no right to work and limited freedom of movement." (Brennan, 2016, p. 54).

2.3 Community Participation of Crisis-Affected Persons

2.3.1 Introduction

In this section, I look the issue of participation of crisis-affected people and a rights-based approach in relation to the Signal Code. Considering its broad meaning in the sector, I define participation within a humanitarian action perspective and the modes of participation. Due to increase adoption of ICTs and digital data in crisis, I look to highlight ethical values of the Minimum Standards of humanitarian response in addressing the sustainable-livelihood of vulnerable persons affected by shocks and stresses of climate change.

2.3.2 Participation of Crisis Affected Persons

The term participation is gradually becoming complex to define in humanitarian action due to a rise of innovative and communication models in the sector. However, from a macro perspective, the ALNAP handbook on Participation by Crisis-Affected Populations in Humanitarian Action states that:

> Participation in humanitarian action is understood as the engagement of affected populations in one or more phases of the project cycle: assessment; design; implementation; monitoring; and evaluation. This engagement can take a variety of forms...Far more than a set of tools, participation is first and foremost a state of mind, according to which members of affected populations are at the heart of humanitarian action, as social actors, with insights on their situation, and with competencies, energy and ideas of their own. (Alnap, 2016b, p. 20)

Participation in this point entails creative interaction from both the parties. In addition, it also asserts to a defined process with a targeted goal, or achievement. I consider this to be an innovative sequence because of the different developmental stages involving different parties with a significant ambition. Participants in this case become contributors using their knowledge and endurance. Similarly, a report by Plan International on the 2004 tsunami in Sri Lanka notes that the media portrayed children as having 'extraordinary skills' because of being separated from their families (Plan, 2005, p. 13). However, upon further research, I argue on the improvement of this approach in chapters five and six in relation to innovation policy.

Inequality and discrimination is also an important aspect in relation to emergency and reconstruction after a crisis or disaster. Considering this, the concept of participation of crisis-affected persons develops a cultural and traditional meaning. Correlated to this, the Inter Agency Working Group on Reproductive Health in Crises defines participation as:

> …the involvement of key stakeholder in all aspects of the programme cycle — assessment, design, implementation, monitoring and evaluation. Opportunities for involvement should be transparent, free of coercion and open to all. It is essential to assure the participation of all groups, including women, men and adolescents (both male and female). It may be necessary to seek out the active involvement of often-marginalized groups such as minorities, young people, widows and the disabled. (Alnap, 2016a, pp. 10-11).

This definition identifies the youth, women and men as key stakeholders during emergency recovery and reconstruction of crisis. Normally in this kind of scenarios, culture and tradition may hinder full participation of the youth because of obedience to their parents. Nevertheless, the mobilisation of the youth is an important factor in emergency recovery and reconstruction of a disaster. I argue upon this issue in chapter five correlating to the emergence of intelligent use of social media in an emergency recovery situation; an aspect that enhances data literacy in participation of crisis-affected persons.

This comes after recent hearings in Habitat III in New York early June 2016 on the process of stakeholder participation which highlighted issues to be assessed in the New Urban Agenda (NUA) (Narang Suri, 2016) The New Urban Agenda (NUA) on the other hand raised debates over its procedural process towards a sustainable urban setting, that is, integrating humanitarian responds with urban planning specialties. According to Narang Suri, NUA lacked the mechanisms to support innovative ideas intended for sustainable urbanism during in crisis management (Narang Suri, 2016).

Participation of crisis-affected person or in this case human-cantered approach, continues to be a debatable issue amongst scholars and humanitarian innovation practitioners. In her article, "Rumor has it, innovation lurks in the shadows of the New Urban Agenda", Suri expresses her dismay on Members States, for lack of stakeholder inclusion in decision making, which is necessary in sustainable urbanism especially for the minority or less marginalised people. (Narang Suri, 2016). It is in this context that community participation becomes essential towards sustainable development for vulnerable nations.

2.3.3 Models of Participation

Community participation of affected-person entails the engagement and recognition of the vulnerable during recovery and construction of crisis. In this context, participation involves three key stages in emergency recovery that entail ownership, consultation and passive (NORCAP, 2016). Groups and committees including the youth hereby can contribute in decision making and problem solving during emergency recovery. In addition, their participation is an important factor of convectional right towards the community they live in. The table below illustrates the degree of participation in different stages from passive to ownership.

Degree of Participation	Definition
Ownership	Communities control decision-making and other partners facilitate their ability to utilise resources. There is therefore greater ownership and a stronger sense of belonging and responsibility.
Interactive	Communities are completely involved in decision-making with other partners.
Functional	Communities are involved in one or more activities, but they have limited decision-making power and other partners continue to have a part to play.
Consultation	Communities are asked for their opinions, but they don't decide on what to do and the way to accomplish it.
Information Transfer	Information is gathered from communities, but they are not taking part in discussions

	leading to informer decisions.
Passive	Knowledge is shared with communities, but they have no authority on decisions and actions taken.

Table 2.1Degree of Participation (CMT, 2016, p. 48; NORCAP, 2016)

These stages highlight the importance of good communication during emergency recovery if a disaster. Vulnerable persons are not only able to be empowered but also build on their personal skills. Ownership, consultation and the passive indicate are the key features in defining the degree of participation of vulnerable persons. For example, youth committees may have no authority in decision in the passive stage whereas in ownership, they bare greater responsible with the partners involved in emergency recovery, hereby become full active members of the community.

2.3.4   The Signal Code

The Signal Code involves a right-based approach to information during disasters and crisis that ensures procedural notification, consent and informed participation of affected persons on their data. As a study program on Human Security and Technology at the Harvard Humanitarian Initiative(HHI), the proposal establishes five rights relative to Information, Protection, Privacy and Security, Data Agency and Rectification (Greenwood et al, 2017).

Due to the prevalent adoption of ICTs and digital data by crisis-disaster individuals, the program intends to strengthen ethical approaches in humanitarian action. Traditionally, humanitarian action anchors on specialised ethical standardizations that humanitarian actors opt to follow and adherence of protection and assistance of human beings as a basic right (Graham, 2008). Herein, the network age presents an advancement of obligations in non-coercive humanitarian action, in ensuring responsibility by humanitarian actors, governments, international agencies and private actors.

In achieving a right-based based approach, humanitarian actors, governments, international agencies and private actors ought to ensure that: 1) the rights of information and protection of crisis-disaster affected individuals/communities be codified under the international humanitarian and human rights law, 2) ethical realization of these rights by humanitarian actors, 3) integration of technical and ethical standards in todays' humanitarian action, and 4) ensure

collaboration in emergencies for humanitarian information work that relates human rights, ethics and law (Greenwood et al, 2017).

Figure 2.5 The Signal Code, Source:(Greenwood et al, 2017; Haas,2013). Author's framework

2.4   Technology and International Relations

The emergence of new technology driven by globalisation has created news ways of addressing humanitarian crisis. The use of mobile phones, geospatial technologies and social media has created new ways of responding to disaster. However, technology has led to debates amongst some humanitarian practitioners because of its role on wars, conflicts, environmental pollution and the global climate change. Some researchers also argue that technology is creating a socio-economic divide between vulnerable countries and those that can manage natural disasters. This reflects an urgent need of understanding of the term technology and its values correlated to international relation because of its diverse meaning (Hughes, 2004). For this study, I define technology correlated to Brooks's broad assessment as, "the accumulation of knowledge and artefacts for the realization of human purposes in a specifiable reproducible way."(Fritsch, 2011, p. 28).

To correlate technology into global affairs, it is fundamental to establish different degrees of technology and its relation to the society. From a confined perspective, technology applies to

material artefacts or tools that relates to the use and competency of technology. A broader context of technology entails technical-aspects as well as cultural and organisational perspectives which together form technical practices. (Fritsch, 2011; Pacey, 1983, p. 6).

The impact of technology in society is a fundamental issue that requires attention from a combination of disciplines for better understanding of human society and technology. Interdisciplinary focus is essential because of technology's ability to govern technological evolution. A viable avenue in viewing technology and society which influences humanitarian innovation is distinguishing technological determinism and social constructivism.

2.4.1   Social Constructivism

Social constructivism of technology gains its popularity in reaction to technological determinism. Unlike the deterministic proponents, this approach builds upon the nature of technology and its relation/effect to human activities in a social, political and economic stance. As Kaplan points convincingly, social constructivism "treats technology as a social construction that interacts with other social forces rather than as an autonomous entity with its own unique rationality" (Fritsch, 2011, p. 31). Technology in this case correlates with the patterns of human activities. Profoundly, constructive engagement in the society is part of technological evolution.

Constructivists unlike determinists view technological alternatives as co-host with other social forces. Evolution of technology represents the interrelation of social structures, economy and culture. There is no 'one best way' in interpreting technology and society in international relations as pronounced by determinists. Preferably, technology is a correlation between individuals, technical experts, organizations, bureaucrats in international relations (Fritsch, 2011; Kaplan, 2009).

As the theory highlights, a deep understanding of technology and society reflects a driving force of globalization which is becoming a benevolent feature in today's global order. In contrast with technological determinism which professes a realistic nature of technology, social constructivism reflects a liberalist notion of technology behind the changing systems of international order (Langhorne, 2001). Liberals concede that globalization is being driven by technology and socioeconomic aspects. As Giddens argues, "globalization entails multiple invasive processes that penetrate our everyday worlds, our routines and our sense of identity."(Steger, Battersby, & Siracusa, 2014, p. 2).

2.4.2 Technological Determinism

Technological Determinism builds upon a reductionist theory where technology shapes how a society operates; an aspect that has infiltrated developed nations since the inception of the industrial revolution (Fritsch, 2011). As Marx shows convincingly through his socioeconomic writings is that, human activities, social relations and organizational structures revolve around productive technology of a given society. Fritsch and Smith reach similar insights with a metanarrative perspective noting:

> The structure of popular narratives conveys a vivid sense of the efficacy of technology as a driving force of history: a technical innovation suddenly appears and causes important things to happen…Whether the new device seems to come out of nowhere, like some deus ex machina, or from the brain of a genius like Gutenberg or Whitney, the usual emphasis is on the material artefact and the changes it presumably effects…Unlike other, more abstract forces to which historians often assign determinative power…the thingness or tangibility of mechanical devices—their accessibility via sense perception—helps to create a sense of causal efficacy made visible. Taken together, these before-and-after narratives give credence to the idea of ''technology'' as an independent entity, a virtually autonomous agent of change (Smith & Marx, 1994, pp. X-XI).

This quotation demonstrates the impact of the industrial revolution and the rise of nation states. A period which illustrates today's global system driven by social, political and economic interest that have encompassed to war and conflicts in low and income countries. Realist proponents view this as a surge for power between states filled with political interests. (Amstutz, 2013). Technology in this point projects as sense of dominance amongst powerful states which most of them are trying to maximise on. As innovation studies show convincingly, inventions and diffusion process continue to be a driving force for development of new technology (Herrera, 2006). Existing science and technology organizations, education systems, and the emergence of disaster risk reduction methods, offer a viable avenue for national innovation policies, markets and companies.

In as much as realism in-cooperates national interest, pessimism and anarchy powered by political interests, the emergence and use of new technology also underpins its perspective in

the global spectrum. As the model highlights, realism denies the applicability of international ethics because of state interests (Graham, 2008, p. 20). This notion tends to ignore the systematic integration or structural change of technology into global affairs. This brings me to my next theoretical concept in assessing technology in the international relation which is social constructivism.

2.5 The Development of the Conceptual Framework

The figure below presents a description of the development conceptional framework.

Figure 2.6 Development conceptional framework: Author's framework

The table below illustrates a descriptive structure of the conceptual framework.

Concept	Element	Study
Social Embeddedness	-Passive -Consultation -Ownership	-(Gigler, 2014)
Sustainable-Led Innovation and Digital Innovation	-Innovation distributed among different kind of actors	- (Graham, 2008) - (Nielsen, 2017)
Social Innovation	-Psychometric approach -Social Refinement	-(Amstutz, 2013)

Table 2.2 Descriptive structure of the conceptual framework. Source: Author's framework

3   RESEARCH METHODOLOGY

3.1   Introduction

The purpose of this case study was to explore a participatory approach durable shelter projects on community participation by disaster affected persons to achieve sustainable livelihood of vulnerable persons affected by shocks and stressors. I believe that implementation of human rights on technological programmes is key on understanding the term humanitarian innovation including community participation of vulnerable persons and emerging ICTs in crisis situations. In seeking this phenomenon, I address one key research question containing two operational research questions. That is, how social embeddedness can be strengthened using innovative ways. The operational research questions including implementation of participation in shelter sites or residents and how decentralisation in technological programmes are implemented to ensure informed participation of vulnerable persons in technological humanitarian programmes.

Herein, in this chapter, I discuss the study's research methodology in the following criteria: I) Research methodology, ii) Research reliability and validity, iii) Research data collection and technique, IV) Research data type and source, VI) Triangulation, vii) Research sampling, viii) Research data analysis method, ix) Data limitation, xi) Research ethics, xii) Issues of trustworthy.

3.2   Research Methodology

3.2.1   Research Approach

Adopting a clear and informative research methodology is a key component of qualitative research. As Bryman shows convincingly, answering research questions is a definitive aspect of qualitative analysis (Bryman, 2012). In this study, I adopted an inductive approach based on building theory. As a component of qualitative analysis, contextual understanding and description of participant experiences were key unlike quantitative analysis which relates to generalization and quantification of variation or data. However, statistical data was also important in analysing the number of affected persons and damages from 2010-2016. (See also figure 4.1).

In adopting a qualitative approach, I focused upon discovering and interpreting the data I collected which in this case took the form of grounded theory. Bryman reaches similar insights

arguing that qualitative analysis projects individual experiences and relationships within a societal context (Bryman, 2012).

As the model highlights I assess the social trends of the Haitian case offering in-depth perspectives on humanitarian innovation. As (Bloomberg & Volpe, 2012; Bryman, 2012; Carey, 2013) shows convincingly, this approach allows a researcher to perceive other's perspectives holistically rather than in a reductionist interpretation.

3.2.2 Research Strategy

A fundamental issue on qualitive research is its tendency on addressing the aims and objectives of a research study (Bryman, 2012). Herein, I adopted a case study design method due to its adoption of a grounded theory.

Building a theory is incisive through using different strategies which is further redefined in accordance to data collected. As Carey argues, "… Case study research attempts to approach real-life phenomenon from the inside, using a range of methods (Carey, 2013, p. 108). Some designs may work well in a community or an individual level (Yin, 2009). Herein, this case study projects an interpretative phase a Participatory Approach durable shelters project. Yin argues that:

> a case study is an empirical inquiry that investigates a contemporary
>
> phenomenon in depth and within its real-life context, especially when
>
> the boundaries between phenomenon and context are not clear (Yin,
>
> 2009, p. 18).

This study relates well to Yin's idea in that I adopt an exploratory research where I assess the Haitian case in enhancing social embeddedness including social innovation so as vulnerable persons adopt sustainable livelihood. Most importantly, Hargadon's perspective on using microhistorical case studies to build grounded theory offers a viable avenue on this research strategy.(Elsbach & Kramer, 2016). He notes that:

> Microhistory describes the incentive study of particular lives, artefacts,
>
> events, or places with the object of revealing the fundamental
>
> experiences, cognition and action of the people involved (Elsbach &
>
> Kramer, 2016, p. 122).

A key element of using this strategy is that I don't emphasize on the historical perspective of the vulnerable persons. I limit this aspect upon answering key questions on enhancing social embeddedness including sustainable development to foster informed participation of vulnerable persons. For instance, figure 4.1 offers a key framework of this strategy in that it depicts the effect of natural disasters towards vulnerable persons on their occurrences until 2016. Just as Hargandon discusses on Mendonca and Morison's research on developing rather than testing a hypothesis on the transition from incumbent to innovative technology, recording the timeframe and series of the total damages and affected persons from the disasters indicate the economic, technical and regulatory institutions and their effects on vulnerable persons in humanitarian operations (Elsbach & Kramer, 2016, pp. 123-124).

Moreover, I used cross-case analogy focusing on disaster and crisis management caused by the tsunami and earthquake in the two cases. Cross-case is an integral aspect in qualitative research that I used to develop new ideas throughout the research study. Similarly, Yin points out that administering the correct protocol on collecting case study evidence is key in avoiding confusion between the unit of data collection and unit of analysis (Yin, 2009). This was important because I re-examined the innovative processes of the Haitian case study and investigated the role of technology and culture in enhancing community participation of the individuals for a sustainable livelihood. More profoundly, I correlated historical data and research methods to determine how disaster affected persons and clusters participated on the recovery programs and in establishing an innovative landscape towards informed participation of technological programmes in humanitarian operations.

Notably, I adopted a qualitative approach in this study in order to the address the nuance and complexity of the case. I adopted this approach continually searching for substantial documents cases in relation to the participatory durable shelter project which led to a case-study database. Yin holds that adopting this model projects a 'Level 3' question as part of the protocol in collecting case study evidence (Yin, 2009, pp. 86-88).

3.2.3 Research Philosophy

Theory assessment in qualitative research study is associated by an inductive or a deductive approach whereby the former builds on a theory whilst the latter test on a working theory (Bryman, 2012). I adopted an inductive approach based upon the research question and its operational. I relied on the research questions as a starting point in addressing the objectives of this study. Bryman reaches similar insights arguing that this prescribes a philosophical aspect of social research study from a positivistic and interpretivist standpoint (Bryman, 2012).

Herein, I adopted an interpretivism approach in relation to building up a theory from the data collected. The basis of this approach was to understand the participants and respondent's perspectives within a socio-economic perspective to analyse their sustainable livelihood and state of their recovery. Moreover, I also used this approach in decentralising humanitarian technology programmes, particularly enhancing social innovation so as foster informed participation of vulnerable women and in children and addressing challenges of SI and emerging ICTs through an ethical perspective. This approach was also determinant factor in limiting biasness. As Carey argues upon addressing research philosophy, "…certain social and cultural phenomena can be viewed as having independent reality of social actors. Therefore, the competent researcher can study phenomena from an unbiased position" (Carey, 2013, p. 78). Lincoln and Guba relates this with constructionism noting that, "the constructivist researcher's role is essentially that of 'passionate participant' as of the facilitator of multivoice reconstruction" (Bloomberg & Volpe, 2012, p. 9).

Upon reflecting towards the topic and objectives of the study, I underlined humanitarian innovation as a key aspect of implementing human rights and informed participation of humanitarian technological programmes. See also table 2.2 descriptive model in achieving humanitarian innovation. This in turn represents a counteractive notion whereby I researched upon developing a theory of this study. Holloway offers a viable perspective noting that "in social research, ontology is directly linked with epistemology because it encourages us to step back and consider deeper questions to ask and therefore assists us in the construction of a research methodology" (Carey, 2013, p. 78).

3.2.4 Research Reliability and Validity

Qualitative research is concerned with the quality of findings undertaken by a researcher through their research process in establishing a significant theory. As contested areas in social research studies, some scholars prefer using the terms credibility and dependability in evaluating the quality of empirical research(Bloomberg & Volpe, 2012; Bryman, 2012).

In this study, I adopted a case study research design which entailed a critical description and analysis of the Haitian participatory case including the responders. Assessment was hereby noteworthy.

Yin constitutes four assessment criteria that include construct validity, internal validity, external validity and reliability (Bryman, 2012; Yin, 2009, pp. 40-41).

In administering reliability of this study, I based my findings upon cross-case study and documents. Yin reaches similar insights based on 'Level 3' of his study protocol and the use of sufficient documents (Yin, 2009). Hereby this study in revolves research questions based on its objectives in relation to the conceptual framework. For instance, in finding out the inefficiency of information transfer both in the hubs and referral centres which indicted limited informed participation, I was eager to find out the importance of informed consent and how it differed from other shelters or residents. This was evident in PR-A which experienced challenges in using a referral system that lacked community participation of affected persons.

Yin's 'Level 3' offer similar insights where I relied on cross-case analysis that led to the findings of a similar scenario in PR-B through assessment retweet in during the 2010 Haiti earthquake. Moreover, I also used documentation in projecting the individuals and correspondents' perceptions in recovering from the disaster. Recording of commentary and quotations from the documents led to maintenance of relevant sources, during cross-case analysis.

Looking at the internal validity, I extensively relied upon relating data analysis and the conceptual framework reflecting the development of an observational and theoretical scope of the study. LeCompte and Goetz offer a viable avenue on this noting that this is an important feature of qualitative research especially in ethnographic, that is, visual research that allows the researcher to develop "congruence between concepts and observation"(Bryman, 2012, p. 384). Herein, I formulated theoretical ideas throughout the research study through critical analysis and interpretation, synthesising the findings and drawing conclusions and recommendations. See also section 5.0. In addition, I also relied on visual ethnography through photo-elicitation in 'spring boarding' the analysis of PR-A and PR-B (Bryman, 2012). On a wider note, I evaluated the images from a reflexive approach, in relation to the study's conceptual framework. Upon focusing on internal validity, I was keen on inferences in pursuing the findings based on data analysis through documents; an aspect in which Yin notes that, "…a case study involves an inference every time an event cannot be directly observed." (Yin, 2009, p. 43).

Looking towards construct validity, I relied on several sources during data collection in analysing the cases. Yin holds that researchers adopt subjective judgements that lead to a failure in acquiring sufficient measures of data collection during case analysis (Yin, 2009, p. 41). Herein, I developed Sen's capability approach through analysis and creating new ideas using in order to address construct validity of the research, that is, the relationship between

sustainable-led innovation, participation and social innovation. I implemented this to address the research questions and objectives of this study including enhancing social embeddedness to foster informed participation of vulnerable persons and addressing the challenges of SI and emerging ICTs programmes through an ethical perspective. As Yin shows convincingly, "identifying correct operational measures for the concepts being studied"(Yin, 2009, p. 40) is key towards the construct validity of a research study.

In addressing the external validity, I relied on cross-case analysis in drawing up relational findings for PR-A and PR-B in accordance to the Signal Code and Sphere Standards[17]. I did this through analytical generalization unlike statistical generation to build a subsequent theory in accordance the findings. I also relied on the research questions and objectives in explaining the entirety of the conceptual framework. I corresponded different conceptual variables for a wider scope on building the theory. Moreover, I pooled community participation with humanitarian work and SLI to enhance awareness of disaster affected persons towards the expectations of aid providers. I also pooled community participation with SLI and the 'degree of participation' in enhancing the humanitarian sector including donor countries and member states response to the affected persons' needs. Lastly, I correlated community participation with SLDI and informed participation to enhance effective innovation on organizational leadership and leadership performance. Qualitative research in this case involves critical analysis of small groups and (eminent)individuals projected through contextual uniqueness of its findings (Bryman, 2012, p. 384). It is in this case that Guba and Lincoln refer to Geertz's concept of 'thick description' being "a database for making judgements about the possible transferability of findings to other milieux" (Bloomberg & Volpe, 2012; Bryman, 2012, p. 384).

3.3   Research Data Collection Techniques

Qualitative research entail enormous data which for its validity require multiple processes of data gathering in projecting a clear in-depth understanding for the reader (Bloomberg & Volpe, 2012; Bryman, 2012). In relation to this, I employed multiple methods of data collection and techniques to attain critical understanding of the research study. According to (Creswell, 2013b; Denzin & Lincoln, 2003), this approach instils rigor and breadth in turn providing affirmative evidence of the data collected and interpretation of the findings (Bloomberg & Volpe, 2012). Bloomberg and Volpe reach similar insights noting that, "specific techniques, procedures or

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[17] The Signal Code and Sphere Standards were incisive in ensuring implementation of updated universal guidelines of human rights and informed participation of humanitarian technological programmes towards vulnerable persons.

tools used by the researcher to generate and analyse data" (Bloomberg & Volpe, 2012, p. 73). However, in this study, I use documents as the main data collection technique. More so, I gather text and image from the case study. The data include the shelter standards, technological artefacts including mobile phones and hubs, and cultural aspect of the vulnerable persons. On the other note, secondary data collection includes articles on ICT and development, information from humanitarian, SDG vision 2030 and data from seminars including Humanitarian Innovation Day 2017[18] and hackathons (UN Women/NOREPs blockchain humanitarian aid). As a means of data collection, the internet also proved to be incisive because of online ethnography, online surveys and online documents. Using numerous data collection was a key aspect of achieving triangulation. Bowen's perspective on document rationality offers a viable avenue in this point noting:

> by examining information collected through different methods, the researcher
> can corroborate findings across data sets across and thus reduce the impact of
> potential biases that can exist in a single study- (Bowen, 2009, p. 28).

This note hereby leads to next point where I discuss the application of documents in this study.

3.3.1 Documents

To the meet the objectives and assessment of the research questions, I relied on documents as the main data collection technique. are key materials that remain independent in social research. Herein, I preserved the material for continually analysis throughout the research correlated to the conception framework and updated guidelines on human rights and participation of humanitarian technological programmes.

I accessed humanitarian operations documents and reports including IFRC Haiti Shelter cluster which corresponded to the research questions of the study. As Bryman suggests, "the state is the source of a great deal of information of potential significance for social researchers." (Bryman, 2012, p. 552). In essence, I gained an overview of critical developments in relation to the Norwegian humanitarian response to natural disasters in Haiti. Herein, I collected the necessary documents related to the Haiti earthquake. (See sect 1.5.6 on the purposes and data analysed of the documents). I also had access to the organization's directory, so I could examine documents related to humanitarian action and camp management toolkits including relevant information on policies and strategy and lastly files documenting on future proposals and projects on natural disasters in Haiti. As a guidance on analysing these documents, I relied on

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[18] See also: https://www.innovasjonnorge.no/en/start-page/noreps/events/humanitarian-innovation-day/

Scott's four criteria on authenticity, credibility, representativeness and meaning, for evaluation purposes (Bryman, 2012, p. 546). In this manner, I discerned relevant themes that were incisive for the findings and interpretation of the study through content analysis. Labuschagne reaches similar insights noting that, "Document analysis yields data—excerpts, quotations, or entire passages—that are then organised into major themes, categories, and case examples specifically through content analysis" (Bowen, 2009, p. 28).

By using documents, I generated more questions and situations throughout the research. For instance, upon assessing informed participation of implementation human rights in humanitarian technological programmes in relation to the conceptional framework, the role of community participation became more adverse in establishing the content of social innovation, that is, social refinement. Goldstein and Reiboldt's perspective on document analysis offer viable grounds on this point. Their longitudinal ethnographic study of service use among families living in poor urban communities demonstrated how different methods complement one another through interactive ways.(Bowen, 2009, p. 30).

Documents analysis were a key aspect in verifying the findings. For instance, in finding out the referral system and communication capability of vulnerable youth and women, I relied on the findings which were based on intense search of relevant policies and communication strategies including verification of legitimate crisis information through tweeting. Herein, organisation documents had a distinct role in the methodology design and corroboration of credibility relative to data collection methods, including visual ethnography in social research (Bloomberg & Volpe, 2012; Bryman, 2012, pp. 451-452; Denzin & Lincoln, 2003).

Another important aspect of document methodology is its unobtrusiveness and manageable capacity considering its concern on flexibility correspondent to a researcher's social interaction and knowledge of influencing the research study (Bloomberg & Volpe, 2012; Bowen, 2009; Bryman, 2012). I relied on coordinating the documents from the cross-case study' from regional, national and global sources correlated to the conception framework. Herein, I constructed discernments of PR-A and PR-B in relation to the research questions which didn't alter the documents unlike when observing or being involved in participant ethnography. This played an import role towards establishing a concise methodological study because of the value of documents.

Despite its efficiency and cost effectiveness, documents are also prone to limitations. Because of this, I couldn't access sufficient information on community participation correlated to the research question. Bowen argues that this is because of the 'independency' upon which some

case study documents area created. Herein, I relied upon 'good listening'[19] approach in reviewing the documents resulting in correlating the research questions and the findings. As Yin found out, poor listeners are prone to suffer from closed mindedness or poor memory that entail skipping relevant information between the lines of documents (Yin, 2009, p. 70). He goes on to note that:

> The listening skill also needs to be applied to the inspection of documentary evidence, as well to observations of real life situations. In reviewing documents, listening takes the form of worrying whether there is an important massage between the lines…with other sources of information…gained in this way (Yin, 2009, p. 70).

Hereby, in developing this approach as a source of data collection, I maintained an open mind throughout the analysis and interpretation of the data.

I also relied on literature that were relevant for the study in correlating the research questions with the conceptual framework. In addition, I also used a notebook in recording relevant insights upon visiting the Norsk Utenrikspolitisk Institutt (Norwegian Institute of International Affairs) and technology seminars. In this regard, I maintained an open-mind throughout the analysis and interpretation stage resulting to changes in the coding scheme. Similarly, in his study of organizational behaviour, Turner refers to the use of documents as 'field notes' that influenced his findings (Bowen, 2009, p. 34; Turner, 1983).

3.3.2   The internet as a means of data collection

Social science research entails online data collection that takes the form of online ethnography, online interviews, online documents and online surveys as methods of data collection (Bloomberg & Volpe, 2012; Bryman, 2012; Yin, 2009). Considering the use of cross-case study, I converted relevant documents into PDF and stored them electronically in files. Yin issues similar insights arguing that different methods of data collection using internet also fall under the protocol of a researcher's case study.(Yin, 2009). In this manner, I undertook cross-reference, a term projected by Yin on case study documents, whereby I recorded commentaries and quotations of disaster affected persons and respondents from the Haitian participatory case study. Considering this, I created a case study database for the research study. Herein, in argues

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[19] According to the Thomas Coram Research Unit, the identification of listening, participation and consultation of young children in education and childcare settings entail two aspects:
"everyday listening by those who regularly work with young children, giving opportunities for decision-making in routines and activities and one-off consultation about a particular issue, event or opportunity."- (Alison Clark)

that, documents, tabular materials and narratives make up the components of developing a case study database (Yin, 2009, pp. 118-122).

In responding to the research question and operational research questions, I relied on online survey based on the archival analysis of documents that were electronically stored in files. Critically, I used this instrument for corroboration purposes and supporting evidence of the research findings. Similarly, a wind field or walking survey is also applicable in assessing the community needs and resources of vulnerable persons, only in this perspective I assessed the survey which took the form of filed documents[20] (Community, 2016a, 2016c; Yin, 2009).

In assessing the objectives and research questions of the study, I also relied on online documentation as a key instrument of data collection. I adopted an open-minded approach in using this instrument which is also driven by Merriam argument of being imaginative and industrious towards public records (Bowen, 2009; Merriam, 1998).

In structuring the concepts and key words of the study, I used to search engines including Clarivate Analytics, Web of Science (WoS) and Oria. Key words included "humanitarian innovation", "human rights innovation", "sustainable innovation", "social innovation", "ethics technology", "design technology", "humanitarian design" and "technology innovation".

I also assessed the content analysis of the reliefweb[21] profiles of the 2004 Tsunami in Sri Lanka and 2010 Haiti earthquake that revealed relevant data on thematic concerns of the study. Similarly, Bullen's and Schepers' also use content analysis of Belgian Facebook profiles in examining the representation of alcohol use (Bryman, 2012, p. 556). In developing this approach, I assessed the 'Most read and Most viewed' links/tags on the 'relief-websites' including humanitarian innovation and digital humanitarianism. In this manner, I identified development humanitarian aspects throughout the research work in comparison to OCHA (Bryman, 2012; Ocha, 2016b)[22].

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[20] See also: Award-Winning Community-Driven Strategic Planning Process (Community, 2016b)

[21] Reliefweb is an online source humanitarian information on global crises and disaster. According to OCHA, "Reliefweb is the leading humanitarian information source on global crises and disasters. It is a specialized digital service of the UN Office for the Coordination of Humanitarian Affairs." (Reliefweb, 2007). See also: http://reliefweb.int/history

[22] See also: The timeline for 25yrs of OCHA's coordination in humanitarian coordination (Ocha, 2016a); and the Haiti humanitarian dashboard response after 4yrs in relation to the case study's analysis (Reliefweb, 2014).

3.3.3 Research data type and data source

Research data and data source are key components of social research study driven by both qualitative and quantitative data. This comes in the form of secondary and primary data. However, in this research study, I focus on qualitative data.

Data collection in qualitative research is integral to the outcome of a research study. I hereby use primary, secondary and tertiary data in assessing the research questions and objectives of this study. Hargadon reaches similar insights note that:

> If your questions addresses how actors shape a particular sense of emerging technologies, then newspaper articles of the time serve as primary sources…More important than inventorying such data sources is considering(discussing) their reliability and credibility: what story they tell and why will determine their usefulness.(Elsbach & Kramer, 2016, p. 129).

In terms of secondary data, I used websites, cluster policies and academic work. In this manner, I correlated the data analysis of SLI and informed participation of vulnerable persons in discussing how to enhance social embeddedness. In addition, I also used organisational and institutional reports to obtain a background knowledge of the cases which was incisive in analysising the data in correlation with the conceptial framework and updated guidelines and Standards of human rights in humanitarian technology programmes.

The images in this case presented visual elements including the social, cultural and economic status of the study. Upon analysing the visual context of this data I conceptionalised the role of organizational culture involved in the disaster risk reduction(DRR) which was critical in building a theory for the research. In this manner, qualitative analysis presents an arena of studying images in a cross-case study. Elsbach & Kramer notes that, "as you get closer to understnading the cognition and actions of the individuals involved, you may find it necessary to collect further data on the context they inhabit"- (Elsbach & Kramer, 2016, p. 129). Bryman reaches similar insights arguing that secondary approach allows for analysis and interpretation of data. (Bryman, 2012).

One of the advantages of using secondary data is that it is effective and time manageable (Bryman, 2012). This correlates to the data I collected which contains a wider geographical range. I also used cross-cultural analysis presenting the norms and values of vulnerable commuinities affected by the 2010 Haitian earhquake.I correlate this with the updated

guidelines on informed participation and implimentation of human rights on humanitarian programmes.

Another advantage of secondary analysis is reanalysis. According to Bryman, reanalysis offers new interpretations and variable interest, that is, a factor in which some researchers don't envision (Bryman, 1994). In reanalysing data, I mean 'innovation' or to 'co-create'.

Moreover, Bryman also notes that reanalysis presents new theorectical ideas (Bryman, 2012). Upon reanalysing the data of this thesis, I inducted two theorectical ideas which were incisive in answering the research questions and objectives of this thesis. These including 'technological determinism and 'social constructivism'. (See also section 2.4). In adopting these terms, I synthesised the data available in answering the research questioin and objectives of this thesis. This was integral in addressing challenges on sustainable livelihood including informed participation and implementation of human rights in humanitarian technology programmes. Bryman reaches similar insights arguing that primary researchers focus on central questions whereas secondary analysis enhances the possibility of a wider range of using the data. Per Hansen also argues that the primary and secondary sources differ from each depending on the nature of the research question (Elsbach & Kramer, 2016, p. 131).

The importance of attaining a bakground knowledge of the secondary and primary data that I incooperate in this study, was to obtain a humanitarian innovative undertanding of cases PR-A and PR-B. This entailes corelating humanitarian work and innovation through social amebeddness resulting to the awareness of SI and ethics of emerging ICTs inorder to address the researher questions and objectives of this study. However, secondary data also bares its own limitation due to the complexity of the data. (Bryman, 2012). This is evident in the data analysis and dicussion section whereby I use critical analysis in classifying the SI components using the conceptual framework(interactive literactive) in understanding the nature of humanitarian innovation in particular, Fritsch's broad perspective of technology(See also figure 2.7) and holistic change in today's humanitarian operations.

3.4   Triangulation

The use of triangulation as a data collection technique is a credential aspect in qualitative research method. Eisner argues that, "by triangulating data, the researcher attempts to provide

'a confluence of evidence that breeds credibility" (Bowen, 2009, p. 28). In assessing the research question and objectives of this study, I employed different methods and sources of data. Denzin reaches similar insights noting that triangulation entails the use of, "multiple methods, observers, theoretical perspectives, sources of data, and methodologies…" (Bryman, 2012, p. 386). In essence to these perspectives, I used several triangulation instruments correlated to Patton's approach including data triangulation and visual ethnography (Yin, 2009, p. 116).

3.4.1 Data triangulation

In addressing the research questions and objectives of this study, I relied on a convergence of evidence from the data collected using documents. As Bowen shows convincingly:

> the rational for document analysis lies in its role in methodological and triangulation, the immense value of documents, in case study and its usefulness as a stand-alone for specialised method for qualitative research methods.(Bowen, 2009, p. 29).

Physical and online documents were key on ensuring in-depth analysis of the Haitian case study. In this case, I compared documents of key issues including cluster strategies and coordination systems from different managerial levels of organisations from the international, national and regional sectors that were involved in the traditional technique participatory approach durable shelters project in Haiti. This included the IFRC clusters, UNICEF functional units and local Haiti hubs involved humanitarian technology communication centres.

3.4.2 Visual Ethnography

I also employed visual ethnography as a triangulating instrument with documents in assessing the research question and objectives of this study. I relied on images from the Haiti traditional technique participatory approach and the decentralization of hashtags sent from the affected persons in addressing the level of participation amongst vulnerable communities. As Pink argues, visual ethnography has gained popularity as a source of data in terms of its conceptualization in social research from a realist and reflexive approach (Bryman, 2012, pp. 452-454).

In developing data triangulation and visual ethnography, I retained a level of open-mindedness which is an important factor on a case study approach. As the study developed into its interpretational and discussion stages, I employed context triangulation through the findings.

Triangulating using a variety of data collection methods is incisive especially in ensuring the validity and integrity of a case study. Moreover, I build a concise theory as the research drew to its discussion and conclusion chapters. Glaser and Strauss perspective on triangulation offers a viable avenue noting that:

> …the usefulness of documents for theory building is a process that 'begs for comparative analysis [with the library offering] a fantastic range of comparison groups, if only the researcher has the ingenuity to discover them. (Bowen, 2009, p. 35).

In relation to Bowen's argument, I used the demographic information of PR-B in provision of contextual data through document review. However, Bowen also argues that triangulation of data sources using documents comes with its own limitation including respondents bias and reactivity from both the researcher's and reader's perspective (Bowen, 2009). In limiting these factors and building a concise theory, I employed thick description in comprehending informed participation of affected persons abilities and social text through their own narratives. Bryman issues similar insights noting that this not only projects transferability but it alleviates the verification of theory development.(Bryman, 2012, p. 384). A key note to consider is that triangulation also provides an arena of quantifying qualitative data and data expansion using multiple sources. This was incisive in analysing damages and affected persons from 2010-2016. (See also figure 4.1).

3.5   Research Sampling

3.5.1   Qualitative Research: Purpose Sampling

On addressing the research questions and objectives of the study, I employed purposive sampling as key element of the research methodology. In order to yield reliable information about a phenomenon from a study, purpose sampling is incisive on theoretical grounds and documentation of case studies (Anselm Strauss & Corbin, 1990; Bloomberg & Volpe, 2012; Bryman, 2012, pp. 407-420; Patton, 2015). I hereby used shelter studies documents of the Haitian case study in establishing the social and cultural relations of the disaster affected persons in turn analysing the degree their participation towards sustainable livelihood. I conducted this in relation to the conception framework. Thus, theoretic sampling is a key aspect I employed in building the theory of the study resulting from the variation of the data I collect. In this way I avoided generalising the findings into wider perspectives.

I also relied on purposive sampling upon selecting appropriate organizations that were relevant for the study using documentation unlike generalizing (Patton, 2015). This involved IFRC Shelter led cluster in Haiti, Hashtags Standards for Emergencies and Norwegian Humanitarian Response to Natural disaster.

I also used homogenous sampling (Patton, 2015). I approached this notion through answering the research question and objectives of the study where I located the individuals in relation to the referral system. Establishing the role of affected of affected persons in referral centres and hub was incisive in defining informed participation and the implementation of human rights towards recovery.

3.6 Research Data and Analysis

In assessing the research questions and objectives of the study, I relied on several data analytical techniques including structural analysis, interpretational analysis and reflective analysis (Bryman, 2012). Design thinking was also key in analysing ICTs used in current humanitarian programmes

In using structural analysis, I investigated the patterns of texts of the participatory approach of the Haitian case study. Interpretation analysis was also important whereby I identified key common traits of the cases including the innovation paradigms. Reflexive analysis was also a key factor in that I referred to experts and researchers in the analysis of the case.

In projecting conciseness in this section, I developed the conceptual framework including the Signal Code that were key in this research work. (See also section 2.5). Bloomberg & Volpe offers similar insights arguing that categorizing the conceptual framework is incisive because it involves the repositories of a researcher's data (Bloomberg & Volpe, 2012, p. 74). In essence, I relied on qualitative data analysis techniques whereby I devised a coding scheme in developing different phrases of the analysis chapter.

In adopting a coding technique, I analysed relevant thematic concerns that were incisive for the findings of the study. Bryman argues that coding represents the central phase of grounded theory (Bryman, 2012). In developing this notion, I analysed the data collected in the form of an inductive approach. Herein, I formulated the findings from data collected correlating them to the conceptional framework. I gathered relevant documents and review reports in relation to the research questions, breaking down long paragraphs and sentences and taking short notes using a notebook. Notable documents were the Review of the IFRC-led Shelter Cluster Haiti 2010, Norwegian humanitarian response to natural disasters-Case of Haiti Earthquake January

2010 and the Hashtag Standards for Emergencies. Herein, I established relevant concepts which according to Strauss and Corbin correlates building blocks of theory (Bryman, 2012).

Due to the large volume of data, I relied on design thinking and taking notes to identify key aspects of the case study. I correlated the needs of vulnerable persons and technology design artefacts including mobile phones in relation to non-coercive humanitarian action approach, that is, relief efforts based directly on human suffering, diverse actors including NGOs, IGOs private donors, technological assistance) in answering the research questions. More so, I referred to the Signal Code and Sphere Standards as well as the UDHR in correlating the needs of the vulnerable persons and the project structures. In doing this, I formulated innovate approaches in fostering informed participation of vulnerable persons. (See section 6.4). Moreover, I refined the findings in relation to the research questions and conceptual framework. In line with this, I relied on the 'Framework' analytical approach through applied policy research in addressing the nature of policies implemented PR-B. As an incentive to policy makers, Walker notes that:

> What qualitative researcher can offer the policy maker is a theory of social action grounded on experiences-the world view-of those likely to be affected by a policy decision or thought to be part of the problem (Bryman, 1994, p. 174).

Herein, I analysed the policies implemented the Haitian case study correlating them to the research questions and objectives of the study through diagnosis, evaluation and strategic categories that were incisive in analysing and interpreting the findings. In this manner, I evaluated the referral system of PR-B to a needs-based approach in turn evaluating degree of participation and community participation of the disaster affected persons. More so, I evaluated the policy making of the clusters and organisations in making these decision and projecting credibility of the findings. As a result, I relied innovation and sustainability so as to in-cooperating individual needs of affected persons and the ethical perspectives through data literacy and human-centred design in the discussion section.

I also evaluated the cluster systems on addressing the objectives of the study in building a concise theory. The merits that comes with this approach is that I had already devised relevant objectives that were to be addressed including the research questions. However, qualitative research on social policies also comes with its own limitation. With this I relied on document analysis in most part of the study in assessing the social policies which according to Bryman

limits the generation of new data that can be accompanied by personal interviews and observation work (Bryman, 1994).

3.6.1 Cross-case analysis

Qualitative social research method is usually based on an inductive method of building theory. Hereby, I relied on cross-case analysis in assessing the research questions and objectives of the case study. As an analytical approach in case study, I established patterns between PR-A and PR-B in form of tables (2 *3) to identify corresponding traits of the elements of the conceptual framework and informed participation of vulnerable persons. Yin and Creswell offers similar insights arguing that the achievement of tables is based on the study of two or more case (Creswell, 2013b, p. 198; Yin, 2009). Hereby, I correlated PR-A and PR-B with the elements of the conceptual framework the Signal Code. The implication with this approach which took the form of word tables, was to gain similarities and differences between the cases. In addition, I also used this approach in formulating and interpreting the findings.

3.6.2 Case description

As an analytic technique of case study, I relied on case description in stating the content of the cases. This included an introduction, overview, the data analysis and the summary of the key findings. In the overview, I highlighted the participatory approach on durable shelter project from the rural part of Haiti where I framed the main causes of the disaster, its impact and the type of responses from the humanitarian sector. I also highlighted the major clusters including stakeholder coordination.

Clarity and formulation of a case study is important in qualitative social studies. Herein I presented the data analysis of the study whereby I noted key elements of the conception framework so as to answer the research questions and address the objectives of this study. In this manner, I categorised SLI, participation and social innovation, each containing its core elements so as to identify key components of the findings. Similarly, Strauss & Corbin argue that the concept 'category' poses the same function as it consists of data, events, happenings and instances (Anselm Strauss & Corbin, 1990; Creswell, 2013b, p. 86). In addition, I discarded unwanted data through open coding which provided different views of interpretation correlated to the conceptual framework. An approach Wolcott refers to as 'winnowing' the data, which is incisive in the developments of codes (Creswell, 2013a).

3.7   Research Limitation

Due to limited data and time, I focused on analysing the data content of PR-B. However, research limitation is a challenging aspect in qualitative research study. This is because of the large amount data pertaining qualitative research method study. In this research study, I use both primary and secondary analysis. Despite its advantages on large access of data, secondary analysis of data remains a key challenge in this study because of developing concepts. Bryman argues that familiarity of data is necessary in qualitative research study, despite complexity of organisation documents (Bryman, 2012).

3.8   Research Ethics

Research ethics is a fundamental aspect of a qualitative research study. In this study, I develop a universal approach of analysis. A key aspect on using this approach is to address the objectives and research question of this study. Considering the diverse thematic concern of human rights and technology, a universal approach remains fundamental for future researchers. Bryman notes that, "a universalist stance takes the view that ethical precepts should never be broken. Infractions of ethical principles are wrong in a moral sense and are damaging to social research" (Bryman, 2012, p. 133) The ethical standpoint in this research study is incisive in addressing research questions and objectives of this study.

3.9   Issues of Trustworthy

Research quality in social science research study is a fundamental aspect in determining analysis, findings and constructive theory of a study. This study consists of a qualitative research method approach which entails key aspects of trustworthiness. According to Lincoln and Guba (1985) and Guba and Lincoln (1994), trustworthiness of a qualitative research study involves four criteria namely credibility, transferability, dependability and confirmability (Bryman, 2012).

3.9.1   Credibility

Credibility in qualitive research methods is incisive in determining the social reality of a research study (Bryman, 2012). In this study, I focus on key humanitarian e and stakeholders that are involved in the case study. Qualitative research methods comprise of social settings

that change overtime. As a participatory approach shelter cluster case study from Haiti corelated to analysing emerging technology, key developing aspects are noteworthy. This is a key fundamental aspect of triangulation. According to Webb et al. (1966),

> triangulation is an approach to the development of measures of concepts, whereby more than one method would be employed in the development of measures, resulting in greater confidence in findings (Bryman, 2012, p. 392).

Hereby, I also use triangulation in collecting data and validation analysis in this study.

3.9.2 Transferability

Transferability is also a trustworthy assessment approach in a qualitative research study. Unlike credibility which involves internal content of a research study, transferability entail external aspects (Bryman, 2012).

Transferability is a fundamental aspect in this qualitative study because its objectives and research question which involve two sub questions. Moreover, this research study involves debatable findings due to involving aspects including emerging technologies used in humanitarian programmes. Profoundly, human rights issues also make this research study more intriguing corelated to its finding. In applying transferability, I define deeply the essential concepts of this research study in the conceptional framework. Moreover, I discuss extensively the relationship between the conceptional framework and the analysis in chapter four (See also section 4). This involves the case presentation of this study. Profoundly, transferability features thick description in qualitative research study. Lincoln and Guba note that, "a thick description provides others with what they refer to as a database for making judgements about the possible transferability of findings to other milieu" (Bryman, 2012, p. 392). Hereby, the thematic approach under the conceptional framework, responders including disaster affected persons and the case presentation of this research study, build upon the theoretical conclusion of this research study.

However, this approach uncovers limitations in qualitative research study due to its rigorous amount of data regardless of its analysis, findings or conclusion. Lincoln and Guba (1985: 316) argue that, "…whether findings 'hold in some other context, or even in the same context at some other time, is an empirical issue'…" (Bryman, 2012, p. 392). Hereby, I discuss the conceptional framework and the case presentation of this research study broadly to validate trustworthiness.

3.9.3 Confirmability

Confirmability is a fundamental aspect of validating trustworthiness with limited 'objectivity' of a qualitative research study (Bryman, 2012). Profoundly, a researcher should limit "personal values or theoretical inclinations" that affect the research study or finding of a qualitative research study (Bryman, 2012). In addressing confirmability, I maintain an open mind throughout the study. By using the flexibility of the conceptional framework, I aim to develop innovative ideas in chapter six. Profoundly, I use Sen's capability approach and Nussbaum's ethical values corelated to the research question and objectives of this study. This is a key approach I use in making sense of the data through coding. Moreover, thematic concepts on human rights remains a key issue, throughout the research study.

Another approach where I validate confirmability is developing the theorical approaches of key philosophers in this study. I use design thinking in constructing key concepts which corelated to the research question and objectives of this study. As a result, I develop constructive thinking corelated to the guidelines of the Signal Code and Humanitarian Standards approaches.

3.9.4 Dependability

Dependability is a fundamental qualitative research method that I use in this study for trustworthy purposes. As an extensive audit requirement, Lincoln and Guba note that, dependability ensures that "…records are kept of all phases of the research process…problem formulation, selection of research participants, fieldwork notes, interview transcripts, data analysis decisions…in an accessible manner" (Bryman, 2012, p. 392).

Since this research study involves documents, using updated guidelines on implementing human rights on humanitarian technology programmes is fundamental. Profoundly, I use the Signal Code and the humanitarian standard guidelines on data and security in problem formulation and data analysis of this study. In selecting research participants including disaster vulnerable persons, responders and stakeholders, I use major the major documents of this research case study namely, Review of the International Federation of Red Cross and Red Crescent Societies (IFRC)-led Shelter Cluster Haiti 2010, United Nations Office for Coordination of Humanitarian Affairs (OCHA) Hashtags Standards for Emergencies-Retweeting during the 2010 Haiti Crisis, Norwegian humanitarian response to natural disasters. Case of Haiti Earthquake January 2010. In keeping these records intact, I use data files, a flash drive and a notebook.

However, this approach of validating trustworthiness in a qualitative research method unfold debatable limitations. This is because auditing lacks popularity to validate dependability in qualitative research (Bryman, 2012). Arguably, this research study involves the implementation of human rights in humanitarian technology programmes, making it an intriguing developmental framework for future researchers. I believe that behaviour and social informatics are key fields of study under sociotechnical case studies for future researchers.

Behaviour change of disaster vulnerable persons is a fundamental analysis in this study because of digital intervention in disaster vulnerable regions. Therefore, I discuss with deep awareness the case presentation corelated to the conceptional framework to address the research question and objectives of this study.

3.9.5   Authenticity

Authentication is a critical aspect in validating trustworthiness in qualitative research study (Bryman, 2012). Key aspects concerning authenticity involve educative authenticity, ontological authenticity, fairness authenticity, catalytical authenticity and tactical authenticity (Bryman, 2012).

In addressing the authenticity of this study, I remain bi-partisan throughout the analysis by focusing on both the demands of disaster vulnerable persons and stakeholders. Arguably, political standpoints still remain controversial in qualitative research study (Bryman, 2012, p. 393). However, I limit political issues and focus entirely on developing sustainable-livelihood ideas of disaster vulnerable persons in a digital era of emerging ICTs in humanitarian programmes.

Developing fairness towards disaster vulnerable persons is noteworthy throughout this research study. As key participants of this study, I present different views points of vulnerable persons in adapting a sustainable-livelihood. Profoundly, I develop Sen's capability approach and Nussbaum's ethical values in constructing capability capacity of disaster vulnerable persons.

Tactical authenticity is also vital in this research study where I advise human rights and technological researchers on future research, despite the debatable issues on crisis data management. Bryman notes that, "The authenticity criteria are thought-provoking but have not been influential, and their emphasis on the wider impact of research is controversial" (Bryman, 2012, p. 393).

In developing the authenticity of this research, I focus on the capability of disaster vulnerable persons and the ability stakeholders to construct a wider view humanitarian innovation.

Similarly, Bryman relates this approach to action research (Bryman, 2012). Bryman further notes that, "Action research is more common in some social science areas than others. It is more common in fields such as business and management research and social policy than others" (Bryman, 2012, p. 397).

4 CASE PRESENTATION

4.1 Introduction

The purpose of this chapter is to provide a qualitative analysis roadmap of the multi-case study. To achieve this, I review and explore the data to gain insights of the cases (PR-A and PR-B) and to establish thematic concerns or 'big ideas'. Second, I dissect and review the data through coding. This include summary tables and figures of the case projects. I also sort and categorize the most relevant quotations of the data. As a case design method, I identify the descriptors from data through open coding based on the language from the participants using relevant documents. Third, I present the findings of the data using summary tables in relation to the conceptual framework and research questions. In relation to this, I also present quotations from the correspondents/participants using documented reports including commentaries and statements. I summarize the chapter with an outline of the analytical process of the chapter and a summary of the key findings.

4.2 Overview

4.2.1 Haiti 2010 Earthquake (PR-B)

In 2010 more than 220, 000 people lost their lives due to a 7.0 magnitude earthquake that hit Port au Prince, Haiti.[23] Over 100,000 people were homeless which led to the construction of temporary shelters to accommodate of 1.5 million. Communication using mobile phones was integral in ensuring the safety of affected persons. Social media including retweeting played a key role in the provision and updates and operational needs of vulnerable persons.

Due to its magnitude, damages and loss of lives, implementation of a decentralized system using technology by humanitarian organisations and stakeholders was key. Considering the enormous information relayed by tweets, 'on the ground information' was integral in encouraging social media in crisis situations and moral culture of collecting relevant tweets from affected communities (Sarcevic et al., 2012). Different methods were used in identifying the locations and shelters of affected communities including tweet hashtags and Tweeter's Application Programming Engine (API) search engine that involved key words *earthquake, Port-au-Prince, tsunami. Haiti,* and *Quest* (Sarcevic et al., 2012).

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[23] See also (Emdat, 2016)

Tracking of affected persons was also incisive in identifying disease outbreaks including and community migration. A key method for tracking affected persons involved using position data of SIM cards which indicated high use of mobile phones (Meier, 2011).

Communication with disaster affected persons is fundamental in addressing sustainable-livelihood including better response on future disasters. Key challenges that materialised in response to the participatory approach Haiti case study included communication management with affected persons. This involved informed participation on humanitarian technology programmes and the implementation of human rights. Studies indicate that lack of feedback mechanisms, accountability discrepancies, poor coordination between regional based staff and stakeholders, poor information literacy by affected persons and 'broken promises phenomenon' were notable aspects in address the participatory approach Haiti disaster (Meier, 2010).

Different actors were involved in the Haiti participatory approach shelter cluster, which is the main case study of this thesis.

Humanitarian response from the disaster management consisted of large scale funding and shelter solutions. Some of the main actors were Shelter & Settlement Department, Camp Coordination Camp Management, International Federation of Red Cross and Red Crescent Societies, Recovery Clusters in addressing the crisis.[24] Humanitarian organisations experienced challenges on shelter construction and land issues due to densely populated areas and lack of accessibility to rural areas due to poor roads. The main goal of the Shelter Projects was to administer ownership through participation[25].

4.2.2   Sri Lanka, 2004 (PR-A)

On 26 December 2004, one of the world's devastating natural disaster hit Sri Lanka. The Tsunami which was triggered by an earthquake in the Indian Ocean which affected more than 12 countries including India, Thailand and Indonesia. Over 200,000 people lost their lives most of them children and women and nearly two million were displaced losing their homes and property. In the wake of this disaster, the country was recovering from civil conflicts involving Tamil groups. Humanitarian assistance was prevalent in community building especially towards displaced and vulnerable people. Community led participation frameworks were introduced in fostering community participation, in ensuring subsistent capacity building. Part

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[24] (CMT, 2016; Wall Imogen, 2011). Anne Kite Yo Pale on community-based communication system as a contributing perspective on community participation. See also: (Galea/Oxfam & Sheltercasestudies, 2013).
[25] (Galea/Oxfam & Sheltercasestudies, 2013).

of the recovery entailed administering policies that were sufficient in the recovery of the affected people and the humanitarian sector.

4.2.3 Summary of the overview

In this section, I have presented a summary of the case study. That is a participatory approach on durable shelter project from the rural part of Haiti. However, the 2004 Sri Lanka tsunami case involving a transitional shelter construction project is comparison study but is not the key focus of this thesis.

The presentation background of the data gives me a better understanding of humanitarian work in maximising emergency response fund for sustainable recovery and development. In the next part I look at the analytical scope of this section. I present the data analysis of the two cases correlated to the conceptual framework of this study with use of documents

4.3 Data Analysis

In the following section I present the data analysis of PR-A and PR-B. As I stated in the introduction of this chapter, the data analysis corresponds to the conceptual framework of this thesis which is a determinant on building a theory for the research study.[26] I present a scope of the occurrence of natural disaster in Haiti and Sri Lanka from their inception up until 2016. I then present the notion of Sustainable-Led Innovation which entails the elements of interdependency with other organisations, 'doing good by doing new things with others' and cooperation through stakeholders. The second section entails participation where I examine the elements of ownership, consultation and passive. The last section entails social innovation, where I present the elements of psychometric approach and social refinement in establishing organisational and leadership performance. Herein, I analyse the data in the form of a cross-cross pattern.

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[26] The state of the case framework is administered by theories from earlier research by scholars that contribute to significant categories; this entails its flexibility and openness for more knowledge and analysis to be developed.(Bloomberg & Volpe, 2012, p. 98).
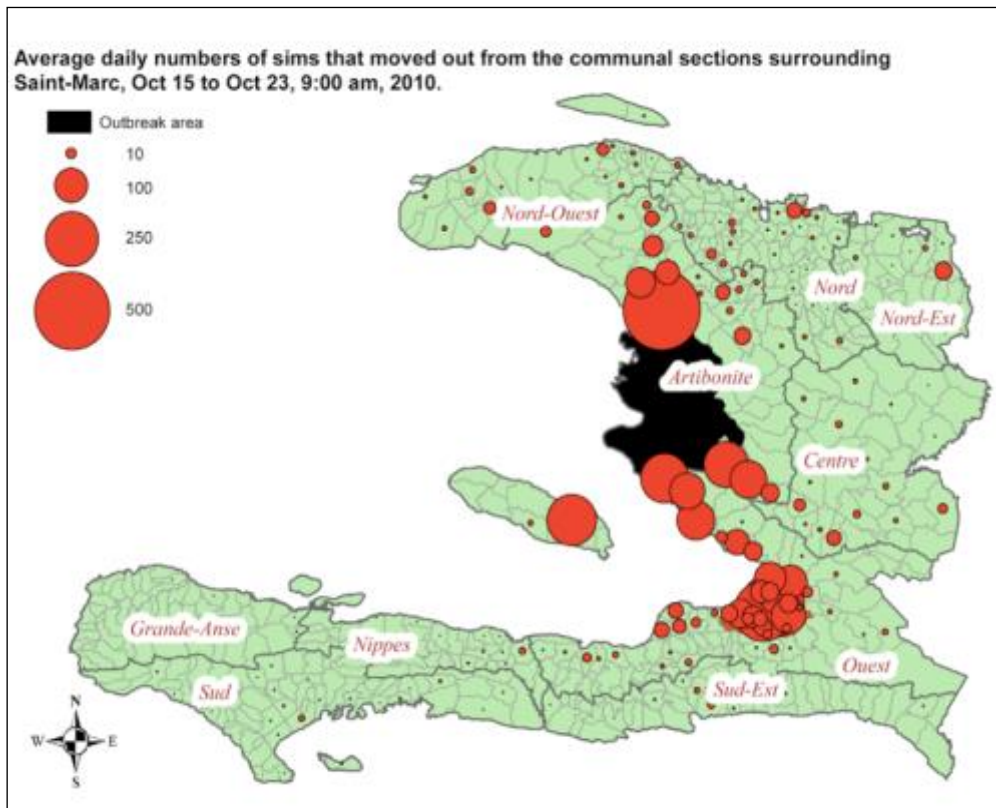
Figure 4.1 Population movements following the Haiti 2010 earthquake. Population movement during the cholera outbreak using analysis of SIM. Source: (Meier, 2011b).

The figure above indicates increased use of mobile phones which upon analysis results to rapid emergency response, identifying vulnerable persons including women and children and highly affected regions.

The follow figures below present an analysis of natural disasters in Haiti and Sri Lanka from the year of occurrence to 2016.
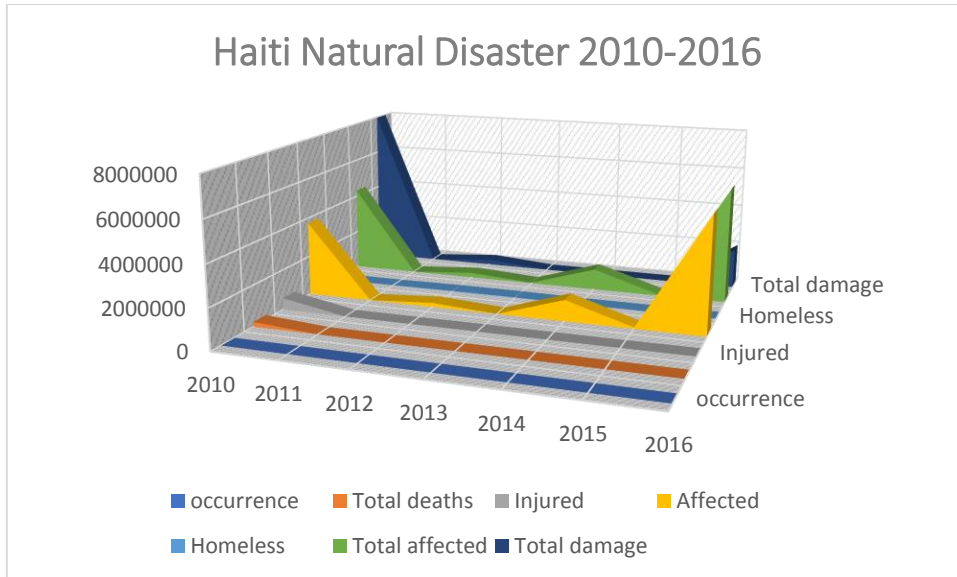
Figure 4.2 Haiti Natural Disaster 2010-16.Author's analytical frame. Source: (Emdat, 2016a)

Figure 4.3 Sri-Lanka Natural Disaster 2004-2016.Author's analytical frame. Source: (Emdat, 2016b)

The table below presents a structure of the conceptual framework that I use in analysing the data.

Sustainable-Led and Digital Innovation	Social Embeddedness	Social Innovation

-Innovation distributed among different kind of actors	- Ownership - Consultation - Passive	**-** Psychometric Approach - Social Refinement

Table 4.1 Structure of the conceptual framework in data analysis. Source: Author's framework

This model presents a guiding note on humanitarian innovation towards achieving community participation through sustainability, social embedded action and social innovation. In the sections that follow, I use this model in relation to the research questions to analyse the data collected using document analysis.

4.3.1 Sustainable-Led and Digital Innovation

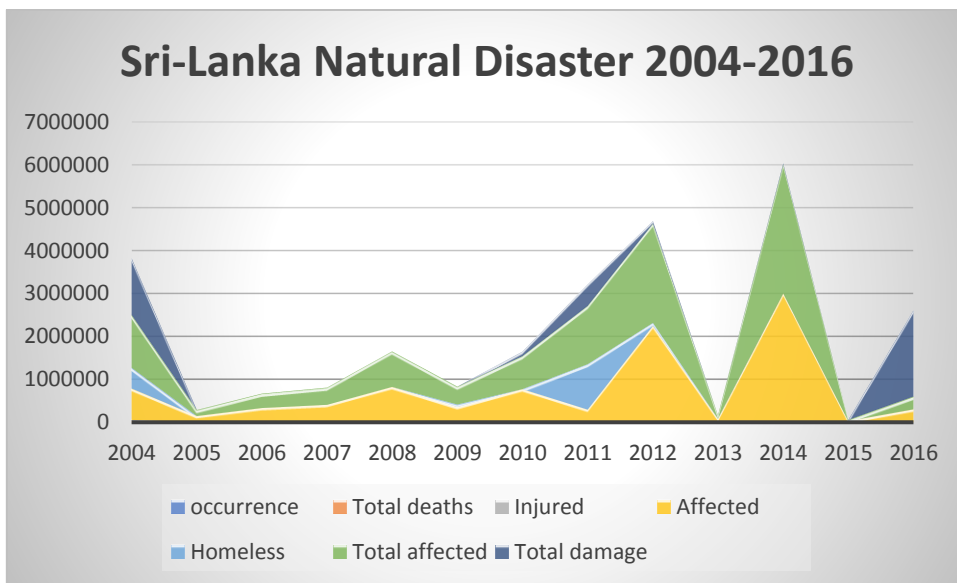| Sustainable-Led and Digital Innovation	Social Embeddedness	Social Innovation
-Innovation distributed among different kind of actors	- Ownership - Consultation - Passive	**-** Psychometric Approach - Social Refinement

Table 4.2 Sustainable-Led and Digital Innovation and Digital Innovation. Source: Author's framework

The table above presents the structure of the conceptual framework that I use in analysing the data. I focus on determining the elements of sustainable led and digital innovation by addressing the research questions using documents.

4.3.1.1 *Innovation distributed among different kind of actors*

I found out that the interdependency by organisations involved in PR-A was subsequent to Tidd & Bessant's sustainable-led innovation. This was in recognition to the role of IASC that includes UN agencies, OCHA, the United Nations Development Program (UNDP) and UN-Habitat. (Alnap, 2017a).

System buildings involves the interdependency with other organisations which builds trust hereby leading to a sustainable-led innovation system. I noted that this correlates with two multi-donor trust fund managed by the Interim Haiti Recovery Commission (IHRC) that comprised of both Haiti and non-Haitians and co-chaired by former U.S. President Bill Clinton, the UN Special Envoy for Haiti, and by Haitian Prime Minister Jean-Max Bellerive.(Alnap, 2017a, p. 24). A report by Oxfam International illustrates the importance of this aspect upon re-envisioning Haiti with equity, fairness and opportunity projects. The report holds that:

> *Haitian ownership, leadership and engagement—not just of the government, but of civil society (NGOs, academics, youth groups, trade unions) and the private sector—will help to ensure that the Fund is able to operate effectively and is held to account not just by its donors, but also by the people who are supposed to benefit from it.(Alnap, 2017a, p. 24; International, 2010).*

It is important to note that the degree of participation can be improved upon working with a system where a crisis is likely to develop. Tidd & Bessant projects an example on position innovation, whereby meeting the needs of the affected persons can be achieved through a bottom of the pyramid scenario.(Tidd & Bessant, 2014, p. 392).

Upon further analysis on the context analysis, I found out that position innovation was evident in Cooperative for Assistance and Relief Everywhere (CARE)'s disaster response with the local communities.

I also found out that PR-B took a definite approach in Tidd & Bessant's SLI on 'Doing good by doing new things' approach, by re-designing shelters of the affected persons through the traditional technique referred to as '*clissade*'. Strategic innovation was due to creativity and recognition to the cultural status of the affected persons. However, I also found out that PR-A lacked creativity in using a participatory model that would be benefit affected person. Using the coastal buffer zone implemented by the local authorities meant that the affected families would live far away from their livelihoods. The lack of creativity on SLDI hereby meant that it would take longer for the affected families to adopting into their cultural tradition. This is a destruction on their psychosocial recovery process that deters interaction and integration.

Coordination is a key aspect that I noted upon analysing PR-B which garnered an attendance of 80 non-governmental organisation that attended Shelter Cluster meetings in addressing the tsunami disaster.(Alnap, 2017d). This notion correlates to Tidd & Bessant's model of sustainability whereby through the attendance of 80 non-governmental organisations that aimed to address the crisis in Haiti which projects a significant innovative staring point.(Tidd & Bessant, 2014). Moreover, I also noted that meetings were coordinated within a national and regional level. These entailed national coordination meetings, Technical Working in Groups (TWIG) meetings and coordination with the local regions of Port au Prince. The IFRC- Shelter Cluster report notes that the coordination meetings were filled with diverse attendees from different parts of Haiti without international experience on emergency relief. One respondent noted that:

[There's] a handful of really experienced people but in general I was really surprised by how young everyone was… It's like a huge, on-the-job training programme-correspondent's viewpoint on coordination (Alnap, 2017d, p. 38).

An important factor that I found is that the national level meetings were held in United Nations Stabilisation in Haiti (MINUSTAH) Log Base in Port au Prince despite limited attendance from the government. This was eminent through stakeholder involvement that served as an incisive factor during the national meeting despite limited attendance. One of the correspondent noted that:

I found that on one hand the Shelter Cluster has been proactive in inviting [Shelter] actors to share their experiences with stakeholders. The shelter cluster meetings happened to be a good platform for sharing information… On the other hand I didn't see local NGOs participating at the national shelter clustering meeting.(Alnap, 2017d, p. 39).

However, I also found out that despite the availability of shelter cluster coordination models, there was still displeasure by some correspondent. One of them noted that:

Cluster leads are good but they were operating in a system [where] there's virtual exclusion of all levels.(Alnap, 2017d, p. 39).

Information management was also a key aspect that I found upon analysis of the reports correlated to project. This came about through the introduction of trigonal hubs. This was effective due to coordination of different international organisations including CARE and both Australian and Spanish Red Cross which covered Leogane, Gressier and Petit-Goave regions. One of the coordinators noted that:

Participation [at meetings] is still high. Other clusters have decreased. Meetings are regular. Actions are taken afterwards. If partners don't get added value they don't come.- (Alnap, 2017d, p. 43).

I also noted that the participatory approach was more effective and inclusive in accordance to the cluster. In this manner, participants are able be more active. One of the coordinates noted that:

[At Leogane] the discussion was open and there was place to raise up topics of particular interest. Perhaps also this sub cluster was smaller and there was less organisations…[the] shelter cluster in Leogane asked for help to relocate

> *104 families that should move from their previous sites and we included this shelter project in our program to support this urgent.(Alnap, 2017d, p. 43).*

An important aspect that I found was that despite coordination between the coordinators and local authorities, the role of Shelter Cluster wasn't nullified leading to more clarity. One of the coordinators noted that:

> *In both of my experience as Emergency Shelter Cluster coordinator, this is a major shortfall that should be addressed. Local authorities do not understand the cluster's role and how they are useful. They are confused with the many organisations swarming the operational area and the clusters that are unable to provide directly requested items/humanitarian aid.- Emergency Shelter Cluster Coordinator(Alnap, 2017d, p. 43).*

I also noted that local authorities had an influence in the development of local Haitian hubs and their roles with communities. This is evident through the diminishing roles of organizations that administered the hubs. The concern was raised by one of the coordinators who notes that:

> *It was the local partner NGO CROSE that showed me… some ways to involve local beneficiaries… In the future I would always look from the beginning for the mechanisms to involve local NGOs and beneficiaries… I think CROSE was able to bring local to bring local knowledge and understanding particular of the political landscape to the cluster, something that an outsider could not have hoped to pick up in a short space of time. - Coordination*

> *Régionale des Organisations du Sud-Ouest (CROSE). (Alnap, 2017d, p. 44).*

Staff briefing, and communication skills is also an important aspect I noted upon analysing the introduction of hubs. This was evident through contradictory perceptions between local appointment policies and communication skills. In response to the appointment of only one local coordinator in a hub at Leogane, one of partners noted that:

> *It's not just to deal with thousands of people without shelter. You need to know what the condition was before, who were the partners already in place before,*

what kind of communication and coordination they have… what is the political,

what is the economical and the social situation of the country. (Alnap, 2017d,

p. 44).

I also found out that there was a significant number of attendees on meetings from different agency. The figure below shows the minutes of twelve meetings that was attended by an average 15 agencies at Petit-Goave.
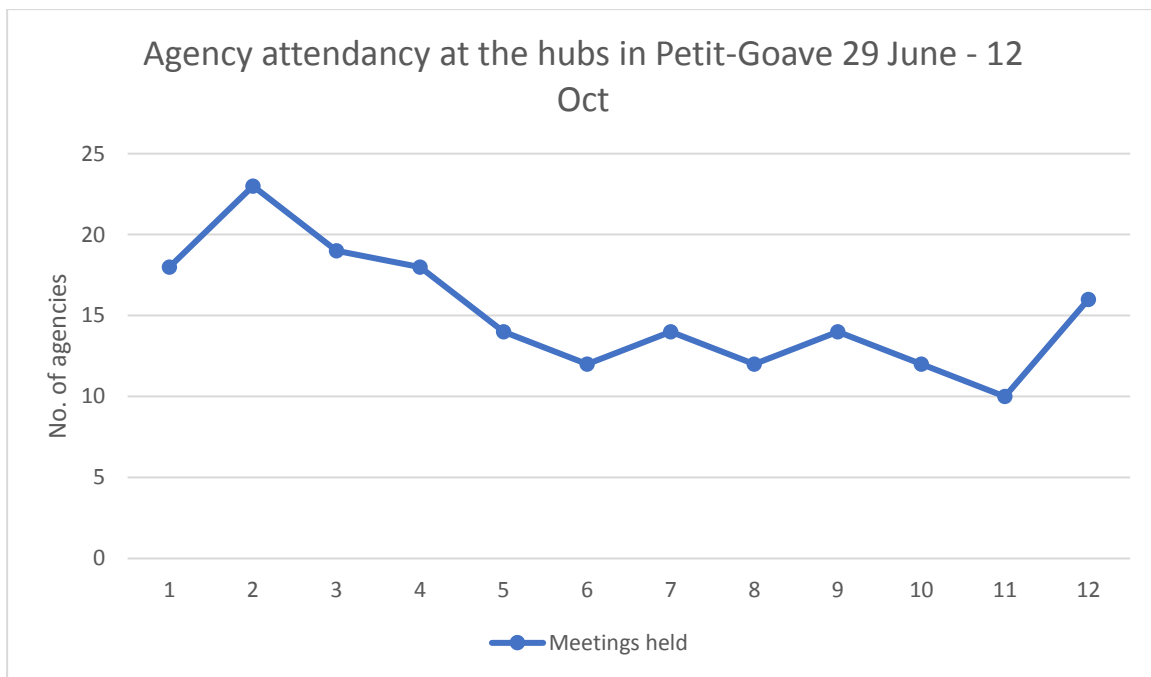
Figure 4.4 An approximation of agency attendance at the hubs in Petit-Goave 29 June- 12 Oct
against the number of meetings held. (Alnap, 2017a). Author's proximity.

The diagram above represents an approximation of the average figures of the data analysis from the researcher in accordance to the IFRC-led shelter cluster report. My main objective was to identify the coordination of the number of meetings conducted and the participation from different agencies.

Different coordination aspects were identified under SLDI that benefitted both the provider and affected individual.

I also found out that there was limited effort in ensuring safe spaces for the crisis affected persons. I noted that the implementation on coastal buffer system in PR-A by the local authorities meant that some communities were deprived of their cultural and social status. This is in contrary to Breivik & Selma-Olsen methodologies of safety conditions.(Breivik & Selmer-Olsen, 2016). Moreover, I also noted that some areas received safety building practices which is a key aspect on safe spaces.(Breivik & Selmer-Olsen, 2016). However, I was keen to note

that the government established an 'owner-driven' housing programme whereby survivors were able to repair their houses from grands. This was initiated through partnerships between IFRC, UN-Habitat and the World Bank's support on 24,000 households. (Tsunami Global Lessons Learned, 2009, pp. 51-52).

Through further assessment on the documents, I noted that PR-B was stationed on mountainous regions around Léogâne and Petit-Goâve. This was an integral aspect on TWIG's communication systems in establishing a significant communication link with the vulnerable persons.

Upon further analysis of the TGLL report correlated to PR-A, I found out that the post-tsunami response led to the implementation of the Ministry of National Disaster and Management and Human Rights in 2006. It was focused on coordinating relief and recovery issues with donor agencies, communities and women's group that helped build local capacities. In addition I also found out that the UN Office of the Recovery Coordinator(UNORC) for Aceh and Nias also administered global coordination of infrastructure between national and international stakeholders(Tsunami Global Lessons Learned, 2009).

Upon analysing the UNHCR Audit Service report on the PR-A, I found out that the project activities were not well coordinated by the UN agencies due to diverse relief assistance by national and international partners. In relation to the shelter coordination, I also found out that UNHCR was took charge of the transitional shelter programme. However staff resources were not organised early enough as prescribed by the Representation (UNHCR Sri Lanka) which delayed the project time. The representative notes:

> *The Representation explained that valuable time was lost, as the identified candidate pulled out at the 11th hour and local resources were not easily obtained UNHR Audit.*

4.3.1.2 Summary: Findings in relation to the research questions

Case	Innovation Paradigm SLDI	Focus (in relation to the research question)	Commentary; examples
PR- B	- GIS and messages updates	- limited informed participation of data sharing	- Shelter cluster difficulties in data allocation of IDPs (Alnap, 2017d, p. 35)
PR-B	-Interdependency by other organization	Implementation of participation(scheme)in	[commenting on the status of the Haitian cluster system(TWIG) which is not at a national level] "A

	-Provider-Individual coordination	shelter sites or residents	big issue for the cluster system in Haiti is that it is not a national system. [There are] no clear guidelines from national level e.g. on replicating achievements, learning lessons."
PR-A	-owner driven housing and coastal buffer system	-Participation scheme in shelters or residents. -Participation scheme in shelter/residents-limited towards women and youth	-[owner-driven]"We found that implementing the owner-driven housing programme has been easier, because you are basically giving people cash to rebuild their own houses on their own foundations, in a thriving community," - -[coastal buffer] "For the relocation housing programme, you have issues with Moving, particularly coastal fishing communities into the middle of inland farming communities." - [child consultation] "while women and children preferred to move to safe interior areas because of their fear of the sea and greater proximity to the school, men preferred to stay close to the sea to carry on fishing from the beach.»

Table 4.3 Sustainable led digital innovation (SLDI) paradigm. Source: Author's analytical frame.

4.3.2 Social Embeddedness
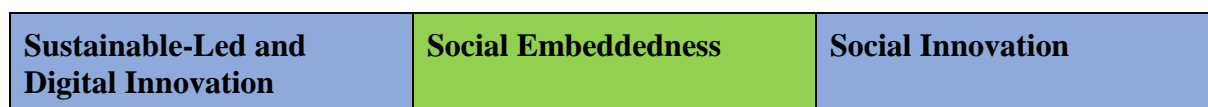
Sustainable-Led and Digital Innovation	Social Embeddedness	Social Innovation

-Innovation distributed among different kind of actors	- Ownership - Consultation - Passive	- Psychometric Approach - Social Refinement

The table above focuses on the social embeddedness of vulnerable persons which entail ownership, consultation and passive. I analyse the data emphasising on the local meaningfulness and social dynamics.

I also found out that the adoption of the participatory approach in PR-B implemented by Shelter Cluster faced challenges on its implementation. This was evident through the national level whereby members from the Haitian organisations were denied access into the MINUSTAH meetings premises. (Alnap, 2017d, p. 39). One of the cluster correspondent noted that:

> *At the start it was really difficult because Haitians couldn't get into Log Base…Shelter Cluster was only in English. [I] saw no translations at all which is appalling. - cluster correspondent.(Alnap, 2017d, p. 39)*

Hereby, I noted that the degree of participation from the affected individuals was within a passive level. Despite being aware of the meeting, local representatives from the Haitian organisations didn't have any impact on decisions or actions taken.(CMT, 2016, p. 48). One of the correspondent also noted that:

> *Other cluster meetings are held in French, which is preferable, but still does not allow for participation by the vast majority of Haitians (only 10-20% of the population speaks French)…meetings are generally not run in way that is sensitive to simultaneous translation even if participants are able to arrange their own translator…we suggest that cluster meetings be held in Kreyol. -cluster correspondent.(Alnap, 2017d, p. 39).*

I also noted that the language used in the meeting was English. Lack of translation meant that some communities had representatives but had little effect on decision making power, while other partners role were acknowledged and were to fully participate. Up to this point, I identified that the degree of participation lacked 'interaction' which deterred the communities' exclusive contact with other partners that proved less beneficial. One of the cluster coordinators noted that:

> *Clusters are good but they are operating in a system [where] there's virtual exclusion at all levels- cluster coordinator(Alnap, 2017d, p. 39).*

Mapping was also a key aspect of information management on assessing affected regions including Leogane and Petit- Goava. I found out that GIS experts from MapAction and CartONG[27] mapped delivery of emergency shelter and coordination zones. One individual notes that:

> *I am impressed by IM, GIS work, bulletins. They"ve responded to particular,*
> *additional functions. The sharing of information – they're one of the few*
> *clusters to share information.(Local beneficiary) (Alnap, 2017d, p. 35).*

Moreover, the information management created a technical reference website on cross-cutting issue that included a 'Google Earth Tips and Tricks' document and maps. One individual notes that:

> *The cluster is good at sharing information. They go out and get information*
> *in the community, for example, in Léogâne. They have so many more*
> *resources than the other clusters (Local beneficiary) (Alnap, 2017d, p. 35)*

In addition, workshops were also held on seismic construction and building shelters from recycled debris. (Clusters promoting standards- Sphere training in addressing future emergencies; environment: recycling and circular economy).

I also noted that the selection of the geographical (rural) area in building the shelter, promoted community development. A participatory approach of this nature meets the standards of community building due to the diversity of the displaced communities, that is, their religion, ethnic background and occupation.

Shelter clusters also experienced challenges on accumulation of accurate information(data) of displaced persons to host families. A six-month evaluation by IASC faced challenges in compiling and sharing information(data) on 'activities of humanitarian organisations and sectoral needs and gaps (Alnap, 2017d).

Communication with vulnerable persons was also noteworthy. I noted that the media was integral in cross-cutting aspects through radio and journalism. The introduction of hubs and sub-hubs was integral in that the local NGOs and affected individuals shared information and coordinated with local technological agencies.

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[27] Mapping and GIS Advisor

Case	Social Embeddedness paradigm	Focus (in relation to the research question)	Commentary; examples
PR-B	- Information literacy - communication capability - content capability	Community driven approach- Limited	Translation submission lacks multiple languages - Mediators of ICT and local hubs and centres. - Product delivery through coordination, GIS, language. - Information management: getting information from community - Hubs: producing and sharing information and local content through the network- open source
	Consultation	Community driven approach – limited/not effective	- Lack of efficient ICT artefact on referral system; ICT artefact concern: poor language software transmission - [commentary on the referral system] "Affected persons selection depended on a referral system from other organisations…This increased the logistical challenges as "affected persons" were identified as the project progressed and were not identified from the start."
PR-A	Ownership participation degree	Community driven approach	[Commenting on the government policy; housing reconstruction] "Where survivors participate from start to finish in the construction process, we end up with homes that people want, a design that suits their lifestyle and a location that allows them to continue earning a living,"

Table 4.4 Social Embedded Action: Source: Author's Analytical framework

4.3.3   Social Innovation

Sustainable-Led and Digital Innovation	Social Embeddedness	Social Innovation
-Innovation distributed among different kind of actors	- Ownership - Consultation - Passive	**-** Psychometric Approach - Social Refinement

Table 4.5 Social Innovation. Source: Author's Analytical frame.

This table above focuses on social innovation that involve psychometric approach and social refinement. I analyse the data of the study in determining the psychometric approach and social refinement of social innovation

4.3.3.1   Psychometric Approach

I found out that organisational innovation played an important role in influencing social innovation during the research analysis. This was evident in PR-B's adoption of a local model which was assessed by engineers from the shelter cluster project. This in turn projects a psychometric ideation of cost effective and convenient ideas which is suitable for vulnerable people. I also found out that the Section of Humanitarian Affairs in the MFA (HUM) and Norwegian Ministry played an important role in the financial and strategic process of Haitian crisis in accordance to the Norwegian Humanitarian policy. Organisational innovation was hereby noteworthy through the role of the Norwegian Humanitarian Policy; a state in which Parhalad & Hame et al notes that it's within the context of the existing system and cultural appropriateness of the role players.(Mumford, 2002). I also clarified this aspect through the 2008 Humanitarian Strategy and Report No. 40 (2008-2009) presented to the Storting[28] on Norway's Humanitarian Policy:

> *Government wishes stronger focus on the achievement of goals, quality assurance and efficiency [...] through the system use of evaluations and reviews. [...] More knowledge, research, learning and education are required, and we are strengthening our efforts in these fields. (p11).- (Alnap, 2017c, p. 8).*

I also noted that the allocation of funds by HUM adopted an organisational innovative strategy in that it focused on the attribution of the local system and structures that were in place. I clarified this by three key factors which included the MFA's experience in the humanitarian

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[28] The Norwegian Parliament- Author's translation

sector, international development in the Humanitarian Field and a report by the Audit General(AG)[29].(Alnap, 2017c, p. 4).

4.3.3.2 Social Refinement

One of the key acquisitions of social refinement is its leadership role on analysing social problems that come with the 'wisdom' of solving issues.(Mumford, 2002). Correlating with this aspect, I noted that selection of vulnerable persons exemplifies social refinement of social innovation. This is illustrated in PR-B whereby a survey was conducted to select the most vulnerable persons that were affected by the tsunami disaster. I also noted that this was conducted by a social officer who collaborated with organisations and non-governmental organisations within the region.

I also noted that child labour was practiced after the earthquake whereby displaced children worked in foster homes.

Through detailed analysis on UNICEFs' role on the response of the disaster, I noted that its adoption on institutional care and private homes which correlates to Mumford's social refinement.(Alnap, 2017b, p. 11; Mumford, 2002). I focused more on the social problem to detect this notion. However, I also noted that there wasn't a subsequent system on engaging vulnerable groups on programs that were introduced by the organisations.

An important aspect that I also noted was on gender-based violence (GBV). This is evident on UNICEF's operational response siting that a 'steady but moderate increase' especially amongst victims (girls) under 18yrs were familiar of the offenders. See appendix 10-C (ii). In addition to this aspect, I also noted leadership disparity within a global scale because of inadequate capacity in the country.

These two points reflect poor execution on Mumford's social refinement that is decisive for social innovation (Mumford, 2002).

Upon analysing the UNHCR Audit Service on PR-A, I noted that the UNHCR Sri Lanka management frequently rotated its members which in turn affected the leadership role of the organisation. This aspect addresses Mumford's social refinement on leadership. I also noted that the management office created several organisations posts without clear descriptions of

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[29] According to the report by Norad on the Norwegian humanitarian response to natural disasters, Case of Haiti Earthquake January 2012, the Auditor General(AG) focuses on grant allocation and funds disbursement, coordination of humanitarian assistance, involvement of local actors, linking emergency to longer term development, monitoring and evaluation.(Alnap, 2017c, pp. 12-13). For a conclusive analysis on the evaluation of Norwegian Humanitarian assistance see also: (MariH, 2008; Riksrevisjonen, 2014).

duties towards the local staff. Another issue that I also noted was that there was that the international and local staff members didn't have a good relationship with the local staff.

4.3.3.3   Summary: Findings in relation to the research question

Case	Type of social innovation	Focus(in relation to the research question)	Commentary; examples
PR-A	Social refinement (in this case identifying solutions with restrictions)	Women and youth as contributors on decision making.	[Initiating community-based consultation for the first time in Maldives]- "…women and youth often had different ideas than men about what was needed"
		Limited relief effort towards youth or women	-[commentary on relief effort challenges] "In an emergency situation, we cannot pay special attention to any one group among the affected people or practise any high social ideals…Where we do find any unaccompanied children the objective was to locate other family members or some other relatives who can take care of the children at least temporarily." Adding, "There are better and more urgent things to do in a disaster..."
	Psychometric approach	A global humanitarian approach	[UNICEF's role/institutional accountability]- "UNICEF is thus the only agency that plays a cluster lead role in almost a quarter of the total number of clusters (12) that were deployed in Haiti…"
PR-B	Social Refinement	Strengthening of innovation through innovative ways	[IFRC's deployment of a Cluster media and communications adviser for the first time in Haiti]- "combination of three constituencies in one role… Haiti govt, donors and general public in donor countries, and

			people affected with the disaster."

Table 4.6 Social innovation and focus. Source: Author's Analytical framework

4.4   Summary of Key Findings

The analysis in this chapter was based on the conceptual framework of the study using documents. The rationale for document analysis was to contextualize the participant's reality, focus and verification of evidence, to create a clear understanding of the study. Major actors of the two projects both national and international, were also integral in the progress of this analysis where I stated their roles and contribution. In doing this, I indicated the importance of SLDI and the role of social embeddedness towards the affected persons.

The diagram below represents the impact of the natural disaster between Haiti (2004) and Sri Lanka (2010). It illustrates the difference in occurrence, total death, injured, homeless and total number of affected persons with total damages between the PR-A and PR-B.

Impact of the Natural Disaster between Haiti(2010) and Sri Lanka(2004)

	occurrence	Total deaths	Injured	Affected	Homeless	Total affected	Total damage
2010	11	229626	577585	4506961		5084546	8105000
2004	6	40915	25949	1065186	496548	1587683	1367500

■ 2004   ■ 2010
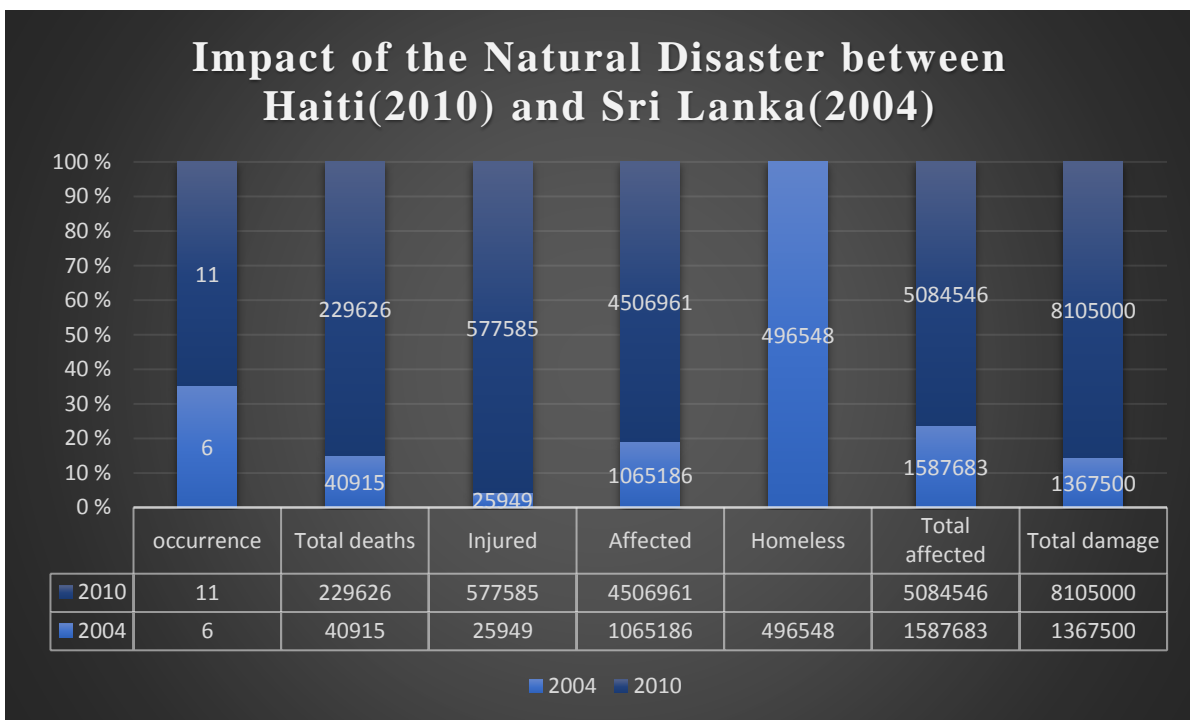
Figure 4.5. Impact of the Natural Disaster between Haiti (2010) and Sri Lanka (2004). Author's framework (Emdat, 2016a).

In the figure below, I project the road map of the data analysis in this chapter.
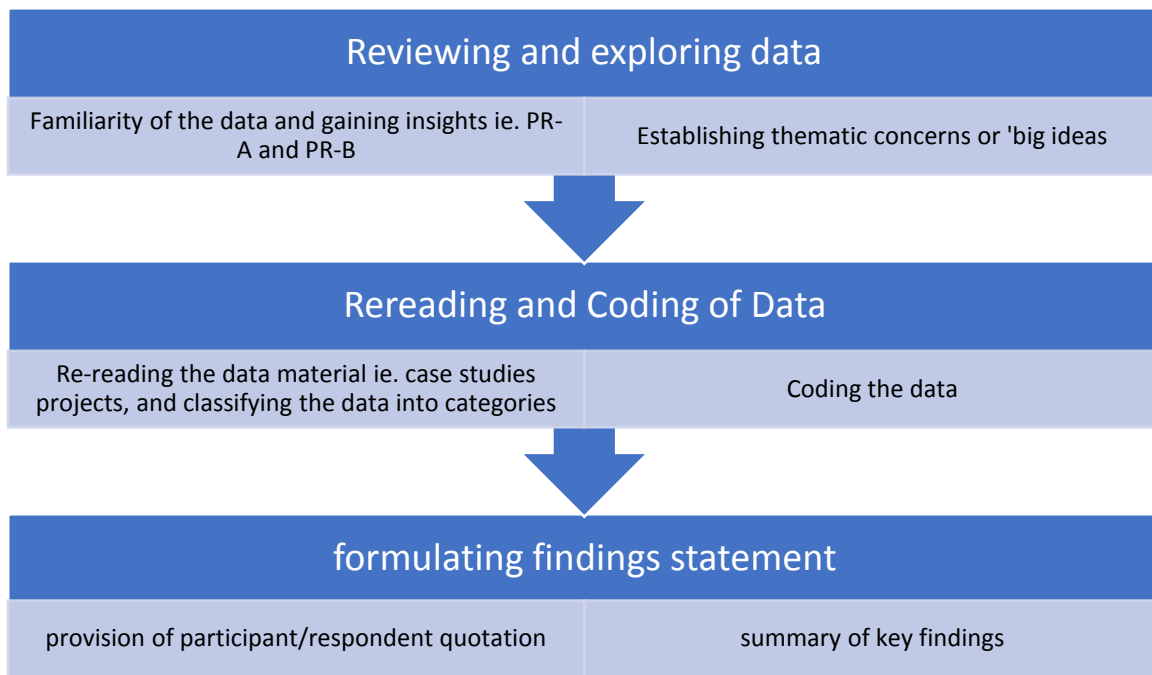
Figure 4.6 Source: Author's Analytical frame.

Below are table checklists of the findings extracted from the analysing the data in relation the conceptional framework and research methodology of this study.

4.4.1   How was participation implemented in shelters/residents?

	How was participation implemented in shelters/residents	Case (Project)	
		PR-B	**PR-A**
1	Sustainable- Led Digital Innovation	**XX**	**X**
2	Psychometric Approach	**N/A**	
3	Social Refinement	**X**	**X**

Table 4.7 How was participation implemented in shelters/residents. Source: Author's framework

The key study area in this section is the participatory approach Haiti case study.

4.4.1.1   Sustainable-Led Digital Innovation

As a key theoretical aspect, sustainable Led Digital Innovation (SLDI) involves innovation amongst different actors in relation to technological programs. As stated in section 1.2 and 2.2.2

of this study, the relationship between humanitarian work and SLDI as one of the key objectives is fundamental in this study. Partnership is a fundamental aspect of sustainability. In this case, innovation is also a decisive thinking methodology of linking or establishing reliable actors for long term goals in addressing informed participation and implementing human rights in technology humanitarian programmes. In this case, the shelter cluster approaches implemented by IFRC and the multi-donor trust managed by the IHRC comprising of Haiti and non-Haitians and the UN Special Envoy for Haiti is noteworthy. Hereby, the diverse actors in this section were apparent in establishing the reliability and validity as a key research method of this study (See also section 3.2.4).

The merits of identify and developing this approach is to encourage informed participation of vulnerable persons. Identifying the stakeholders dedicated in contributing to sustainable development is decisive both as intrinsic and extrinsic motivation. As a research methodology, this is fundamental in developing a non-coercive humanitarian action response that focuses long term solutions of addressing disasters (See also section 3.6). In addition, this approach contributes in developing the guidelines of the Signal Code encouraging stakeholders to implement human rights in technology humanitarian programmes (See also section 2.3.4).

However, a hindrance under this section is poor information literacy by vulnerable persons in understanding the invaluable aspect of major stakeholders. Some stakeholders are fundamental in addressing the SDGs Agenda 2030 which most vulnerable persons lack knowledge of.

4.4.1.2   Social Refinement

According to the conceptional framework of this study, social refinement is a fundamental aspect of social innovation that involves stakeholder engagement. Implementation   of   this strategy encourages local leadership participation of vulnerable persons with stakeholders. In this section, representation of a local leader from the participatory approach Haiti case with stakeholders is noteworthy.

Representative leadership from disaster affected communities in technology humanitarian programmes is an effective communication strategy of information literacy. In this study, social innovation focuses on informed participation of crisis affected persons in adapting ICT information products. Hereby, cultural and behavioural attributes is noteworthy amongst women.

Despite traditional norms on leadership adopted by men, investing on women leadership is incisive under this section. Women leadership is a feedback loop that ought to be implemented in a participatory approach to encourage gender equality.

Gender equality is incisive in meeting household needs especially in a participatory approach of this study. Behavioural change amongst disaster affected women in adopting leadership roles in humanitarian technology programmes is a key strategy that I encourage on implementing effective communication. Linking women leadership and Sen's capability approach of an individual's freedom to access ICT humanitarian programmes is hereby a key design methodology that I use in addressing sustainable-livelihood of disaster affected persons. Empirically, linking women leadership and human freedoms is incisive in evaluating the effectiveness of technological progress and social modernization. In this case, I link ontology as a research philosophy in determining women leadership and epistemological perspective of human freedoms so to build a constructive theory of this study. Reason being is that achievement of sustainable livelihood is realized through motivational factors. As a researcher, the realization of linking emerging ICTs and humanitarian programmes is fundamental in enhancing social power of women leadership which in turn unfolds economic opportunities in a participatory approach shelter cluster.

Notably, informed participation of vulnerable person's adaptation of using ICTs products, which is incisive in social refinement, is a developing factor adopted by several Start-ups in Oslo. Two influential Start-ups contributing towards this approach are Vipi Cash[30] and Diwala[31]. Vipi Cash uses blockchain technology to encourage responsible money transfer to meet basic needs of vulnerable persons. As a researcher, this is incisive in encouraging economic inclusion of disaster affected person's that expands the kind freedom that people enjoy. More so, Vipi Cash and Diwala were amongst two of the three Start-ups that were founded in 2017 in a multi-disciplinary hackathon that involved the UN Women and Innovation Norway. Attending this hackathon[32] is a research methodology I adopted as a research data technique including participation, taking notes and gathering information on climatic disaster affected women. In addition, the development and growth of Vipi Cash and Diwala is integral in building the theory of this study. According to *Innovasjonsmagasinet*, Vipi Cash ranks in the top 50 most innovative Start-ups in Norway 2018 (INNOMAG, 2018). Considering the

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[30] See also: https://vipicash.com/
[31] See also: https://diwala.io/
[32] See also FAQ doc on the design strategy of the hackathon involving UN Women and Innovation Norway: https://docs.google.com/document/d/1E3EboHATFzRgLXghsSfpIvDnP5bB4PWM0uctV8MjMIY/edit

construct validity of this study, which is a key factor of the research methodology, corelating the growth of Vipi Cash is incisive in establishing key links of vulnerable person's real freedoms. This is a key aspect on developing between SLDI, informed participation and social refinement. Yin argues that, identification effective measures in a study is key in a constructive study (Yin, 2009). See also section 3.2.4.

4.4.2 How was social embeddedness improvised; decentralization in technological programmes ensure informed participation of vulnerable groups

	How was social embeddedness improvised; decentralization in technological programmes to ensure informed participation of vulnerable groups	Case (Project)	
		PR-B	**PR-A**
1	- Information literacy	**X**	**N/A**
2	- communication capability	**X**	**N/A**
3	- content capability	**X**	**N/A**

Table 4.8 How was social embeddedness improvised; participation made inclusive for youth and vulnerable groups. Source: Author's framework

	Implemented
XX	Widely implemented
N/A	Not Applicable (Not implemented)

4.4.2.1 Information Literacy

Information literacy is key in analysing social embeddedness of a participatory approach shelter cluster case study. Its significance is based on a participatory approach that I use in constructing the theory of this study. Notably, information literacy is an important aspect of building data literacy amongst disaster vulnerable persons because of the high increase of social media platforms in humanitarian crisis response. See also section 2.3.2. The difference between information literacy and data literacy is hereby noteworthy in evaluating the research question

under this section namely decentralization of technological programmes to ensure informed participation of vulnerable persons.

Data literacy in this sense, involves linking the terms digital information and literacy. Reasonably, information literacy in this case involve linking the term raw information and literacy. The importance of underlining the difference between these two terms in constructing a thorough theory of this study is enhancing clarity and reliability. As a research method, clarity and reliability is key in developing a social constructivism concept involving a participatory approach shelter cluster. The focus in this case is ensuring language translation of technological products namely mobile phones, into local language. National languages in Haiti involve the Haitian Creole and French. Despite adopting two languages unlike other disaster vulnerable middle-income nations namely Sri Lanka which consists of three languages, vulnerable persons in this case study still faced language barriers that limited informed participation.

As a research methodology, design thinking is incisive in developing social constructivism corelated to the research question of this section. Growing interest in humanitarian technology programmes is on the rising meaning that design methodologies ought to be encouraged. Herein, by analysing information literacy, better interpretation of social media data in humanitarian technology programmes is incisive, in enhancing non-coercive humanitarian response.

Under this case study, information literacy occurs in a two-fold system. That is, both the disaster affected persons and stakeholder's involvement in humanitarian technology programmes and their understanding of invaluable features of using Tweeter in emergency response. In perceiving this approach, I intend to enhance morality in designing technological artefacts intended for non-coercive humanitarian response. Profoundly, designing ethics and morality are the key fundamental concepts of building a valid and reliable of this study. More so, I use this design thinking research methodology in developing the philosophical concept non-neutrality of technology.

Design thinking methodology of analysing a participatory approach Haiti case study important aspect enhancing informed participation of disaster vulnerable persons and implementing of human rights in humanitarian programmes. Hereby, in developing the philosophical concept of social constructivism corelated to the research question under this section, I depict technology artefacts as social construction that corelates with human behaviour, See also section 2.4.1.

Considering that digital intervention in non-coercive humanitarian work continues to intensify, I project the relationship between sociotechnical systems and humanitarian response. By linking these two aspects, I project that technological artefacts used in humanitarian programmes contain political platforms including decentralization, centralization, egalitarian or inegalitarian systems. This is a fundamental methodology in developing the philosophical concept of social constructivism corelated to the research question under this section. Similarly, Winner argues that Some technologies don't allow flexibility due to today's sociotechnical system (Winner, 1980). Profoundly, Mumford reaches similar insights arguing that two traditions of technology were imminent(side by side)in during industrialisation; an authoritarian and a democratic system (Winner, 1980, p. 192).

Information literacy is a fundamental aspect on analysing a participatory approach shelter cluster because it illustrates the flexibility of technological artefacts used in non-coercive humanitarian programmes. This enhances informed participatory of vulnerable person in a participatory approach and responsible stakeholder involvement in implementing human rights in humanitarian technology programmes.

4.4.2.2 Content capability

Relatively to information literacy but slightly adverse is the availability of content capability as way of decentralizing technological programmes to ensure informed participation of vulnerable groups. I establish this aspect through developing a human approach philosophical concept namely ethics, projected by Nussbaum and Sen.

Sharing and producing information by local hubs through open source network is incisive in developing of disaster vulnerable person's information capability to share crisis information. In a participatory approach shelter cluster project, disaster vulnerable persons including volunteers could share reliable information using mapping.

A key approach on realizing the benefit of content capability is the use of Tweeter. Crisis data delivered by disaster vulnerable persons using the social media platform is corelates to answering the research question under this section. Hereby, developing Sen's capability approach is results of correlating Gigler's concept of information capabilities and disaster vulnerable person's local knowledge including norms and tradition. See also section 2.2.1.1.

The philosophical concept of ICT capabilities adopted by Gigler and the guidelines outlined by the Signal Code is also design approach methodology of enhancing human rights in humanitarian technology programmes. Developing these two aspects are fundamental in

addressing morality in humanitarian technological artefacts. Critically, this notion raises the debate on whether technological artefacts are intentionally designed to exemplify different languages or communities in humanitarian response. In building the theory of this study, justification of whether of whether technological artefacts used in non-coercive humanitarian action is key. Hereby, identifying content capability in a participatory approach shelter cluster is fundamental aspect of developing philosophical perspectives of Nussbaum and Sen.

Content capability also develops Sen's capability approach of freedoms. Similarly, Verbeek argues that, "freedom exits in the possibilities that are opened up for human beings to have the relationship with the environment in which they live in and to which they are bound" (Verbeek, 2008, p. 98). Sen's capability approach on freedom offers a viable meaning on social embeddedness and the appreciation of disaster vulnerable volunteers' capability of sharing crisis information using technological artefacts (Gigler, 2014; Walsham, 2017). Corelated to this study, developing informed participation is a fundamental aspect on building a valid theory.

Notably, design thinking methodology of research study is fundamental under this section.

4.4.2.3 *Communication capability*

Communication capability is a key aspect of decentralizing technological programmes to ensure informed participation of disaster vulnerable persons. This is notable in the participatory approach shelter cluster Haiti case study.

Upon recognition of this concept, I analysis the capability capacity of disaster vulnerable persons in using technological artefacts namely mobile phones, in tweeting information. This include vulnerable regions, outbreak of diseases and asserting the wellbeing of community members. Hereby, communication capability includes language proficiency, knowledge capacity of using ICT artefacts, moral aspect of the wellbeing of relatives and cultural heritage of community participation.

On the other hand, information management is also a key aspect of communication capability. I identify this notion in the analysis because of key launches of volunteer hubs in Port au Prince. The desire of learning how to use mapping to identify and update affected regional areas is incisive under this section. This notion is critical in constructing the theoretical aspect of this research study as well as developing philosophical perspective of Fritsch's social constructivism and Sen's capability approach.

Profoundly, I use design thinking strategy, in developing social constructivism corelated to communication capability of ICT artefacts namely SIM cards used in mobile phones in storing

digital data. Notably, mobile application development, research on ICT and development, humanitarian crisis, telecommunications systems and geospatial research are some of the global aspects leading to the high demand of mobile phone use in disaster vulnerable regions like Haiti. In addition, information communication technology for development (ICT4D) researchers are also focusing on how mobile phones can contribute on sustainable-livelihood of disaster vulnerable communities and stakeholders to adapt to climate change shocks/ stresses (Pierce, 2012).

5 FINDINGS

5.1 Introduction

In the previous chapter I presented a qualitative analysis of a multi-case study using documents analysis. I coded the information through establishing key themes and assortment of the most relevant quotations in relation to the conceptual framework using document analysis of shelter studies. The two cases that I studied were part of a collection and updates of post disaster shelter projects developed by the Global Shelter Cluster.[33] In this chapter, I outline key findings of the analysis in relation to the research question and conceptual framework. This include the participatory approach durable shelter project from the rural part of Haiti after the 2010 earthquake and a limited focus on the 2004 Sri Lanka tsunami which adopted a transitional shelter construction project.

5.2 Finding 1

The referral system used for selection was ineffective towards communicating with the affected persons in PR-B. First-hand information was not available in selecting the affected persons which interrupted the progress of the project; poor ICT artefact and software on information and data collection.

The referral system used on selecting affected persons was time consuming and less effective in PR-B. Access to information on affected persons was not readily available. According to the IFRC report, " The Shelter Cluster, like others, was challenged by difficulties in eliciting accurate numbers of persons displaced to camps and to host families, and data on their locations from other coordinating bodies" (Alnap, 2017d). Similarly, another shelter study document notes:

> *"Beneficiary selection depended on a referral system from other organisations. It proved very time and resource consuming to receive beneficiaries referred in this way. This increased the logistical challenges as beneficiaries were identified as the project progressed and were not identified from the start."- Shelter studies*

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[33] See: http://shelterprojects.org/index.html; http://shelterprojects.org/about.html

5.3   Finding 2

Communication capability: Right to information and participation of affected persons-UN Guiding Principles on Internal Displacement.

Media and journalism including hubs and sub-hubs played a key role on informing the national and international community about the humanitarian crisis in Haiti. Communication with donors, international partners and other international media outlets was imminent including CNN which eased the pressure on Cluster coordinator.

Communicating with Disaster-Affected Communities (CDAC) network used local radio to broadcast humanitarian aspects that were essential for community outreach. [empowering the community on human rights; the affected persons negotiate with local authorities for better infrastructure and facilities for better preparedness of future shocks]

The GIS advisers played a key role on mapping out delivery and coordination of emergency shelter zones using Google tool kit. This included a website on Google Earth 'tips and tricks' and the map room of the affected regions (Alnap, 2017d). [Mapping[34] and open source software[35] for better preparedness in the future shock; development of safe/routes, online education on external shocks- achieving well-being] One correspondent notes:

> *Information Management was really good. So was mapping: the people were*
> *very patient, both people ...There was a lot of staff turnover in the Shelter*
> *Cluster, but information management and mapping was continuous. There*
> *was the same line of quality (local correspondent) (Alnap, 2017d, p. 35)*

I also found out that a shelter cluster hotline was suggested by one of the informants noting that, it would be an efficient way of directly communicating to affected persons and better future preparedness [telecommunication services- emergency connectivity].

5.4   Finding 3

Information management and managing crisis data

Population movements to safe spaces including referral centres, cholera outbreak and affected regions required sustainable methodologies in insuring responsible management of data. Moreover, data gathered using mobile phones was also integral. Despite the use of the geographical information system (GIS) by the shelter clusters management, lack of skills from

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[34] https://www.openstreetmap.org/#map=4/65.40/17.86
[35] https://opensource.com/resources/what-open-source

volunteers including affected persons and capacity to use the system derailed the operations in Port au Prince. The recruitment strategy states that:

> *The human resource strength of the Shelter Cluster Coordination Team was hugely beneficial in terms of presence and representation at the numerous forums and capacity, particularly when compared to some of the other clusters.*

> *There's a direct correlation for me with the Shelter Cluster between how well they did and the fact that they [were] staffed properly ... they made a huge effort to understand the distinction between cluster and agency and that really paid off (Alnap, 2017d, p. 19).*

5.5   Finding 4

No informed concept and participation of data as well as limited 'passive participation in community outreach

Websites and insights on transitional shelter construction by Shelter Cluster partners and Concern, IOM and UN Techno Para Mi Pais provided lesson learned through technical and participatory approach weren't fully utilised.

5.6   Summary of the key findings

The analysis in this chapter was based on the conceptual framework of the study using documents. The rationale for document analysis was to contextualize the participant's reality, focus and verification of evidence, to create a clear understanding of the study. Simply, I use the findings in understanding value of systems thinking in vulnerable situations involving climate shocks and cumulative stresses in addressing sustainable livelihood of disaster affected individuals (I discuss this in the next chapter). Profoundly, the findings are also a checklist of the Signal Code and conceptualize of the role of ICTs in climate change which is decisive in dealing with future disruptions.

The findings hereby set precedence on specific ICT products not as means of communication and management, but a link in the chain of sustainable livelihood of affected persons and development in vulnerable climatic conditions. In the next chapter, I discuss these issues to assess the objectives of this study which are decisive towards the future predicament of affected

persons in climate change and the role of ICTs in relation to Nussbaum capability ethics and Sen's capability approach (J.-M. Coicaud & Warner, 2013; Gigler, 2014; Nussbaum, 2000).

6   DISCUSSION

6.1   Introduction

The purpose of this study is exploring the relationship between humanitarian action and SLDI that involves the process and distribution of innovation and digital technology attributes. The humanitarian ecosystem involves different actors that I analyse in shelter cluster approaches. I also explore the process of ICTs and their contribution in humanitarian response. In enhancing the social embeddedness in vulnerable situations through Nussbaum's ethical approach and Sen's capability approach, I conceptualize the role of ICTs in climate change in achieving sustainable livelihood of beneficiaries(individuals). This in turn may offer better alternatives in dealing with internal and external climatic shock in low and middle income countries. In addition, authorities and affected persons in vulnerable situations will also be better equipped and enlightened in predicting future catastrophes.

In pursuit of these features I intend to clarify the interdependency between humanitarian action and the emergence of new technology that would pave way for more research on this field. The increase of the total number of affected persons from external and internal climate shocks (see also figure 4.1) is a concern amongst humanitarian practitioners and information communication and technology for development ICT4D (Nielsen, 2017; Ospina & Heeks, 2010). Similarly, humanitarian innovation depends on consolidated learning and evidence, sustainable solution to the problem addressed by the innovation and the adoption or scaling of an improved solution (improving humanitarian action).

In the previous chapter I presented a qualitative analysis using a multi-case study involving case studies on a participatory approach on building rural shelters in the rural part of South Haiti (PR-B) and the Sri Lanka transitional shelter recovery model (PR-A). I noted down the findings upon reviewing, exploiting and coding the data using document analysis. In this chapter, I analyse and interpret the findings in relation to the research questions and conceptional framework. I discuss this chapter in a twofold whereby I first channel the relation between humanitarian action and SLDI. Second, discuss on enhancing social embeddedness in vulnerable situations and conceptualize the role of ICTs in climate change in achieving sustainable livelihood for affected persons. In this way, the affected persons will not only have a role to play in building a sustainable livelihood, but also have the capacity to deal with

disruptions and predict future catastrophes. For clarity, I research on the interdependency of technology and humanitarian action. Herein, I organize the chapter as follows:

a. Channelling relation between humanitarian action and SLDI
b. Enhancing social embeddedness and conceptualize the role of ICTs in climate change in achieving sustainable livelihood for affected persons.

6.2   Channelling the relation between humanitarian action and SLDI

The findings of this study including the increase the total number of affected persons from external and internal climate shocks from 2010-2016(see also figure 4.1) critically reveals underlining issues on the relationship between humanitarian action and SLDI. Systems of improving humanitarian action after the devastating 2010 Haiti earthquake continue to be a debatable aspect amongst ICT4 researchers. This involves the improvement of emergency relief and long-term development assistance in addressing the increase in natural calamities in low and middle-income countries.

Over a period of time, humanitarian action continues to be reinvented by the Responsible to Protect(R2P) Doctrine whereby state sovereignty ought to be reconceived and that the international community (outside state actors) take *responsibility* in protecting human rights of vulnerable persons affected by natural disasters (Amstutz, 2013). The contravening aspect about this ethical trend of addressing Haiti's crisis signifies challenges of moral foreign policy on humanitarianism and socioeconomic rights. Findings three indicate poor community outreach by emergency relief agencies including the increase of affected persons from 2010-2016(see also figure 4.1) from chronic (social and infrastructure) climatic changes in coping with the effect. A key term that humanitarians and policymakers use in addressing this failure is the lack *political will* by state agencies which deters incentives for success in their projects (Amstutz, 2013). Similarly, the Shelter Sector Response plan report notes that political insecurity, unfavourable trade agreements and poor administration was already an problem prior to the earthquake (Alnap, 2017d, p. 15). This also indicates the challenges on addressing the humanitarian development gap between emergency relief which focuses on immediate suffering and long-term humanitarian development assistance.

However, aid agencies continue to develop more ideas in addressing the humanitarian developmental gap. Walzer notes that, "it is, of course, immediately necessary to feed the hungry…but repair, despite the risks it brings with it, should always be the long-term goal…"

(Coyne, 2013, pp. 38-39). Similarly, the UN secretary-general Ban Ki-moon conceives that, "…long-term reconstruction…is a wholesale national renewal…in nation-building on a scale and scope not seen in generations" Despite the moral approach of addressing the acute and chronic stresses in the 2010 Haiti earthquake, vulnerable persons including women continue to suffer(see also findings and figure 4.1). This indicates the challenges on funding framework aid agencies over the past ten years related to the so political will. More so, a bureaucratic state-led humanitarian action continues to grow through these approaches in the name of 'forestalling human suffering' (Coyne, 2013). This in turn indicates the fragility of the planner's problem and the lack of mobilizing vulnerable actors whereby scarce resources are located to their highest-valued uses similarly as hubs and referral system(findings one and two) (Amstutz, 2013; Coyne, 2013; Msiska & Nielsen, 2017; Nielsen, 2017).

According to Norad report(analysed document in this research) on Norwegian Humanitarian Response to Natural Disasters, eighty per cent of Haiti's 9 million population lived under poverty threshold (Alnap, 2017c). This means that Haiti's poverty rate in the aftermath of the catastrophe limited the purchasing power(capability) of vulnerable persons in acquiring basic needs and access to good and services. Reflecting to the findings and figure 4.1, it seems that vulnerable communities are still experiencing constrains to mechanism, basic needs and access to local markets. Humanitarian action within this period was disastrous in a welfare-maximizing perspective of affected persons. Singer projects this as a disastrous outcome of international aid that lacks justice on human welfare (Amstutz, 2013). This indicates knowledge constrain in non-coercive humanitarian action in impacting and addressing sustainable livelihood of vulnerable persons. Unlike coercive humanitarian action which constitutes *uninvited* humanitarian intervention, non-coercive involves relief efforts including technical advice in alleviating human suffering (Coyne, 2013). The introduction of hubs and sub- hubs (see also section 5.3) proved to be effective in communicating relief efforts in Haiti with the international media houses including CNN. However, despite these efforts, there is still a missing link for the impact of ICT and sustainable livelihood in relation informational capabilities (see also figure 2.2). Moreover, despite efforts on community outreach, adapting the human-development gap (gap between emergency relief and long-term assistance aid) seems to be ineffective (see also figure 4.1) and that more attention is being focused on bureaucratic state-led humanitarian. Similarly, despite efforts from the Humanitarian Affairs in the Norwegian (HUM) from the MFA (Alnap, 2017c), it seems like actions meant to do good are exacerbating human suffering of vulnerable persons (see also figure 4.1).

For instance, in his research on the Haiti's 2010 earthquake, Farmer argues that failed to state-led humanitarian efforts led to poor delivery of basic goods and services, logistics failure in especially on housing and removing of rubbles (Coyne, 2013, p. 91). Profoundly, despite the knowledge on promoting society growth of vulnerable persons including private property and assets by humanitarian organizations, there are still challenges on alleviating suffering and inclusion in vulnerable regions. I believe that humanitarian action should focus on more human capability and technical artefacts in achieving sustainable livelihood of vulnerable persons. To impact the lives of vulnerable persons, humanitarian organizations should embrace ICT capabilities and link them with human capabilities. Simply, digital components allow for ideation and creativity that is incremental to long-term development of vulnerable persons affected by acute and chronic stresses of climate change.

In the next section, I discuss on enhancing social embeddedness through conceptualizing the role of ICTs in climate change in achieving sustainable livelihood of vulnerable persons.

6.3 Enhancing social embeddedness (vulnerable situations) and conceptualizing- the role of ICTs in climate change in achieving sustainable livelihood for affected persons.

Emphasis on social embeddedness of vulnerable persons and conceptualizing the role of ICTs in responding to natural disaster emerges from local social dynamics (Nielsen, 2017). The introduction of hubs and sub hubs in findings two, indicates an innovative ICT approach from community engagement and the CDAC. Communication with the international media house including CNN was integral in informing the international community on the current situation. As a form of crowdsourcing arrangement, the hubs and Haitian volunteers produced and shared local content of the disaster. A notion in which Nielsen holds precedent on social embeddedness (Nielsen, 2017).

6.3.1 Information capabilities of individuals

The surge for information and data during the 2010 Haiti crisis indicates new forms of humanitarian response. Relief efforts manifested through social and mainstream media is an intrinsic aspect of savings lives of disaster affected persons (Meier, 2015). For instance, the link between Haitian diaspora network and the hubs labs in Port au Prince demonstrates global goodwill of digital humanitarian (Meier, 2015). Profoundly, the Haitian volunteers illustrate

Nussbaum's ethical capability and Sen capability approach. Interestingly, practical foundations of utilitarianism assert this point in conveying the ethics of technology (J.-M. Coicaud & Warner, 2013). Notably, Meier, a digital humanitarian volunteer recalls how, "students were pulling all-nighters in the middle of their winter holidays" in order to save lives of disaster affected persons (Meier, 2015, p. 4). Global goodwill of digital humanitarian action in this context projects Singer's perspective on moral utilitarianism of saving the lives of vulnerable persons affected by the 2010 Haiti earthquake from a regional, national and international level (Graham, 2008). Similarly, volunteers from different nationalities who mapped tweets from the most affected regions in Haiti focused more on the needs of the most affected (Meier, 2015). Herein, crisis mapping and volunteer work from the Haitian hubs which was significant in community outreach though radio and journalism illustrate key fundamental issues of information literacy. These include ICT capability, communication capability and content capability (Gigler, 2014)

First, as a key aspect of social embeddedness, communication capability was fundamental through Haitian volunteers and linking the CDAC in response to the disaster. Some individuals value volunteer work as key *functionings* of their livelihood. According to Sen, *functionings* involve aspects or duties individual may value doing (J.-M. Coicaud & Warner, 2013; Gigler, 2014). Notably, not only does this empower affected persons on human rights, but also encourages them on overcoming future disasters.

Second, emergency response using crisis mapping and mobile devices are gaining popularity in vulnerable regions affected by shocks and climatic stresses mostly in developing counties (Meier, 2015). Local institutions (universities, hospitals, churches, small scale farmers associations,) in partnership with ICT software companies can introduce crisis mapping courses through community engagement of vulnerable persons residing in disaster prone regions (developing countries). Application of ICTs in Sen's capability approach and Nussbaum's ethical perspective is noteworthy in determining the sustainable livelihood of disaster affected persons (J.-M. Coicaud & Warner, 2013; Nielsen, 2017). This illustrates ICT capability and how it may be used effectively in empowering vulnerable persons. Notably, increase of mobile subscriptions has reached over one billion subscribers since the 2010 Haitian disaster including high access to internet in the Global South ranging from one in four individuals (Meier, 2015).

Third, the capability of processing, evaluating and using information in disaster response is integral for sustainable livelihood of vulnerable persons. This projects Gigler's argument on the nature of cross-natural information between information capital and others forms of capital in

evaluating the role of ICTs in the livelihoods of disaster affected persons (Gigler, 2014). Profoundly, findings two on mapping out delivery to affected regions using the google kit through volunteering and GIS advisers' underscores Nielsen's perspective of innovative networking of different actors.

6.3.2 The Question of Big(crisis)Data

Despite overwhelming data (information collected during the 2010 Haiti earthquake), information management is critical in enhancing sustainable livelihood systems of affected persons to cope with shocks and stressors of climate change (See also section 5.4). Due to its impact, some researchers argue that the 2010 Haiti earthquake led to the rise of digital humanitarians (Meier, 2015). Information management of *big(crisis)data* is hereby fundamental for humanitarian action especially with the increase of natural disasters. For instance, over a quarter million tweets were registers by mappers after Typhoon Yolanda's devastation in the Philippines in 2013. In their analysis of tweet messages, Doan and Collier also note that over 177 million disaster related tweets were posted in social media, an equivalent of 2000 tweets per second (Meier, 2015). Taylor emphasizes on *big(crisis)data* after Hurricane Sandy in New York, which recorded over 20 million disaster related tweets including Instagram pictures (Meier, 2015). What this signifies is that 2010 Haiti earthquake, information management (evaluating, processing and using information) of *big(crisis)data* is critical in enhancing livelihood systems of disaster affected persons especially in developing countries. More so, *big(crisis)data* (digital perspective) involves the variety (audio, numerical, photographic and videography, volume and speed of information management in humanitarian emergency response (Meier, 2015). The volume and speed of data management from referral systems and hubs (see also findings one and two) is critical for relief efforts in non-coercive situations because it focuses on the most affected. Hereby, innovation on social embeddedness is enhanced through local situations (meaningfulness of the youth participation on mapping and volunteer work) of affected persons which reflects Nussbaum's ethical and Sen's capability approach of improving sociotechnical systems (J.-M. Coicaud & Warner, 2013; Gigler, 2014).

6.3.3 Decision on Big(crisis)Data

This discourse sees the capacity of ICT as a link in improving the lives of vulnerable persons arising from local problematization. In addressing the gaps(challenges) facing relief models in climatic related shocks disturbance, social embeddedness constructs new tech-organisational changes in progress of sustainable livelihood (J.-M. Coicaud & Warner, 2013; Gigler, 2014). Over 12 million Haitians were affected by climatic shocks in 2015-16; an increase over 4

million from 2010. (see also figure 4.1). Traditional humanitarian organizations seem to face challenges in identifying the gap (missing link) in *real time* of disaster affected communities in the age of *big(crisis)data.* (By Big(crisis)data, I am referring to a large conception of information obtained from disasters through mapping, social media and mainstream media). This not only involves government policy(technology) but also challenges in identifying *big(false)data* in what Meier terms as "finding a needle in a haystack"[36] (Meier, 2015, p. 31) and sample(representative) bias in humanitarian data.

Prioritization of life saving data in emergency response is a challenging issue in today's value chain of humanitarian aid. This is also influenced by private and public sources of social media including meta-data[37] used by emergency responders in formulating their report(Meier, 2015). Adopting life-saving systems in emergency response may involve tweeter hashtags (#), for example, #ReliefPort-au-Prince or #HealthNeededHaiti. This in turn "creates demand"(Meier, 2015) towards affected persons, which is a challenge facing governments and humanitarian organisations in adopting development aid favourable for sustainable livelihood of vulnerable persons. However, a positive step in prioritizing lifesaving data in response to disaster was evident in the Ebola crisis. In his blog on iRevolutions[38], Meier highlights on UN's adaptation of standardized hashtags[39] in responding to the Ebola crisis (Meier, 2015). Similarly, the Filipino government advocated the use of different Twitter hashtags including #ReliefPH and #RescuePH in responding to Typhoon Pablo. Considering different mediators in ICT and developmental aid systems including NGOs and software companies, these kinds of proactive approaches address the gaps(challenges) of traditional humanitarian action herein expanding the freedoms of vulnerable persons. In addition, humanitarian organisations need to focus more on the ethical use of *big(crisis)data* in disaster response and avoid demographic biases as in the case of 2010 Haiti earthquake.

- Creativity is a key factor driven by generosity as seen from the Haiti volunteers during the 2010 earthquake. The response to 2010 Haiti earthquake exposes the weaknesses of state-led humanitarian action over the past ten years(see also figure 4.1) in addressing the needs of vulnerable persons in *real time.* On the other hand, as I've denounced in this study, the Haiti earthquake reveals the genesis of innovative *real time* approaches of addressing disaster

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[36] St Thomas More 16th century notes, "to seek out seek out line in his books would be to go looking for a needle in a meadow" (Meier, 2015, p. 97)

[37] Meta-data involves real time updates or information from sources of Big data including pictures, tweets, instant messages(IM).

[38] See also: https://irevolutions.org/2014/11/05/social-media-hashtag-standards-disaster-response/

[39] See also OCHA Policy on Hashtag Standards for Emergencies: https://app.box.com/s/yvobt4n9wptqa8sd0887

affected persons through democratising humanitarian technology in the age *big(crisis)data.* User-generated participation in emergency connectivity today presents a neo-geographic social movement of public sphere in technology (mapping and social media). A participation in which disaster affected communities and volunteers illustrate between 'dominators and oppressed' and the 'hidden transcripts' in humanitarian action (Meier, 2015). The former presents the global goodwill (public views) that can be controlled by political powers whereas the latter illustrates criticism to power that cannot be decoded during humanitarian crisis. This draws Habermas's ethical discourse of dialogical community enabled by ICT that can be used as a basis of empowerment for vulnerable person affected by disasters.

Habermas argues that, "a group of people who take on tools of open expression becomes a public, and …increasingly constrains undemocratic rulers while expanding the rights of that public"(Shirky, 2010). Coicaud also projects this as a critical aspect of international ethics presenting a dilemma in governing within contemporary politics (J.-M. Coicaud & Warner, 2013).

I believe that forwarding thinking in humanitarian action should shift from crisis management to risk management. More profoundly, forwarding thinking policies should not only contain anecdotes and human-centered engagement but also data, machines and scientist. Put together, this creates humanitarian innovation; innovation built upon enlightened leadership. For instance, prediction of population movement in future climatic stresses as part of risk management approach of disease outbreak. Notably, a study conducted by Linus Bengtsson and Erik Wetter on location data of 1.9 million cell phones during the devastating 2010 Haiti, establishes viable movements of affected persons with high mobile usage (Meier, 2011; PLOS Medicine, 2011). Findings on this study also revealed that affected person also relocated to areas of close family ties. With reported cases of out-break of diseases during disasters, for instance, the Ebola outbreak in West Africa in 2014, consultations between vulnerable communities, humanitarian organisations and mobile technology is noteworthy for better preparedness on future disasters. With rising numbers of affected persons over the past years (see also figure 4.1), humanitarian organisations should seek more partnership with communication technologies in promoting sustainable livelihood of vulnerable persons. Moreover, considering increase of internet connectivity in vulnerable regions and emergency connectivity infrastructures provided by the Global Association of Mobile Operators (GSMA), forwarding thinking policies is needed by humanitarian organisations in ensuring resiliency of sustainable livelihood of vulnerable communities.

Notably, forward-thinking policies and innovative thinking is a developing factor in ensuring ethical approaches of democratizing humanitarian technology in disasters. Essentially, discussions on the impact of big data in non-coercive humanitarian action in the 2018 World Economic Forum signifies this aspect (WEF, 2018). Key aspects that were raised included disruption of traditional power dynamics, a shift in composition and a quest for efficient tools in the humanitarian sector.

6.3.4   A question of Policy

Key challenges in the twenty first century is democratizing digital humanitarian aid. The debate mainly lies on the involvement of the private sector in sustainable livelihood of vulnerable persons affected by acute and chronic climatic stressors

Vulnerable persons affected by climate change face challenges in adopting a sustainable livelihood after disasters.

However, this remains a question of policy and governance in not only mediating ethics into technology, that is, democratizing humanitarian technology, but also adopting a virtual ethical approach. Simply, governments should focus on the well-being of vulnerable persons ensuring that they are resilient to future shocks through timely data. Profoundly, Pogge emphasises on personal and ethical values as key aspects of human personal flourishment in the context of sustainable- livelihood (Pogge, 2008).

6.4   Concluding Remarks

In conclusion, these findings suggest that Gigler and Graham's concept of social embeddedness and moralism can provide beneficial progress in investigating digital intervention and sustainable-livelihood of disaster vulnerable persons because of increasing challenges in non-coercive humanitarian response.

A key finding in this research for Graham's moral philosophy and Fritsch's social constructivism is that informed participation of disaster vulnerable persons and communication capabilities of ICT artifacts are integral in determining sustainable-livelihood of disaster vulnerable persons.

However, limited attention to confirm Hypothesis two indicates that Amstutz, Graham and Nielsen's concept of social refinement, sustainability and digital innovation is complex, considering the role of local and national leadership involved in humanitarian response.

Notably, the concepts that I have used to research humanitarian innovation and development have been decisive, but the results are also varied in that digital intervention in non-coercive humanitarian response is a developing factor.

Through this research, I have demonstrated that innovation is integral in linking human rights and technology. Moreover, key contributions include development of theoretical concerns including social constructivism. In addition, enhancing construct validity and increase on research purpose through future framework is also a major contribution.

Hereby, the implication of these findings on the study of humanitarian innovation are that informed participation and communication capabilities can provide beneficial progress in investigating of digital intervention and sustainable-livelihood of disaster vulnerable persons because of increasing challenges in humanitarian response.

In conclusion, I propose that future research should focus on implementing moral principles in technology non-coercive humanitarian programmes. Moreover, based on these findings, I conclude that informed participation of disaster vulnerable persons and communication capabilities of emerging ICTs are decisive in determining sustainable-livelihood of disaster vulnerable persons.

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$ctrl.firstLine.delimiter)"> *Closing the feedback loop : can technology bridge the accountability gap? </prm-highlight>.*

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8 APPENDIX

8.1.1 Appendix Human Capabilities Strengthened

Indicators for Individual Empowerment

Human Capabilities strengthened

Dimension	Objective	Outcome
Informational	*To improve the access to information and informational capabilities*	- improved capacity to use different forms of ICTs - enhanced information literacy - enhanced capacity to produce and publish local content - improved ability to communicate with family members and friends abroad
Psychological	*To support a process of selfreflection (critical conscientization) and problemsolving capacity*	- strengthened self-esteem - improved ability to analyze own situation and solve problems - strengthened ability to influence strategic life choices - sense of inclusion in the 'modern' world
Social (Human capital)	*To strengthen people's human capital (skills, knowledge, ability to work and good health)*	- enhanced ICT literacy and technology skills (i.e. repair computers) - enhanced leadership skills - improved program management skills
Economic	*To enhance people's capacity to interact with the market*	- improved access to markets - enhanced entrepreneurial skills - alternative sources of income - productive assets strengthened - improved employment opportunities - improved income through a) lower transaction costs (less time constraints); b) reduced transport

Dimension	Objective	Outcome
		needs; and c) increased timeliness of sales
Political	*To improve people's participation in decision-making processes at the community-level and the political system*	- improved access to government information/services (e-government) - improved awareness about political issues - improved capabilities to interact with local governments
Cultural	*To strengthen people's cultural Identity*	- use of ICTs as a form of cultural expression (i.e. design of computer graphics, websites) - increased awareness of own cultural identity

8.1.2 Appendix Social Capabilities Strengthened

Indicators for Community Empowerment

Social Capabilities strengthened

| Dimension	Objective	Outcome
Informational	*To improve access to information and informational capabilities*	- traditional information system strengthened - information flows within community improve - horizontal knowledge exchanges with other communities strengthened vertical knowledge exchanges with the state, donors, NGOs strengthened
Organizational	*To strengthen organizational Capabilities*	- transparent selection of leaders - increased efficiency - improved information flows - better coordination among different organizations - networks with other local organizations strengthened
Social Development	*To improve access to basic social Services*	- improved access to formal and non-formal education (i.e. e-learning)

		- improved access to health services (improved knowledge about health practices and traditional medicine) - improved knowledge and access social programs of the government (e-government services)
Economic Development	*To promote economic* *Opportunities*	- improved access to markets and commercialization of products - improve productive activities through enhanced knowledge (i.e. better knowledge about agricultural practices) - enhanced capacity mobilize resources from outside donors - improved access to remittances through improved communication with migrant workers
Political Participation	*To improve participation in the political system* *To enhance transparency within community* *To improve participation in the political system* *To enhance transparency within* *Community*	- improved 'voice' and participation in development process - improved transparency of political institutions (e-government) - enhance decision-making power in political process - better coordination of political activities enhanced transparency of information flows within community - direct participation in international policy dialogue (UN permanent forum
Cultural Identity	*To strengthen the communities* *cultural identity*	- Local languages strengthened - indigenous knowledge strengthened - improved dissemination of communities own culture

Human Capital Strategy
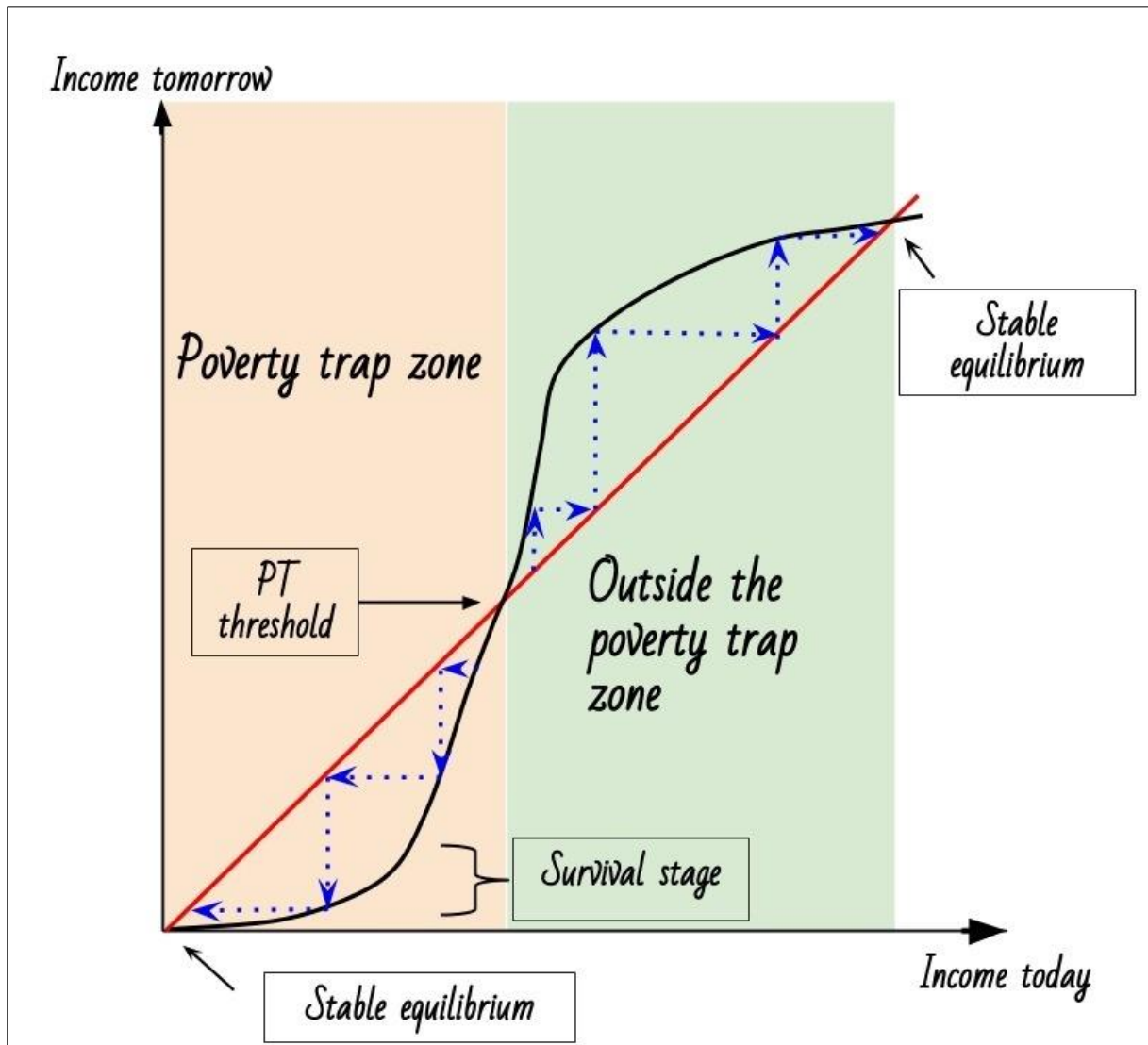
S-Shaped curve

8.1.5   Case Study: Participatory Approach Durable Shelters; Traditional Technique Project (PR-B)

The focus of the project was on displaced disabled persons from the rural part of Southern Haiti. The project adopted a traditional approach known as '*clissade*' in response to durability and beneficiaries. This was also viewed as a formidable aspect to large crowd meetings and gathering. In addition, the participatory approach was used in the construction of shelters.

Project Timeline

Figure 4.6 shows the time duration in completion of the re-engineered traditional technique shelter known as '*clissade*', which was built using a participatory approach. It also includes the distribution of labour over the time frame of the construction

22 months
Completion of construction

8 months
Project scale up

5-6 months
Establishment of supply and workshops
Pilot 50 shelters start

2 months
Project starts five weeks after the disaster
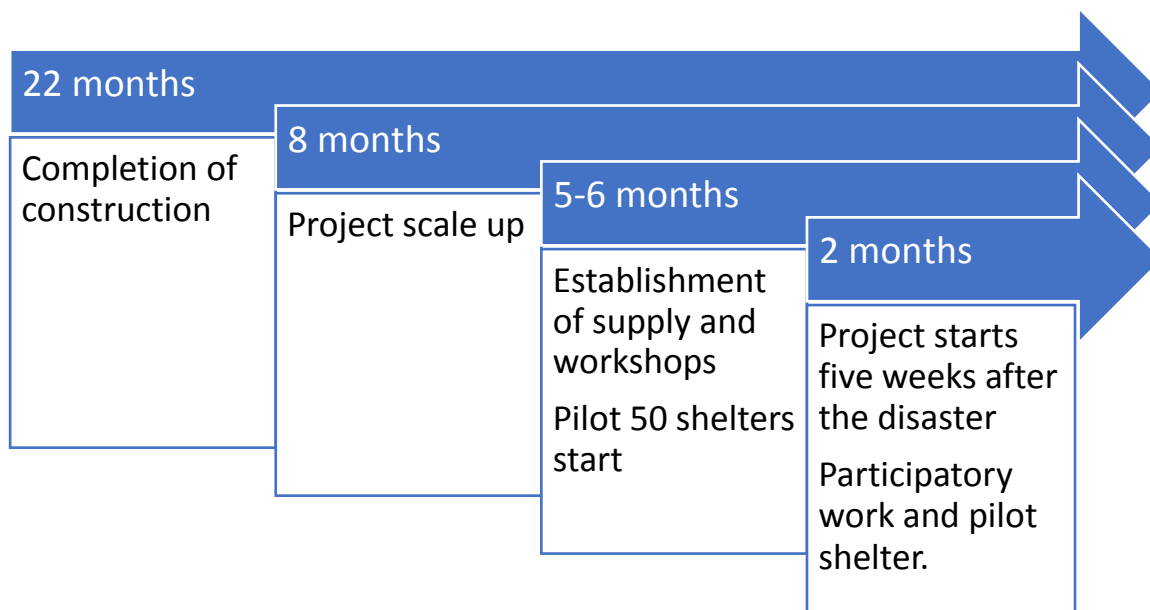Participatory work and pilot shelter.

Figure 9.7 Source:(Sheltercasestudies, 2012, p. 32)

Assessment

The project incurred a formidable setting but faced several shortcomings

- The project's main target was for displaced disabled persons, upon which the shelters' sanitation system were set up in recognition to an individual's disability.
- In adopting the traditional model of construction '*clissade*', maintenance and sustainability was prevalent by the locals.
- The shelters were built with panels that had the same width as the doors. The disabled persons hereby, could create their own opening.
- Youth students from a training centre were involved in the project, which created more experience in joining the labour market
- A referral system from other organisations was used in the selection of individuals to accommodate the shelter which in turn was time consuming and created logistic challenges.
- Upgrading the panels by covering the panels was advisory, or else the individuals would succumb from the cold weather.
- The project model was demanding, that is, labour consuming.

- Logistics was a challenge in reaching out to families in rural areas.

The individuals prefabricated the shelters themselves, sending them to be assembled in the central work shop. This was for logistic purposes.

Shelter Strategy

The construction of the shelters adopted a traditional method referred to as '*classide*'[40] which was prevalent and more popular in Haitian families most of whom lived in rural areas. After the earthquake, houses built from '*classide*' were more resistance and severe injuries were report as compared to bricks houses. See fig. 4.7 This was because of the material used in building the '*classide*' shelters which included palm wood and walls.

Establishing a Pilot Shelter

The project entailed communities from different areas that consisted of a participatory approach on a ten-day period. The focus was to establish a daily routine of the family members which included cooking, working and sleeping.

In establishing a pilot shelter, an agreement was met with the local authorities. The shelter later served as a treating centre for the disabled. Tools, equipment and design models were developed in accordance to the budget. This also included engineers from other organisations. The individuals were given 60 USD to pay the local workers who built the shelters.

A multi-party document was signed by individuals for landownership of three years, which gave them access of owning both shelters and latrines. This was in response of 40% of families who owned their own land.

The selection of individuals on the other hand involved people with extreme vulnerable disabilities. This was met through collaboration of NGOs and local organisations in establishing disability cases.

The table below describes different stages of the project. Different roles were assigned in accordance to ones skills and ability.

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[40] '*classide*' refers to a Haitian traditional model of building houses by weaving bars of palm wood in making walls which are later cover by mud and cement. (Sheltercasestudies, 2012, p. 33).

Day	Stage	Worker days
1	Ground Preparation	2 x technical advisor
		6 x individuals
2	Digging foundation	6 x individuals
3	Bolting and fixing Columns	1 x chief carpenter
		1 x chief mason
		6 x beneficiaries
		6 x labourers
4	Embankments	6 x workers
5	Installation of panels and carpentry	1 x chief carpenter
		6 x beneficiaries
		3 x workers
6	Paving and drainage	1 x chief mason
		6 x beneficiaries
		3 x workers
7	Fixing roof windows and doors	1 x chief carpenter
		6 x beneficiaries
		3 x workers

Table 4.1

Coordination

The construction process was prevalent through substantial coordination between structural engineers and local workers. One of the key risk managements on the durability of the shelters was landslides upon which involved raising the houses to a level of 30 to 50cm above the ground.

Figure 9.8 Source: (Sheltercasestudies, 2012, p. 33). The local workers used the traditional model referred to as '*classide*', in building the shelters.

In relation to logistics issues, some of the raw materials including pressure treated pine had to imported because they weren't available in Haiti. However, transporting materials from the workshop to the remote areas of Southern Haiti proved to be a challenge. Some materials were pre-fabricated in panels and trusses, upon which had to either be transported by trucks or by hand to the building sites. See fig. 4.8.

Figure 9.9 Source: (Sheltercasestudies, 2012, p. 34). Some building materials had to be pre-assembled for delivery in remote areas of the building sites.

The diagrams below illustrate a traditionally built shelter that sustained the earthquake and one that has been redesigned through traditional means.

Figure 9.1.1 Source: (Sheltercasestudies, 2012, p. 34). Diagram 1 illustrates a shelter that could endure the earthquake whilst diagram 2 entails a redesigned housing constructed in the aftermath of the earthquake disaster.

 Summary

This section has therefore presented a summary of a participatory approach durable shelter project from the rural part of the Southern Haiti. The construction adopted a traditional method, 'classide' before the establishment of pilot shelters. NGOs and local organisations collaborated in selecting affected persons with extreme disabilities. This method helped in establishing disability cases during the recovery period. Structural engineers and local workers coordinated in constructing the shelters. Affected persons were assigned roles in accordance to their skills. Pre-assembled building materials from the workshop were delivered by hand to remote areas of the building sites.

Figure 4. Source OCHA . Infographic on the use of hashtag

Figure 5 Source: OCHA. Infographic hashtag use in emergencies

Appendix Public reporting hashtag feed and Emergency Response hashtag feed
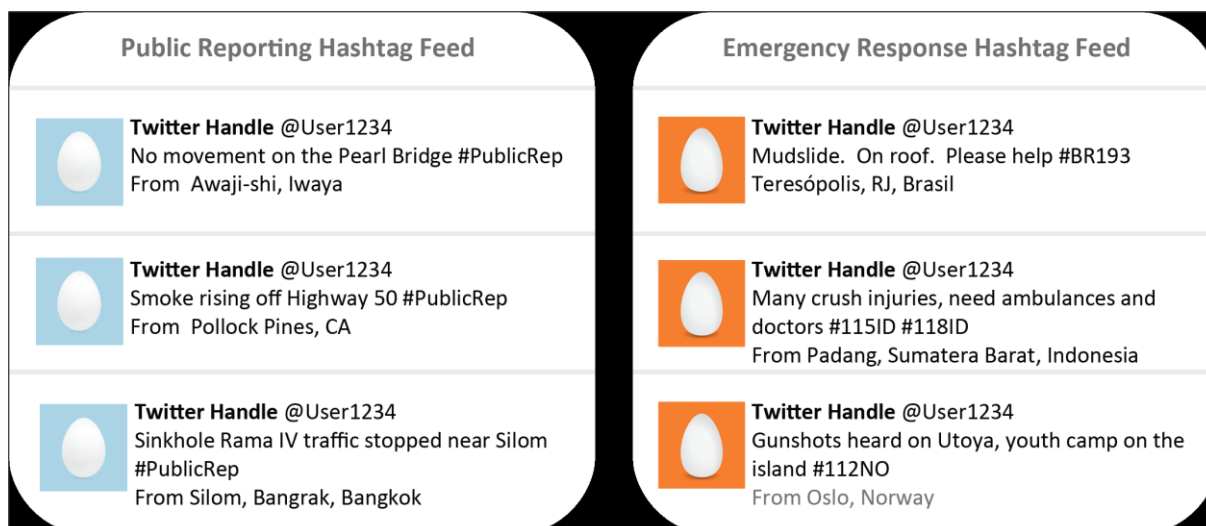
Source: Think brief hastag Standards for Emergencies (OCHA, 2014)

8.1.7   Appendix Findings, Interpretation and conclusion

Findings/ interpretation	Interpretations /conclusio	Conclusion
Targeting the disabled persons	- Implementing the *'Pinheiro Principles*- implementation that can be used. -restitution rights as a prerequisite? -	
Introduction of hubs	-innovation through crowd-sourcing; creating and communicating value	
Humanitarian ecosystem	- Universal Basic Income(UBI) https://futurism.com/the-first-blockchain-based-universal-basic-income-experiment-just-launched/ - https://futurism.com/images/universal-basic-income-ubi-pilot-programs-around-the-world/	

'If partners don't get their added value they don't come back'	-focus on the affected individual or end-user was limited.	**-**bottom-up theory doesn't apply
	-Paradigm innovation -mental	-BoP actually works with
Size of cluster	-more inclusive	**-**acknowledging one's idea is easier and convenient
Strategy on appointment tools.	-continuity process. -identify previous	
Global coordination	-globalisation -interest on joining humanitarian and development; <mark>Education Cannot Wait first Global fund</mark> http://www.educationcannotwait.org/the-fund/	
Universalistic ethical princip Interdependency of basic rights	-interdependency of ethics within the global order	
Humanitarian intervention	Argument on national sovereignty-	

| **Goodwill-** Doing good by doing new things**-challenge**	-rich in goodwill (wealthy countries) but lack core entrepreneurial skills in turn ideas into sustainable social value	-Bessant- 'Heart vs Head' Challenge
The 'fuzzy front end' **challenge**	Finding novel(R&D) [using drones to carry relief supply into damaged terrain] solutions to old problem **-applies to PR-B logistic factor on delivery of small construction material and food to the affected**	-Bessant -resource allocation system as strongly biased towards backing safe bets and proven ideas.
The 'user-management'** challenge**	-addressing the research questions on participation. -inappropriate solutions with best intentions litter the disaster sites. e.g., the **Uganda refugee case**- misuse of mosquito nets. http://www.oxhip.org/ -empowerment of the user as a rich source of ideas. - HI arising from as bottom up model [the need and focus of the beneficiaries] -e.g. crisis mapping app- **Ushahidi** https://www.ushahidi.com/about developed from post-election violence in Kenya.- - App has been in Brisbane floods and Fukushima disaster. [Global effect].	-Bessant -participatory approach -recognizing the importance of user-perspective! -behavioral acts under crisis conditions, how their prioritize their needs, how best they can support themselves,[through religious activities participatory

		perspective- in meetings- applies to the PR-B.
The 'mad Mavericks' challenge	-crisis condition that defy old models to new ones. (Agility, risk talking and experiment). - **Entrepreneurs thrive.** **-**Challenging the lean start-up' model of experiment and fail fast-not an ethical perspective (dealing with people's lives). -Assumption to HI ideas-= internalizing& institutionalizing actors (private sector) i.e. innovative context. = **cash programming (radical business model for provision of food).** http://www.cashlearning.org/downloads/cash-based-programming-in-the-food-assistance-sectorcase-study-mihis-project-final.pdf - experimented in mid-1980 but adopt 2000(legitimate/mainstream model). -	-Bessant
The 'missing middle' challenge	-challenge arising from HI process(destructing the scale) https://www.thoughtworks.com/insights/blog/scaling-innovations-missing-middle -reliant on donor money- needs solid evidence; ethical consideration needed-slowing the process/ideas---politics/agenda/major actors --**adopting factors that have been proven elsewhere—i.e. part of HI ideation.** **Learning for the HI(Solution)-**	

	Currently- using '**entrepreneur-labs' and similar spaces**. http://www.tandfonline.com/doi/full/10.1080/01436597.2015.1135730 - allows early stage prototype and exploration. -Special funding streams offering guidance & counselling. http://www.elrha.org/hif/home/ **HIF-** eliminating '*ambidexterity' solutions* used org. in cooperating venturing activities. **Learning from HI laboratory- crisis driven innovation:** **-**extreme conditions=radical solution approach=innovation models -**users and context critical=HI requires user participatory in configuring solutions** **-**HI linked to entrepreneurial experimentation i.e. rapid prototype -**rapid diffusion**- -**Recombination- cross-sector learning- failure on current solutions on crisis leads to rapid thinking.**	
	Liquidity crisis - The Economist http://www.economist.com/news/briefing/21709530-water-becomes-ever-more-scant-world-needs-conserve-it-use-it-more-efficiently-and?fsrc=scn/tw/te/bl/ed/	
	Pay as you drink- A better way to provide drinking water in Africa. **In innovative cure for broken pumps**- The Economist http://www.economist.com/news/middle-east-and-africa/21717766-innovative-cure-broken-	

Table 9–1. Characteristics of Centralized and Decentralized Diffusion Systems

CHARACTERISTICS OF DIFFUSION SYSTEMS	CENTRALIZED DIFFUSION SYSTEMS	DECENTRALIZED DIFFUSION SYSTEMS
1. The degree of centralization in decision making and power.	Overall control of decisions by national government administrators and technical subject-matter experts	Wide sharing of power and control among the members of the diffusion system; client control by local community officials/leaders.
2. Direction of diffusion.	Top-down diffusion from experts to local users of innovations.	Peer diffusion of innovations through horizontal networks.
3. Sources of innovations.	Innovations come from formal R&D conducted by technical experts.	Innovations come from local experimentation by nonexperts, who often are users.
4. Who decides which innovations to diffuse?	Decisions about which innovations should be diffused are made by top administrators and technical subject-matter experts.	Local units decide which innovations should diffuse on the basis of their informal evaluations of the innovations.
5. How important are clients' needs in driving the diffusion process?	An innovation-centered approach; technology-push, emphasizing needs created by the availability of the innovation.	A problem-centered approach; technology-pull, created by locally perceived needs and problems.
6. Amount of re-invention?	A low degree of local adaptation and re-invention of the innovations as they diffuse among adopters.	A high degree of local adaptation and re-invention of the innovations as they diffuse among adopters.

Characteristics of Centralised and Decentralised Diffusion Systems. Source: Rogers, 1972

(Rogers & Olaguera, 2003)
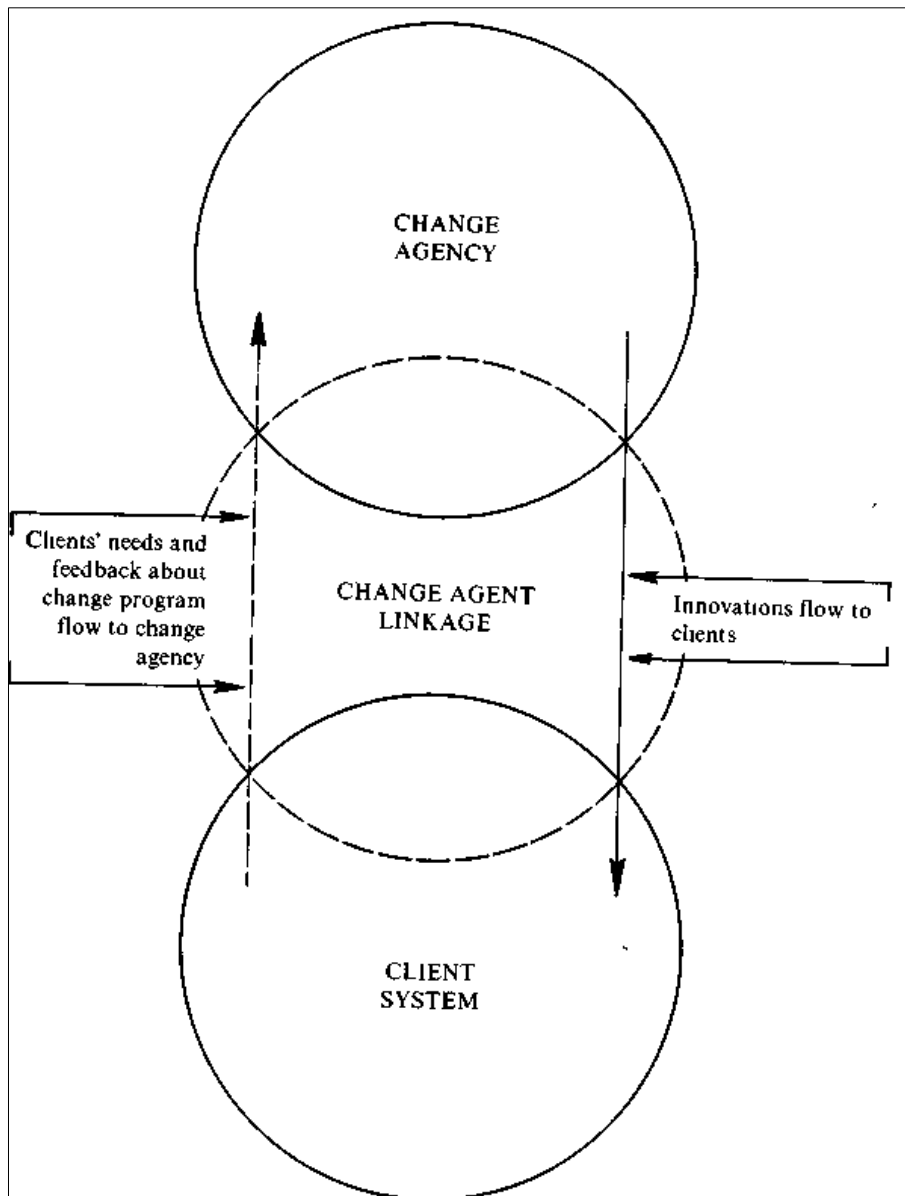
Change agents provide linkage between a change agency and; client system. Sources: (Rogers & Olaguera, 2003, p. 314)

Table 2-1. Comparison of the Nine Major Diffusion Research Traditions.					
DIFFUSION RESEARCH TRADITION	NUMBER OF DIFFUSION PUBLICATIONS	TYPICAL INNOVATIONS STUDIED	METHOD OF DATA GATHERING AND ANALYSIS	MAIN UNIT OF ANALYSIS	MAJOR TYPES OF FINDINGS
1. Anthropology	134	Technological ideas (steel ax, the horse, water boiling)	Participant and nonparticipant observation and the case study approach	Tribes or peasant villages	Consequences of innovations; relative success of change agents
2. Early sociology	10	City manager government, postage stamps, ham radios	Data from secondary sources and statistical analysis	Communities or individuals	S-shaped adopter distribution; characteristics of adopter categories
3. Rural sociology*	791	Mainly agricultural ideas (weed sprays, hybrid seed, fertilizers)	Survey interviews and statistical analysis	Individual farmers in rural communities	S-shaped adopter distribution; characteristics of adopter categories; perceived attributes of innovations and their rate of adoption; communication channels by stages in the innovation-decision process; characteristics of opinion leaders
4. Education	336	Teaching/learning innovations (kindergartens, modern math, programmed instruction, team teaching)	Mailed questionnaires, survey interviews, and statistical analysis	School systems, teachers, or administrators	S-shaped adopter distribution; characteristics of adopter categories

Assessment of Diffusion Research Tradition pt 1 Source: (Rogers & Olaguera, 2003)

5. Public health and medical sociology	226	Medical and health ideas (drugs, vaccinations, family planning methods, CAT scanner)	Survey interviews and statistical analysis	Individuals or organizations like hospitals	Opinion leadership in diffusion; characteristics of adopter categories; communication channels by stages in the innovation-decision process
6. Communication	372	News events, technological innovations	Survey interviews and statistical analysis	Individuals or organizations	Communication channels by stages in the innovation-decision process; characteristics of adopter categories, and of opinion leaders; diffusion networks
7. Marketing	304	New products (a coffee brand, the touch-tone telephone, clothing fashions)	Survey interviews and statistical analysis; field experiments	Individual consumers	Characteristics of adopter categories; opinion leadership in diffusion
8. Geography	130	Technological innovations	Secondary records and statistical analysis	Individuals and organizations	Role of spatial distance in diffusion
9. General sociology	382	A wide variety of new ideas	Survey interviews and statistical analysis	Individuals	Characteristics of adopter categories; various others.
10. Other traditions†	500	—	—	—	—
Total	3,085				

*The rural sociology tradition actually includes 147 publications by diffusion scholars in extension, whose work is closely related.

†Includes general economics, political science, agricultural economics, psychology, statistics, industrial engineering, and various others.

Source: Diffusion Documents Center, Stanford University, in 1981.

Assessment of Diffusion Research Tradition pt 2 Source: (Rogers & Olaguera, 2003)

8.1.8   Appendix- The Building Environment

The building environment role's in crisis management continues to gain more attention in the humanitarian sector. This is evident through the 2016 Oslo Architecture Triennale's initiatives including, "Reporting from the front" and "After Belonging"- A Triennale In Residence, On Residence, and the Ways We Stay in Transit. (Gintoff, 2016; Medina, 2016). The safety and relocation of affected persons and IDPs in crisis situations is hereby an integral aspect in architectural work incubated by site planning. As an incumbent to the Camp Management, site planning focuses on the provision of sustainable shelters of crisis affected persons.

Within the humanitarian sector and building environment, a 'Site Planner' responds to:

…urban and rural displacement through spatial solutions and upgrade of the physical environment. Within emergency response, the Site Planner's role is to identify and coordinate all physical interventions needed in order to create safe living conditions for displaced populations. (Breivik & Selmer-Olsen, 2016, p. 12).

The writer describes architectural solutions from a geographical perspective; an aspect that is relative in mapping through Geographic Information System(GIS). GIS ensures constructive reliability of equitable data and information, which in turn projects environmental management skills (CMT, 2016, p. 38). This ensures the safety of vulnerable groups especially persons prone to gender-based violence and those with specific needs, in turn encouraging community participation from youth groups. Substantial architectural work has seen the introduction of sustainable structures that are capable of ensuring safe spaces for crisis affected persons which is noteworthy for the right to dignity of individuals (Breivik & Selmer-Olsen, 2016). Equally, humanitarian need of communication infrastructure and ICTs by disaster affected communities is on the rise in improving traditional shelters vulnerable to climatic shocks and stresses(Greenwood et al, 2017).

Establishment of safe space is hereby noteworthy in recognition of the culture and social status of the affected crisis affected persons or IDPs. In a report conducted by architects Håvard Breivik and Tone Solmer-Olsen on methodologies of safety conditions on Nepalese who were affected by the 2015 earthquake states that religious input on site selection is decisive in reflection of norms and rituals in the camp(CMT, 2016, p. 102). This follows a distinct hierarchical caste system in Hinduism whereby low castes are restricted from high castes public areas including restaurants. However, the correlation of this aspect from a worldwide perspective projects a different understanding in the West. In understanding the themes and

counter-themes of worldviews, Todd argues that Scandinavia and northern France 'stress' equality and freedom, but also allow the measurement of equality (Hiebert, 2008, p. 27).

As a description of site planning, Breivik and Solmen-Olsen's perspective on advocating human rights is clear in the provision of shelter on crisis affected persons as basic need. Article 26 of the Universal Declaration of Human Rights states that:

Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control.(Haas, 2013).

Haas proclaims the concept of universalism, in addressing the living conditions of crisis affected persons or IDPs. Herein, Breivik and Solmen-Olsen argue that architecture is an integral aspect of promoting 'socially integrated communities, whether the shelter is designed for long-term or short term purposes. (Breivik & Selmer-Olsen, 2016, p. 16). This is coined further in Skog et al's projection on common spaces through building of social structures .

8.1.9   Appendix- Big data assumption

- Big data will improve decision-making for disaster response

- Big data suffers from extreme sample bias- only on non-random sampling--- sample bias (also affects SoMe)

- Big data enthusiasts suggest doing away with traditional sources of information for disaster response

- Big Data will makes us forget the human faces behind the data.