The use of Information and Communication Technology in natural disaster management

(The case of Cameroon)

Master’s thesis within Business Administration

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Carine Kuo & Joseph Bayiah
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Abstract

The frequency of natural disasters and its negative consequences in terms of the number of people killed, property destroyed and negative environmental impacts caused in the affected communities constitute one of the basic foundations and motivations for the development and use of ICT and other means of preventing as well as responding to disasters in the world today. This is simply because disaster management constitutes an important part of any developmental framework. Unfortunately a majority of these natural disasters occur in developing countries where information flow is greatly hampered because the national actors in disasters lack the skills to use ICT to prepare for and to response to disasters in their communities. Current study aims at studying the use of ICT in disaster management in Cameroon—a less developing country south of the Sahara.

To achieve the aim of this study, a quantitative research approach was chosen. A total sample of 150 organisations was selected from a population of 285 organisations within Cameroon, that are directly or indirectly involved with disaster management or developmental issues of any nature. In total 150 questionnaires were administered to these selected national actors by mail, internet, telephone and self-administration and 85 of the organisations responded to the questionnaire.

After collecting and analysing the data, the authors came to the conclusions that; disasters occur in Cameroon on frequent bases causing lots of damages thus the need for ICT use in humanitarian logistics to move information and material. Results showed that national actors use the radio and local TV (CRTV) for disaster preparedness and the mobile phone for disaster response, while the internet and computer technology, foreign TV, Fixed phone and fax had a very low usage rate or sometimes not used at all. The reason for low usage or no usage was due to problems encountered by national actors in an attempt of trying to use them. Against this background, the authors suggested a number of recommendations that could improve the degree of ICT usage. One of them was that the Cameroon government should partner with private sector firms to make ICT infrastructure available by investing more and improving on the telecommunication sector in the country. This will solve the problem of poor ICT infrastructure, poor radio and TV signals, limited internet connectivity accessibility and availability in Cameroon.
## List of abbreviations

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<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ADRC</td>
<td>Asian Disaster Reduction Centre</td>
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<tr>
<td>DMM</td>
<td>Disaster management model</td>
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<tr>
<td>CIA</td>
<td>Central Intelligence Agency</td>
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<tr>
<td>DITF</td>
<td>Disaster Information Task Force</td>
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<td>DM</td>
<td>Disaster Management</td>
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<tr>
<td>ECA</td>
<td>Economic Commission for Africa</td>
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<td>ERELA</td>
<td>Rural Electronic Schools in African Languages</td>
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<tr>
<td>EII</td>
<td>Emergency Information Infrastructure</td>
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<td>EREUDEF,</td>
<td>Environment and Rural Development Foundation</td>
</tr>
<tr>
<td>GDIN</td>
<td>Global disaster information network</td>
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<td>ISDR</td>
<td>International Strategy for Disaster Reduction</td>
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<tr>
<td>IFRC</td>
<td>International Federation of Red Cross and Red Crescent Societies</td>
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<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
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<tr>
<td>ITAA</td>
<td>Information Technology Association of America</td>
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<tr>
<td>ISTD</td>
<td>Science and Technology Division</td>
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<td>NDM</td>
<td>Natural Disaster Management</td>
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<tr>
<td>NGO</td>
<td>Non Governmental Organization</td>
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<tr>
<td>SID</td>
<td>Sudden Impact Disasters</td>
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<td>SSA</td>
<td>Sub Saharan Africa</td>
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<tr>
<td>TAM</td>
<td>Technology Acceptance Model</td>
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<tr>
<td>TRA</td>
<td>Theory of Reasoned Action</td>
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<tr>
<td>UN</td>
<td>United Nations</td>
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<td>UNDP</td>
<td>United Nations Development Programme</td>
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1 Introduction

This chapter will guide the reader to the main purpose of the study. It begins with the study's background, followed by a discussion of the research problem and the research questions. Other issues discussed here are; the perspective, the delimitations, the significance and the disposition of the study.

1.1 Background to the study

The frequency of Sudden Impact Disasters (SIDs) such as tsunamis, floods, earthquakes, hurricanes, landslides, volcanoes are on the increase today (Asian Disaster Reduction Centre ADRC, 2004). The increase in the number of such disasters is due to many factors some of which include environmental degradation, rapid urbanization and social marginalization, leading to loss of life and property in the affected areas particularly in developing countries (McEntire, 1999). Unfortunately, the poorer communities are the most vulnerable to such disasters due to a variety of socio-political, cultural and economic factors which force them to live in disaster prone areas (Benson et al., 2001). Natural disasters attack the poor by interrupting income, reducing personal assets, and destroying essential public infrastructure. About 67.75 percent of all types of natural disasters occur in Africa, Asia, the Caribbean and South America where the poor constitute a greater portion of the population, while 24.67 percent occur in Europe and North America (International Strategy for Disaster Reduction ISDR, 2005).

According to ADRC (2004), the Asian continent ranks first with about 89 percent of the population affected by natural disasters between 1975 and 2003. The report shows that the African continent is ranked in the second position and South America and the Caribbean occupy the third position. These catastrophes have killed more people than the wars in Vietnam, Afghanistan, Iran and Iraq (Cate, 1994). The increase in the frequency and number of natural disasters in the world today, the incalculable suffering and untold damage caused in terms of life and property as a consequence, the pressure that is brought to bear on affected populations and the long run impact of such disasters raises the need for information as this is very vital in preparing for and also responding to disasters when they occur. Therefore, the use of information systems in vulnerable communities in preparing and responding to disasters is very important for stakeholders involved in disaster management.

The use of information and communication technology (ICT) is very vital for stakeholders in the affected communities (nongovernmental organisations, governmental organisations, local administrators, charitable organisations) because in the event of such disasters communications is very important as it can make a vital difference in the 24 hours that follow the incident itself (Cate, 1994). In Cameroon, there is an increasing threat of natural disasters from Volcanoes that stretch from Mount Cameroon in the Southwest to Kapsiki Massif in the Northern region of the country, toxic gas emissions from volcanic lakes, landslides, floods and epidemics (UNDP Cameroon on risk reduction, 2007). This raises the need for the use of ICT in managing disasters.

1.2 The problem statement

Natural disasters such as volcanic eruptions, toxic gas from volcanic lakes, landslides and floods are a threat to Cameroon (UNDP Cameroon, 2007). In order for stakeholders in disaster management in Cameroon today to be able to create awareness on how to
prepare and response to these disasters when they occur, they need ICT. This is because of the role information plays in disaster management (DM) in preparing communities to mitigate disaster impacts. Over the years, governments and agencies in developing countries have not been placing sufficient importance on preparing communities to cope with disasters (IFRC, 2002). Such has been the situation in Cameroon where the authorities have been putting little efforts to prepare for such catastrophes, not to mention been able to deal with them when they occur. As a result, when these disasters occur, such as the lake Nyos gas disaster of 1986, periodic floods, landslides and the mount Cameroon volcanic eruption, many people are killed and a lot of property is destroyed. As a consequence, the population needs to be sensitized on the negative impacts of different types of disasters that occur in their locality, how to be better prepared and how to respond to avoid the destruction of life and property caused by these disasters. Newport and Jawahar (2003) also argue that preparing for disasters cannot be effective without the full participation of vulnerable community. In Cameroon, the vulnerable communities are not always well informed about the negative impacts of disasters how to prepare in order to mitigate them and how to response when such disasters occur because the means of communication is inadequate or sometimes adequate but poorly used because of the poor information infrastructure. Preparing and responding to disasters in Cameroon, is a process that needs a constant flow of information from all internal actors involved (nongovernmental organisations, governmental organisations, local administrators, charitable organisations) when a disaster strikes to ensure an effective response, but it is always difficult to achieve this goal because of the nature of the ICT infrastructure in Cameroon and the consequence is usually high in terms of loss property and life. This is because the level of preparedness and the ability to response immediately during a disaster is reduced. Cameroon is a disaster prone country and needs to be well prepared to response to disasters. One of the ways through which this can be achieved is for vulnerable communities and stakeholders to be able to access and use modern ICT. Mbarika et al. (2005) explains that the use of ICT in Cameroon lags considerably even when compared to other underdeveloped countries, such as those in Central America. This means that the use of ICT in disasters in Cameroon is faced with a lot of difficulties as well. In humanitarian logistics the use of ICT to move information to prepare for and during disasters is a vital weapon (IFRC, 2009). The appropriate use of ICT enhances the effectiveness of the disaster response system, thereby safeguarding the infrastructure of the community and the population (Harrison and Harrison, 2008). “ICT is the electricity that lets humanitarian staff conduct assessments, communicate requirements and speed relief in the form of shelter, healthcare and food to those affected by natural disasters” (Brindley, 2009).

As earlier mentioned, another issue that affects the use of ICT in disasters in Cameroon is the fact that ICT infrastructure is underdeveloped with legislation acting more to the disadvantage of IT investment. Mbarika et al. (2005) compare the fact that, although ICT infrastructure are well established in the more developed and industrialized parts of the world, the same is not true for developing countries especially Sub Saharan Africa Cameroon inclusive. Odedra-Straub (1993) supports the issue of infrastructure by arguing that in developing countries, simple infrastructure for widespread public information such as television broadcasting, telephone services, educational institutions, and public libraries are seriously deficient and this cripples citizens’ ability to gather information and coordinate with each other to solve their problems. Lastly, very little or nothing is done to empower the local communities to be able to use ICT for communication espe-
cially during emergencies. These issues are supported by Travica (2002) who argues that ICT represents a revolutionary technological tool that can enable efficient transfer of information on a global scale. This global information can be used for many applications that can potentially solve critical problems in the developing countries such as e-government (Becker, 2001), online education (Light, 1999), telemedicine (Mbarika, 2003), crisis management and natural disaster management. Against this background, current research is out to study the use of ICT in disaster management (DM) in Cameroon and also aims at studying what barriers or enablers exist when using these ICT in DM in Cameroon.

1.3 The purpose of the study
The purpose of the study is to examine the use of ICT in the preparedness and immediate response phases of natural disasters in Cameroon. The study will also focus on the enablers and barriers to ICT use particularly in humanitarian logistics in disaster management in Cameroon.

1.4 Research questions
This study will explore the answers to the following research questions:

- **What types of ICTs are commonly used to prepare for and to response to natural disasters in Cameroon?**

  This question was formulated in order for the authors to discover whether ICTs are used in preparing and responding to disasters in Cameroon. Secondly the purpose was also to discover whether if ICTs are used in natural disaster management, than what types of ICTs are used and for what disaster phase. As a follow up to the first research question, a second one was formulated as;

- **What are the barriers or enablers to these commonly used ICT systems in DM in Cameroon?**

  This question enabled the authors to compare the use of ICT in Cameroon by national actors with the use of ICT in developed countries in DM and to be able to see if the use was the same or if it was lacking. These was to help determine “what enablers” if the use was the same or “what problems” if the use was lacking.

1.5 Research propositions
Against this background, the authors formulated an assumption that;

*The Internet, Fixed and Mobile phone, computer technologies, television and radio sets with accompanying transmissions are used to collect process store and transmit data on volcanic eruptions, toxic volcanic gas disaster from lakes, landslides, floods, and wildfire to help the communities prepare and response to disasters in Cameroon.*

1.6 The delimitation of the study
The study focused on SIDs for example volcanic eruptions, toxic gas disasters, landslides, floods and wildfire in Cameroon. Disasters constitute a wide and complex area of research and as such our study did not include slow onset and manmade disasters. Disaster management involves so many stakeholders but for the purpose of this study the authors only focused national actors with no particular attention to international actors.
Secondly the study does not cover the whole DM process. Our interest was only on the preparedness and immediate response phases with no focus on mitigation and the aftermath’s phases. Thirdly our focus during this study was on the use of ICT in the preparedness and immediate response phase, and the type of ICT considered were; computers, Mobile and fixed phones, radio and television sets and the internet.

1.7 Study Perspective
It is always important that any study should focus on a particular direction in order for the intended readers to be able to understand why the authors make certain assumptions and also to know why they draw certain conclusions. This study is concerned with ICT use and disaster management. In the area of ICT they are a number of perspectives which could be taken but the authors suggest only two; IT developer perspective and IT user or customer perspective. The developer perspective is concerned with issues important to those who manufacture or produce ICT systems while the customer perspective focuses on the groups or people ordering or using the systems. This study focuses on the customer or user perspective and in our case it is the users of ICT in a particular situation (disasters) in a less developed country-Cameroon. This perspective brings in an implication which is, to carefully consider the focused groups in Cameroon. In terms of using ICT in disasters in Cameroon, the study focuses only on local and national actors in disasters. It delimits the national actors to include; nongovernmental organisations, governmental organisations, the Cameroon Red Cross movement, local administrators and religious organisations. It is important to note that this study does not look at international humanitarian actors. In summary this study is done in the direction of using ICT by national actors in disaster management in Cameroon.

1.8 The significance of the study
It is hopeful that the findings of this study will raise national and international awareness about the vulnerable nature of some parts of Cameroon to SIDs especially areas boarding Mount Cameroon and the hinterlands, the type of ICT systems used in Cameroon, the problems encountered in using ICT and the nature of ICT infrastructure in Cameroon which acts more as an impediment to ICT use. This study will contribute to the research community on current studies on ICT in humanitarian logistics in developing countries. It is also hopeful that the study will raise awareness on the use of ICT in emergencies in Cameroon.

1.9 Disposition
This research discusses in a straightforward manner the use of ICT in natural disaster management (NDM) in Cameroon. The work is divided into six chapters; chapter one is made up of an introduction which is subdivided into, the background to the study, the problem statement, the purpose of the study, research questions, the significance, delimitations and the disposition. Chapter two reviews the current literature related to the study. The research methodology implored in the study is discussed in chapter three and chapter four presents the empirical data related to the study followed by an analysis and conclusion in chapter five. Lastly the discussions and recommendations are discussed in chapter six.
1.10 Definition of terms

*ICT*: IT is any technology used to support information gathering, processing, distribution and use and is composed of hardware, software, data and communication technology.

*ICT use*: ICT usage could be seen as an indicator of adoption, acceptance as well as diffusion of innovation.

*National actors*: These are government and nongovernmental organisations within a particular jurisdiction and with reference to current study it is Cameroon.

*Disaster management (DM)*: DM is a combination of preparedness and response where preparedness addresses the strategy put in place that allows the implementation of a successful operational response.

*Disaster preparedness*: Disaster preparedness basically means putting in place response mechanisms to counter factors that society has not been able to mitigate.

*Disaster response*: Disaster response is the art of attending to the disaster when it finally occurs.
2 Frame of reference

In this chapter the relevant literature, theories and models related to the study are presented and reasons for using such models explained. This lays a foundation for the creation of a frame of reference for empirical data collection and analysis. This section is divided into three parts, conceptual framework, which deals with definitions and explanations of all concepts embodied in the study, the theoretical framework which explains all theories and models selected for the study and previous studies which presents current relevant literature that has been done in this area. The chapter ends with a summary which constitute a frame of reference to be used for empirical data collection and analysis.

2.1 Conceptual framework

2.1.1 ICT and Information Needs in humanitarian logistics

Information is data that has been interpreted, verbalized, translated, or transformed to reveal the underlying meaning and context (King, 2005). According to Beynon-Davis (2009), information is data interpreted in a meaningful context. A combination of data creates information (Hicks et al., 2006). Well gathered and processes data yields relevant and reliable information (Tomasini & Van Wasserhove, 2009), and information is combined to create knowledge (Hicks et al., 2006). Tomasini and Van Wasserhove (2009) explains that knowledge is created within an organization as well as between organizations as they cooperate in the field and its value increases when it is captured and shared between stakeholders. As a result, knowledge is very important because it is needed in the humanitarian supply chain at three levels; field, supply chain, and theatre levels.

The field level is people intensive and the most source of knowledge as field workers are the closest to the affected and very knowledgeable about needs and priorities. At the second level knowledge shifts from people to organisations. The last level presents the big image that has to do with knowledge about existing conditions in the affected area for example market conditions, government regulations etc.

![Knowledge creation process](Source: Tomasini & Van Wasserhove, 2009)

The figure above simply explains that collected data is processed and turned into information and when the information is communicated within and between organisations, knowledge is created. Harrison and Van Hoek (2005) stress the need for information by arguing that information is very important in logistics because if an organisation is to make effective supply chain decisions, it must ensure that there is accurate and timely
flow of information across the supply chain as a whole. According to (Tomasini & Van Wasserhove, 2009), “information is the foundation upon which the humanitarian supply chain is designed, formed, and managed”. Information obtained must be communicated. Communication is defined as the imparting or interchange of thoughts, opinions, or information by speech, writing, or signs or means of sending messages, orders, information etc, including telephone, telegraph, radio, and television.(The American Heritage Dictionary of English language, 2010). On the other hand, communication is defined as the exchange of information with a value statement which qualifies the implication of the information often indicating action as well as urgency (Tomasini & Van Wasserhove, 2009). Information communication is another important concept because humanitarian actors need information as fast as possible wherever they are at the right time.

This raises the question of technology for information transfer. Technology is defined as the branch of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment, drawing upon such subjects as industrial arts, engineering, applied science, and pure science, it could also be viewed as a set of artefacts for doing things (Beynon-Davis, 2009).

2.1.2 ICT and IT use

A combination of the concepts information and communication produces the main concept in the study; Information and communication technology (ICT) or simply Information technology (IT). In this study ICT and IT is used to mean the same thing. The Information Technology Association of America (ITAA) defines ICT as “the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware.” They stress that IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and securely retrieve information.

Beynon-Davis (2009) defines IT as any technology used to support information gathering, processing, distribution and use and is composed of hardware, software, data and communication technology. For the purpose of this study this definition will be our working tool mainly because of the ICT systems that the authors refer to like; the internet, computers, mobile& fixed phones, television & radio sets. According to Long (1997), ICT are the single most important factor in determining the success of an emergency logistic operation. In this context ICT comprise; the information, the method of communicating the information, reporting procedure and the computers (Long 1997). According to Tomasini & Van Wasserhove (2009), ICT can be a powerful lubricant for supply chains because appropriate information systems enable disaster response to be more agile, as the disaster develops.

According to Narasimhan and Kim (2002), IT utilization refers to the ways that firms apply computer and information technology to support infrastructural and operational decision making and to assist in strategic decision planning. Strategic IT use refers to how a firm uses IT for formulating, justifying, and improving long-term business planning processes (Kyobe, 2004). Operational IT use has to do with how the firm uses IT for monitoring, justifying, and improving daily operational decision and lastly Infrastructural IT use deals with how the firm uses IT to facilitate information sharing and data communication, to recommend standards for IT architecture, to implement security, and to coordinate work activities within firm (Narasimhan & Kim, 2002). In an-
other perspective, Usluel et al. (2008), argue that ICT usage could be seen as an indicator of adoption, acceptance as well as diffusion of innovation.

2.1.3 Humanitarian Logistics

Logistics is a concept which originated from the military and was used to mean the movement of soldiers from one point to another (Wassenhove, 2006). According to the Department of Defence (2002), it is the science of planning and carrying out the movement and maintenance of forces in other words, logistics involves those aspects of the military that deal with the design and development, acquisition, storage, movement, distribution, maintenance, evacuation and disposition of material. In the business world logistics is defined as a planning framework for the management of materials, services, information and capital flows and also includes the increasing complex information, material, communication and control systems required in today’s business environment (Wassenhove, 2006).

According to Thomas and Kopczak (2005), humanitarian logistics is defined as the process of planning implementing and controlling the efficient, cost effective flow and storage of goods and materials as well as related information from the point of origin to the point of consumption for the purpose of meeting the end beneficiary requirements. Wassenhove (2006) defines it as a process and systems involved in mobilizing people resources, skills and knowledge to help vulnerable people affected by disaster. According to Thomas and Kopczak (2005), humanitarian organisations are beginning to understand that logistics serves as a bridge between disaster preparedness and response, provides a rich source of data and is the most expensive part of any relief operation.

These definitions bring out the importance of information in logistics in general and humanitarian logistics in particular. Information flow is one of the most important flows in logistics because the right information about the product specifications, destination and delivery must be in place before an effective financial flow can be accomplished. In humanitarian logistic information as Tomasini and Van Wasserhove (2009), put it “is the foundation upon which the humanitarian supply chain is designed, formed, and managed.” In this respect therefore, the use of ICT is very vital especially in disaster prone regions of the world in order to effectively prepare for and to response to disasters.

2.1.4 Natural disaster and Disaster management (DM)

Wassenhove (2006) defines a disaster as “a serious disruption that physically affects the functioning of a system as a whole posing a significant and widespread threat to human life health, property or the environment”. He further explains that a disaster can be natural or artificial/ man-made. According to Blaikie (1994), a natural disaster is defined as a natural event which has catastrophic consequences for living things and property in the vicinity. Natural disasters include slow onset disasters, such as famine, drought, and SIDs such as volcanic eruptions, earthquakes, landslides, floods (Wassenhove, 2006). This study is focused on natural disasters which are sudden onset or sudden impact disaster SIDs. The fact that SIDs are frequent and increasing in the world today (ADRC, 2004) raises the need for the use of ICT in disaster management planning.

Lettieri et al. (2009), define DM as the body of policies and administrative decisions, the operational activities, the actors and technologies that pertain to the various stages of
a disaster at all levels. In simple terms DM is described as a process with several stages (Nisha de Silva, 2001). Tomasinì and Van Wasserhove, (2009) outline the stages of DM as mitigation, preparedness, response, rehabilitation and define DM as a combination of preparedness and response where preparedness addresses the strategy put in place that allows the implementation of a successful operational response. This definition is considered by the authors of this study as an operational definition because it sees preparedness and response as very important phases in the DM cycle and fits well into the aim of the study. According to Lettiere et al. (2009), “the actors and technologies that pertain to the various stages of a disaster at all levels” constitute an important component of his definition. This brings out the link between ICT and DM.

2.1.5 Disaster preparedness and Disaster response

According to Perry and Lindell (2003), “Emergency preparedness refers to the readiness of a political jurisdiction to react constructively to threats from the environment in a way that minimizes the negative consequences for health and safety. It results from a process in which a community examines its susceptibility to hazards (vulnerability analysis), identifies human material resources available to cope with these threats (capability assessment), and defines the organizational structures by which a coordinated response is to be made (plan development).” Disaster preparedness basically means putting in place response mechanisms to counter factors that society has not been able to mitigate (Tomasini & Van Wasserhove, 2009). Kimberley (2003) explains the importance of disaster preparedness by arguing that DM has four phases: mitigation, preparation, response and recovery with immediate response as the most visible phase. According to him, mitigation and preparedness are at the bottom and drives a successful response. The recovery phase is placed at the top because it is time consuming and too costly.

Kissel (2010) explains that preparing ahead of time helps communities to react quickly, and also to learn what to focus on before and after a disaster. When communities are well prepared, the long term hazard risk to life and property is reduced in a cost effective and responsible manner. He further argues that planning results in effective disaster response because emergency and assessment teams respond well when they have clear lines of communication and defined roles. Secondly, he stresses the importance of communities to take insurance and to adopt strict building codes depending on the type of disasters they are prone to. The issue of planning is further stressed by The Public management report (2008), which explains that planning is an important component of community emergency preparedness. The report further stresses that in some communities, the planning process is formalised and responsibility is assigned to an office while in others it is informal. In order to increase the community’s level of preparedness, the report presents eight fundamental emergency planning principles which are:

- The community should anticipate both active and passive resistance to the planning process and develop strategies to manage these obstacles.
- The community should address all hazards which it is exposed to and also include all response organisations in the planning process.
- The community planners should base pre-impact planning on accurate assumptions about the threats and possible human behaviour in disasters and likely support from both internal and external donors.
- All type of emergency response actors that are most likely to be appropriate should be identified.
- The linkage of emergency response to disaster recovery should be addressed,
• Provide for training and evaluation of the emergency response organisations at all levels (individual team, department and community)
• The community planners should recognise that emergency planning is a continuous process

In addition to these principles, Contractor's Business Management Report (2008) outlines the realistic aspects of disaster preparedness as: training of a full response team, re-examining the full disaster safety plan for your community, locate a shelter in your community in case a disaster strikes, designate a team to notify other community members by using a phone tree (situation where one member calls another and then the second person calls the third and fourth the trend continues), and lastly the identification of areas of vulnerability in the community. In another perspective, Jin (2010) in a study “The interplay of organization type, organization size, and practitioner role on perceived crisis preparedness: A cognitive appraisal approach” looks at preparedness in terms of organisational type and size and concludes that organizations of different types and sizes should all be involved in crisis preparedness. He places the media at the centre and explains that crisis preparedness is an important responsibility to be handled by strategic communication managers and support from communication technicians. He further emphasises that important disaster preparedness factors and how they interplay should be consider in all future disaster training programmes in order to be able to respond well in different disaster situations.

On the other hand, disaster response is the art of attending to the disaster when it finally occurs (Tomasini & Van Wasserhove, 2009). They further explain that the response phase during a disaster is very complex as humanitarians are sometimes in the dark, with no information as to where, when and how big the next disaster will be as well as the number of people to be affected and for how long. According to Chandes and Paché (2010), responsiveness is preceded by the gathering and diffusion of information. They further stress that if accurate data on demand during response is not handy during a relief operation, there will be a lot of stress on people, resources and organizational capability. Harrison and Harrison (2008) in their study “the role of information technology in disaster medical response” argues that if IT is appropriately use during a disaster it will enhance the effectiveness of the disaster response system and as a result will safeguard the population and the community infrastructure. They also provide a framework for the use of IT in response to natural disasters or terrorist activities. The findings of their study showed that US hospitals have wireless local area networks (LANs) with disaster medical response capabilities. The study stressed the importance of a wireless LAN networks and remote input devices that could ensure a timely medical response to disasters. Patterson (2005) argues that IT plays an important role in saving lives and property before and after a natural disaster. This is because computer simulation allows the modelling of the potential impact of a natural disasters before they occur, computer graphics can help people in prone areas understand the impact of a potential disaster after a disaster occurs, telecommunications and the Web are vital tools to coordinate relief, to find lost family or friends, and help the rest of the world appreciate the magnitude of the disaster and computer based sensor networks can rapidly detect events shortly after they occur. The above are the value of IT in natural disasters.
2.2 Theoretical framework

2.2.1 Technology Acceptance model (TAM)

Over the years there have been massive developments and advances in hardware and software capabilities but the problem of underutilisation of these ICT systems has been identified as a major factor underlying the "productivity paradox from organizational investments in information technology (Sichel 1997). This issue has led to a lot of IT research with the main objective of assessing the value of using information technology to an organization and understanding the determinants of that value (Taylor & Todd, 1995). One of the theories that best explains general ICT use is the technology acceptance model (TAM). This theory and others has been confirmed by Meso et al. (2005) as important in any global study that has to do with assessing the impact of ICT and its use. Current research uses the TAM to explain the general use of ICTs.

The TAM is one of the many theories that explain the concept of ICT use. The theory has its roots from the Theory of Reasoned Action (TRA) which specifies two beliefs, perceived usefulness and perceived ease of use, as determinants of attitude towards IT usage (Davis et al., 1989). The model captures the user’s perceived usefulness and perceived ease of use, of the ICT system and from these two views can derive the intention to use the system. TAM theorizes that an individual's intention to use an ICT system is determined by two beliefs: perceived usefulness and perceived ease of use. According to the model, perceived usefulness, is the degree to which a person believes that using the ICT system will enhance his or her job performance, while perceive ease of use has to do with the belief that using the system will be free of effort. Perceived ease of use of any ICT system influences the perceived usefulness. The TAM is an instrumental tool, used to measure an information system because it captures the user’s perceived usefulness and perceived ease of use, of the system and can from there derive the intention to use the system (Venkatesh & Davis, 2000).

![TAM Diagram](Source: Adopted from Venkatesh and Davis, 2000)

The study considers this model to refer to the general usage of ICT by users involved in disaster management. The ICT systems considered here are; desk top computers, lap top computers, internet, mobile phones, fixed phones, radio and television sets and warning systems. The study considers particularly the idea that users intension is influenced by perceived usefulness and perceive ease of use and the idea that perceive ease of use of
the ICT during a disaster will influence perceive usefulness of that particular ICT. The study looks at the role of ICT in disaster management in Cameroon. This leads to the issues of disasters, disaster management and thus humanitarian logistics.

2.2.2 The Disaster management model (DMMs)

According to Kelly (1998), a theoretical model of DM is very important because it helps to simplify complex events by distinguishing between the critical elements especially when responding to disasters with severe time constraints. Secondly when actual disaster conditions are compared with theoretical models, a better understanding of the current situation is obtained and this helps in the planning process of any eventual disaster. DMM help quantify disaster events and allow for better integration of the relief and recovery efforts (Kelly, 1998).

The role of a DMM as specified by (Kelly, 1998), points to the fact that a well defined and clear model is useful in disaster management because a formal model helps to reduce the negative consequences of disasters. In line with this, Churilov et al. (2006) presents four categories of disaster models; The logical models which provides simple definitions of disaster stages explaining basic actions of a disaster; integration models which also talks about disaster phases but focus more on the evolution of functions; the cause models which defers from the first two in terms of disaster phases and talks of disaster causes and lastly, miscellaneous models. Any existing disaster management model fits into one of these categories (Churilov et al., 2006). Current research will consider the logical models because there in line with the aims of the study.

![Diagram of Disaster Management Models]

*Figure 2.3: Categorization of Disaster Management Models: (Source: Churilov et al. 2006).*

The traditional model of logical DM mentions only two phases which are pre and post disaster. The pre-disaster is subdivided into prevention, mitigation and preparedness and the post-disaster into response, recovery and rehabilitation.
Kimberly (2003) argues that a DMM is in four phase which is made up of mitigation, preparation, response and recovery with immediate response as the most visible phase. According to him, mitigation and preparation are at the bottom and drives a successful response. The recovery phase is placed at the top because it is time consuming and too costly. This idea is supported by Tomasini and Wassenhove (2009) in their explanation that DM is made up of four stages; Mitigation, Preparedness, Response and Rehabilitation but focus much on the preparedness and response stages with the argument that, preparedness addresses the strategy put in place allowing for the implementation of a successful operational response.

According to Churilov et al. (2006), the three categories of DMMs mentioned above have some limitations; for example, most of the models revolve around the four main phases of disaster management: prevention, mitigation, response and recovery and no single model covers all the major activities of a disaster in a single framework and the arrangement of activities if any, are not done in any logical sequence. Environmental conditions that might affect the severity of a disaster are not covered in any of the models. Lastly and most importantly the models do not give effective consideration to the evaluation and analysis of information and data which are very important in the mitigation of future disasters.

In line with these arguments, Churilov et al. (2006) proposed a comprehensive DMM and argue that such a model will supports different stages and phases of a disaster management cycle and also fill in the gap which occurs in the current models. Secondly they stress the fact that such a model will have the ability to handle complex and difficult disaster scenarios which are not addressed by the current models. The comprehensive DMM is divided into six main stages which are; strategic planning, hazard assessment,
risk management, disaster management action, monitoring and evaluation and environmental effects and is based on linking the following activities; hazard assessment and risk management activities; risk management activities and disaster management action

Figure 2.6: Proposed Comprehensive DMM: (Source: Churilov et al., 2006).

According to Churilov et al. (2006), the six main components of this model are broken down into activities required in carrying out DM operations which are performed in a sequential manner in order to mitigate a disaster. DM measures and actions are constantly reviewed and assessed bearing in mind the environmental impacts and the results can be used as an input for a new evaluation proving a feedback loop to the strategic planning module. The strategic planning model provides improvements in forecasting future events and their impacts. The most important thing about this model is that it does not only capture disaster management in stages revolving around mitigation, preparedness, response and recovery, but extends DM to include the changing effects of the environment (Churilov et al., 2006). He stresses that the assessment of possible disaster
events is a very important issue when mitigating disasters and this is addressed in the model by the hazard assessment and risk management modules.

According to comprehensive DMM, a large number of activities are involved in mitigating disasters and this raises the problem of complexity in DM such as the huge volume of diverse data scattered at various sources, how to collect and use the distributed data, how to share the distributed resources in disaster management. This is basically because DM requires a high-level of coordination and immense information flow that needs to be communicated between organizations and agencies in the event of a disaster and thus the need for an integrated communication platform or an emergency information infrastructure. Current studies considered section four of this model which talks about disaster management actions in four phases; mitigation, preparedness, response and recovery and the link to the fifth section-monitoring and evaluation which gives a feedback to the sixth section -strategic planning relevant because the model introduces the importance of ICT us in DM. This study focuses more on this section because its main aim is to study the use of ICT in the preparedness and response phases of disasters in Cameroon.

2.2.3 The Emergency Information Infrastructure (EII)

According to the US Disaster Information Task Force (1997), report on harnessing information and communication technology for disaster management, information in disaster management is very important because of the high and rising disaster cost involved in DM; it can help reduce disaster risk by helping the affected people to track appropriate actions. DITF (1997) in its report presents an EII which include a comprehensive DM cycle composed of four overlapping phases: mitigation, preparedness, response, and recovery. According to DITF (1997), this platform suggests that a disaster-related information infrastructure needs to provide balanced support to each phase of a DM activity. Because data needs changes depending on each disaster, each phase imposes unique requirements on the infrastructure. According to the report, the preparedness and response phases are characterized by high timeliness and reliability needs along with highly variable volume. The report concludes that the most important contribution of the EII is that disaster prone communities can be built by integrating disaster information through all four phases of the disaster management cycle. The report stresses a continuum of information needs across the comprehensive DM cycle. This model proposes a global disaster information network (GDIN) that spans across all disaster phases in disaster management.
According to the report, the preparedness phase of DM needs to involve activities ranging from development of community training and logistical support, supply, and resource systems needed for disaster response, development of early warning and monitoring systems preceding disasters such as hurricanes, tornadoes, fires and volcanic eruptions. The use of Radio, television and the internet to dissemination information in other to raise Public awareness is very important. While the immediate response phase is time critical and is characterised by rapid, reliable, configurable, controlled-access communication. As a result communication between actors involved and the general public becomes critical (DITF report, 1997).

2.2.4 Cyber infrastructure for Disaster Management

In line with the same argument on an information platform for DM, (Churilov et al., 2006), proposed a model for cyber infrastructure made up of the following components: Communicational infrastructure, Knowledge management systems, database systems and digital libraries, Organizational structure and agencies involved, Services and expertise, Software, collaborative tools, equipments, advanced applications, algorithms and models and Computational, physical, technological and human resources.
Figure 2.8: Cyber infrastructure for DM: Source: (Churilov et al., 2006)

This model focuses on the use of information sharing, integration and decision-making for agencies concerned with disaster responses. It also assists the disaster response agencies to develop consolidated decision-making, coordination and integrated information to adequately serve disaster needs. The model also explains information sources, organizations, resources, infrastructure and tools that become available due to its existence. The disaster management plan is one of the sections in this cyber infrastructural platform with all its phases – disaster assessment plan, risk management plan, disaster mitigation strategy, disaster preparedness plan, disaster action plan and disaster recovery plan. This study considers this model important because it covers the main component of the study and fulfils the aim of the study which is to study the use of ICT in DN in Cameroon.

2.3 Previous studies

According to the UN Economic Commission for Africa ECA (2007), report on ICT, Science and Technology Division (ISTD), ICT has been use in Cameroon in the educational area particularly on the promotion of local languages in a program support by the government of Finland. The program involved the experimentation of the utilization of ICTs in African languages, particularly in rural schools, during a period of three years. The study notes that a few African languages have online resource materials, such as dictionaries, translated documents, library content, audio files and news programmes.
and that only about 2% of African languages are made available online. The study recommended Rural Electronic Schools in African Languages (ERELA) of which there are two in two primary schools in the outskirts of Yaoundé.

Meso et al. (2005) in a study on the use of ICT in developing countries used, the TAM and other theories of technology transfer, to identify the factors affecting the use of mobile information and communication technology specifically in Sub Saharan Africa. They took a survey of mobile ICT users from Kenya and Nigeria and found out that access to mobile ICT, and cultural influences on mobile ICT diffusion, strongly influence individuals’ perceptions of the usefulness and ease of use of mobile ICT. They concluded that although ICT diffusion is important for commercial and economic activities, the use is not sufficient. As a result business firms in Sub Saharan Africa need to consider the factors that explain individual mobile ICT use as these factors play a big role in determining strategies for leveraging E-commerce operations and also helping economic planning and commerce for governments in Africa.

Mbarika et al. (2002) in their study “Cyberspace across Sub-Saharan Africa: Moving from technological desert toward emergent sustainable growth”, explains that Africa has joint the information superhighway although it still has a long way to go. They argue that the motivating factors for ICT usage in Africa are: the liberalization policies toward Internet connectivity by African governments, the improvements in the telecommunications sector, increase in PC purchase and import policies facilitated by free or reduced import duties allowed by governments, the rapid diffusion of wireless technologies and the falling prices of telecommunications and Internet services. The importance of ICT use is also emphasised in areas like education and health. The study ends with a positive tomorrow for ICT use in SSA in all areas of public life.

According to Ipe et al. (2009), disaster situations are emergency situations and like any other emergencies are characterized by unstable environments where information available could be incomplete and sometimes inadequate. As a result, decision making is sometimes taken with suboptimal information and communication structures. With this in mind, it is important to note that IT systems for emergency preparedness need to provide real-time information that is secure and can be verifiable while at the same time making communication and coordination between stakeholder organizations responding to the emergency easy. Information systems during emergencies need to be easy to use, accessible and able to provide a means of evaluation so that users can be able to search for and access information easily.

According to Underwood (2010), in her work “Improving disaster management”, Social networking, sophisticated imaging, and dual-use technologies promise improved disaster management, but they must be accepted by governments and aid agencies if more lives are to be saved during crises. She goes on to explain that although the Web 2.0 applications such as twitter, blogs, and wikis are increasing used as a means of improving disaster response, the dual-use technology is very important during disasters as it overcomes the difficulties of using different communications equipment and eliminates the time lag by government administrative bottle necks. For example direct firsthand reports from a disaster with a phone can provide a realistic picture of the situation than inaccurate television broadcasts. In line with this dual-use technology, she explains the peer-to-peer incident notification system that builds on the concept of human sensors
which collects and relay information about disasters, to first responders and the general public using mobile phones. She also explains another new ICT innovation in disaster management, the UNICEF’s Bee, an open source emergency telecommunications system. This system provides Internet access in areas where infrastructure is nonexistent or unusable. It requires no tools, and can be installed by a field worker and be operational within 30 minutes. Working with RapidSMS, it helps UNICEF provision supplies appropriately and gives workers immediate warnings of potential health risks and disease outbreaks (Underwood, 2010).

2.4 Summary of current literature review

![Figure 2.9: Summary of literature review (Bayaih and Kuo)](image)

The above figure simply summaries the fact that disasters are increasing and their negative impacts are enormous on the affected communities (ADRC, 2004). Most of the vulnerable communities are in the less developed world (McEntire, 1999). In order to mitigate the impacts of these disasters vulnerable communities need to use ICT to be able to prepare for disasters and also to response effectively when these disasters occur. This is because preparedness drives a good response (Kimberly, 2003), thus a need for a disaster information platform in DM as shown on the above diagram. Given the fact that DM requires the collection, processing and dissemination of huge volumes of data (Churilov et al., 2006), there is a great need for ICT use in DM. Local and National humanitarian actors in the communities need ICT to be able to transmit information that can help in the preparedness and response of natural disasters in their communities.

- The disasters that data collection will focus on in Cameroon are eruption, toxic gas disaster from lakes, earthquakes, landslides, floods and wildfire
- The local and national actors involved in the study are; nongovernmental organization, governmental institution, traditional ruler, Cameroon red cross movement, Cameroon media, religious organization, international NGO in Cameroon.
- The ICT systems in the study are Internet, Fixed and Mobile phone, desk top and lap top computer, television and radio sets with accompanying transmissions, fax and warning systems.
• The disaster management phases in focus are; the preparedness and response phase.

According to the literature reviewed, much has been written on ICT use especially in the developed world where ICT has been addressed as an enabler in all areas of life especially in emergencies; also much has been written on ICT use in disasters in the Asian continent and South American. In Africa and particularly in Cameroon, to the best of our knowledge, very little research has been carried out on the use of ICT. In the area of ICT use and humanitarian logistics especially in emergencies related to disasters or crisis the authors found separate studies carried out on DM as well as ICT use but to the best of our knowledge there were no studies linking the two disciplines. The increase in the number and frequency of natural disasters and the devastation caused by these disasters in Cameroon, calls for research in this area. The novelty of current studies is therefore to study the use of ICT in DM in Cameroon.
3 Methodology

This chapter presents the research methodology used in the study in order to meet the study purpose. It begins with the research approach and an explanation for the choice of approach, followed by the research design and research strategy. The ethical issues are discussed here before moving on to procedure for data collection and analysis. Further, the authors conclude the method chapter with a discussion regarding research credibility.

3.1 The research approach

According to Ghauri and Gronhaug (2005, p.15), there are two approaches to research; inductive and deductive reasoning. They go further to define inductive reasoning as “the systematic process of establishing a general proposition on the basis of observation or particular facts whereas deductive reasoning is defined as the logical process of deriving a conclusion from a known premise or something known as true”. Although these two approaches are well distinct in theory, it is sometimes hard to make out the distinctions between them when it comes to application. This is simply because the research methods used can develop and change during the course of the study (Ghauri & Gronhaug 2005, p.29), giving rise to new theoretical ideas or they may change because of the incompatibility between the original data and the assumptions made (Bryman & Bell, 2007).

The research approach used for this study is deductive. In order to fulfil the aims of the study the authors began with a review of literature on the assumption that ICT is used in the preparedness and immediate response phases of natural disasters in Cameroon. A review of literature on these concepts showed that ICT play an important role when used in disasters. The authors then formulated an assumption that was based on the fact that the Internet, Fixed and Mobile phone, desk top and lap top computer, television and radio sets with accompanying transmissions are to prepare for and during volcanic eruptions, toxic volcanic gas disaster from lakes, landslides, floods, and wildfire in Cameroon. We then went on to collect data on the users of the above mentioned ICT during disasters in Cameroon to analyze it to determine whether the above ICTs are used in disaster preparedness and immediate response phases of natural disasters in Cameroon.

3.2 The research design and Research Strategy

Ghauri and Gronhaug (2005, p.56) define research design as the overall plan for relating the conceptual problem to the relevant and practical empirical research and outline two types of research design; qualitative research design and quantitative research design. Creswell (2009) defines qualitative research as “a category of research designs or models, all of which elicit verbal, visual, tactile, olfactory, and gustatory data in the form of descriptive narratives like field notes, recordings, or other transcriptions from audio and videotapes and other written records and pictures or films.” In addition to this, Saunders et al. (2007), explains that qualitative research is a method of data collection technique which deals with an interview or data analysis procedure or use non-numerical data. This is opposed to the quantitative design which puts more emphasis on collecting data that lead to dependable answers to important questions, reported in sufficient detail that it has meaning to the reader (Ghauri & Gronhaug, 2005). It is also defined as a method of data collection technique which deals with questionnaire or data analysis procedure or uses numerical data (Saunders et al. 2007). Although the two research designs have
been defined as mutually exclusive, there are not mutually exclusive because some studies can use qualitative methods to collect data and still code the data to allow for quantitative analyses. The differences only come in the overall form, emphasis and objectives of study (Ghauri & Gronhaug, 2005).

This study adopts a quantitative research design to study the use of ICT in the preparedness and immediate response phases of a natural disaster in Cameroon. In this regard, questionnaires were used to collect data and the collected data was analysed by using frequency tables and graphs. This method of data analyses is called descriptive statistics and is good because it helps the researcher to summarise and organise his data in an effective and meaningful way (Ghauri & Gronhaug, 2005). The quantitative research design was adopted because it was suitable for the type of research questions in the study - the “what question.” Secondly, the choice of approach was because the authors wanted to manipulate numerical data to be able to answer the research questions in the study. The first research question in the study was to find out what types of natural disasters occur in Cameroon? This question opened up avenues for a clear description of the type of disasters. The second question deals with what type of ICTs are used during disasters in Cameroon? While the third questions dealt with; what role ICT played in the preparedness and response phases of natural disasters in Cameroon? This question opened up avenues for a clear description of the type of ICT used in Cameroon during disasters, the number of people such disasters have killed and displaced in the past. These questions are of a descriptive nature thus the reason for choice of methodology. Reason and Rowan (1981) explain that this method is advantageous because it is objective and can be measured for better comparisons and if it is explained in detail it will be easy to replicate and so have a high reliability. Lastly they also stress that results obtained can be reduced to a few numerical statistics and interpreted in a few short statements.

On the other hand, a research strategy is a general plan of the way the research has been conducted in order to answer the research question(s) and fulfil the objective of the study (Saunders et al., 2007, p.610). According to Yin (2003), any research, whether exploratory, descriptive or explanatory, as well as any study approach either deductive or inductive needs a strategy and no strategy is superior or inferior to the other. Saunders et al. (2007) supports this argument by explaining that a research strategy is very important in carrying out studies related to; experiments, surveys, case studies, action research, grounded theory, ethnography and archival research. This study adopts a survey strategy as the most suitable strategy to study the role of ICT in disaster management in Cameroon. Creswell (2009, p.145) defines a survey strategy as a design that “provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population” The main purpose of a survey research strategy in this situation was to be able to generalize the findings obtained from the objective data collected from the sample to entire population of the study.

### 3.3 Ethical concerns

Ghauri and Gronhaug (2005) maintain that the moral principles and values influencing the conduct of research by a researcher or group of researchers are referred to as ethics. They further stress the fact that the researchers have to be honest with the way they have conducted their work by giving their strengths as well as weaknesses. They go further to outline eight ethical issues in the researcher–participant relationship which are;

- Preserving the identity of the participants
In trying to formulate the questionnaire and to collect the data needed for this study, the authors had all these ethical issues in mind.

### 3.4 Data collection sources

To be able to capture the information that was needed to fulfil the purpose of this study, data was collected from both primary and secondary sources. Saunders et al. (2007) define primary data as “data collected specifically for the research project being undertaken” and secondary data on the other hand as “data used for a research project which was originally collected for some other purpose.” The authors used questionnaires to collect primary data for this study. This was mainly because the research strategy required the use of questionnaires and also because the use of questionnaire is the most popular approach to collect primary data and is very appropriate for a descriptive research design (Ghauri & Gronhaug, 2005). Using questionnaires is very flexible and can be customised to suit almost all types of research project in terms of respondents’ group type, structure, complexity, and administration. Secondly questionnaires are easy to code and analyze collected data from respondents. Nevertheless they are disadvantageous because the response rate can be reduced by factors such as precision, simplicity, appropriateness, design or layout, and brevity. The study also made use of secondary data obtained from books, journals, articles, and online data sources such as WebPages of firms, governments, semi government organisations and databases (Ghauri & Gronhaug, 2005) to supplement what has been collected from primary sources.

#### 3.4.1 The questionnaire

The questionnaire used for the study was structure in accordance with the theoretical framework and contained 14 items divided into 5 main sections namely; respondents’ profile, natural disaster types, ICT systems, ICT accessibility, ICT and disaster management, and lastly enabler and problems. These main sections were subdivided as follows; section one, respondents’ profile was subdivided into gender, educational level, organisational type, and current position. Section two presented the types of natural disasters under study; eruption, toxic gas disaster from lakes, earthquakes, cyclones, landslides, floods, wildfire, epidemics and drought. Section three on the ICT information systems, outlined the types understudy, Internet, Fixed and Mobile phone, desk top and lap top computer, television and radio sets with accompanying transmissions and fax. While section four talked about accessibility asked whether the users own or had access to any of the types above and for the user to identify type used or owned. The last section on ICT and disaster management was divided into ICT and preparedness, ICT and response, factors influencing use and lastly problems. About 95% of the questions in the questionnaire were structured where the answers were predetermined and the respondents asked to select one of the pre-determined answers. The questionnaire was in two versions; PDF format for hand and mailed in which respondents were asked to fill out
and return the email version in word 97-2003 where the respondents were asked to fill out online and return by email to us.

3.5 The population of the study

Ghauri and Gronhaug (2005) define the population of a study as the universe of units from which a sample will be drawn and goes further to explain that a population in this case does not only refer to people but can also mean firms or products etc. They also stress that the issue of deciding on the relevant population for a particular study is not an easy one. The population from which this study was based is made up of several groups of organisations. Arriving at the clear decision as to which group to consider and which not too was not an easy task. This was mainly because of the multi-task nature of functions performed by organisations in Cameroon when it comes to disasters. These functions include: development, disaster management, environmental and nature protection, civil protection and the fight against epidemics which are viewed as one. As explained in the study perspectives, the study was focussed on ICT users in disaster management in Cameroon and these users were identified mainly as local and national actors in disaster management. According to Tomasini and Van Wasserhove (2009), “local conditions are the foundation” and they continue by stressing that “access to population or information are some of the tools that local actors may use to manipulate access to limited resources and that at the national level the reaction of governments and semi-government bodies contributes to operating conditions as well”.

![Figure 3.1: Different levels of influence: Source Tomasini & Van Wasserhove, 2009)](image)

The above figure classified actors into three groups and this classification guided us to select within the humanitarian space the local and national actors within our framework and study the flow of information between them during disasters. Although a difficult task to specify the population, the authors selected the following groups based on the aims of the study and the objectives of the organisations; a listing of all registered NGOs in Cameroon was obtained from the world wide NGO directory. The number summed up to 165 but the study was interested in NGOs with mission or objectives linked towards humanitarian relief efforts, environmental protection, development, civil protection and the media as all these concepts are interrelated in a disaster situation. In this regard a total of 50 NGOs were filtered from the lot. The second group was all governmental organisations (GOs), concerned with relief operations during disasters in...
Cameroon. According to UNDP Cameroon (2007) report on risk reduction units, there are seven government ministries involved in this domain either completely or partially each with a provincial delegation in each province with an assigned tasked. These are; the department of civil protection placed under the Ministry of Territorial Administration and Decentralisation, Defence, Public Health, Town Planning and Housing, Transports, Social Affairs, Scientific and Technical Research, The Cameroon Red Cross Movement is an independent body with a committee in each administrative division in Cameroon. Cameroon has 58 administrative divisions (World fact book 2010), this gives 58 Red Cross committees in the whole country. Religious organisations constitute another charitable group that helps communities prepare for disasters and also helps in relief efforts. According to the (world fact book Cameroon 2010), there are three main religious groups in Cameroon, the Christians 40 %, Muslims 20 % and traditional African religion 40 %. The main Christian denominations are Catholics with 24 dioceses and Protestants with 23 presbyteries. Traditional rulers are also another important group for the study because they are very instrumental in the prevention, mitigation and response phases of disasters, due to their proximity to the communities and a good knowledge of the local environment and realities. In Cameroon there are about 2000 traditional chiefs but this study will only look at the traditional administrators to whom the traditional rulers are responsible and in under whose jurisdiction they fall. There are 58 administrative divisions in Cameroon, each headed by a Divisional officer (DO) responsible for overseeing into the affairs of the sub divisions and local chiefs under their jurisdiction. Also included are some international NGOs represented in Cameroon, The UNDP and The French cooperation. Table 1: below summaries the population for the study.

<table>
<thead>
<tr>
<th>Actors</th>
<th>Size</th>
<th>Source of contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registered NGOs in Cameroon</td>
<td>50</td>
<td>Worldwide NGO directory</td>
</tr>
<tr>
<td>Governmental organizations</td>
<td>70</td>
<td>Cameroon phonebook directory</td>
</tr>
<tr>
<td>Cameroon Red Cross Movement committees</td>
<td>58</td>
<td><a href="http://www.lacroix-rougecamerounaise.org">http://www.lacroix-rougecamerounaise.org</a></td>
</tr>
<tr>
<td>Local administrators</td>
<td>58</td>
<td>Background Note: Cameroon</td>
</tr>
<tr>
<td>Religious organizations</td>
<td>Approx. 47</td>
<td>World council of churches/Cameroon current diocese</td>
</tr>
<tr>
<td>International NGO Represented in Cameroon</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.1: summary of the study population

3.5.1 Sample procedure
The study used the probability sampling procedure, allowing each unit of the population a chance of being included in the samples since the aim was to get a representative sample at the end. The advantage is that the sampling error is reduced (Bryman & Bell, 2007). There are basically three types of probability sampling methods; simple random sampling, systematic sampling, stratified and cluster sampling (Ghauri & Gronhaug, 2005). The authors considered the use of the proportional stratified random sampling, defined as “a sampling method whereby the parent population is divided into different layers of different units with different size, and a sample is drawn from each layer in proportion to the size of the layer (Ghauri & Gronhaug, 2005). The population of the study was made up of different organisations with different sizes and there was need for each organisation in the population to be part of the sample in order to constitute a representative sample and also because the authors were aiming at generalising the results of the study to the whole population. Although the authors hoped for a higher precision with any small sample that was obtained, the method was problematic because a listing of all units involved was required and this was really difficult because of lack of information.

3.5.2 The sample size
Leedy and Ormrod (2002) provide the following guidelines for the selection of a sample size for any quantitative study;

- If the population size is less than 100 the entire population should be included
- If the population size is around 500, sample should be 50 %
- If the population size is around 1 500, sample should be 20 %
- If it is above a certain population size (approx N > 5000) a sample size of about 400 is adequate.

The population of this study was not less than 100 and not up to 500 but close to or around 500 and thus 50% of the population was considered as a suitable sample size for the study. Therefore the theoretical sample size was 150 with a proportional sample drawn from each group.

3.5.3 Questionnaire administration methods
Questionnaires can be administered by mail, internet, telephone and self-administration personal (Ghauri & Gronhaug, 2005). This study used all these methods either individually or in combination with others because of the condition under which the studies were conducted. All sample units that the authors got their email addresses received the questionnaires by internet directly from the authors here in Sweden with an authorisation letter signed by the programme coordinators attached. The follow up of this group of respondents was done by telephone and email reminders. The mail and self-administration method was done in Cameroon with the help of an NGO called (The Environment and Rural Development Foundation ERUDEF, Buea) that accepted to work with us. Follow up was done by the volunteers of ERUDEF who administered the questionnaires in some localities and by telephone calls for the mailed questionnaires. A pilot test was first conducted before the final administration phase began.
The pilot test was conducted both in Sweden and Cameroon on Friday 16th March 2010. The authors selected 5 Cameroonian students in Sweden and 5 NGOs in Cameroon and administered the email version of the questionnaire to them accompanied by an explanatory letter, spelling out the purpose of the process. The aim of the pilot test was to see if the questions will be well understood and if there will be some misunderstanding or any other problems involved during the final administration phase. Two major problems were uncovered; the Word 2007 document with the question could not open in Cameroon and the emailed versions could not be used to the mailed respondents. The authors had to change the word 2007 doc and save it as word 2003 to be compatible with the word documents in computers in Cameroon. This solution again led to another problem because the radio buttons were rendered inactive. To solve the problem, the answer instructions were changed to suit the 2003 word version. Secondly the emailed version was compressed to be suitable to the mailed respondents.

The final phase of the administration began on the 22nd of March 2010 with the email version and the mailing of the mailed and face-to-face version to our partner NGO in Cameroon with the authorisation letter, the motivation and all that was needed for the administration of the questionnaire. The questionnaire were administered in three ways; by email directly from Sweden to the private email boxes of the contact persons in the organisation in Cameroon and follow up was done by email and phone. The second and third by mail and personal contact by volunteers of ERUDEF Buea-Cameroon and follow up of the face-to-face administered questionnaires was by the same volunteers in their respective administrative division. All the questionnaires by email, mail and face-to-face contact were accompanied by an authorisation letter from the programme director of informatics and logistics in Jonkoping University-Sweden. This was considered very important because of the level of scamming in Cameroon. Without the letter the risk might have been that the questionnaires will not be answered. The mailed questionnaires were sent with another stamped envelope and a nice pen as motivation.

### 3.5.4 Non-response analysis

Non response is a common feature of a survey Strategy and needs to be scrutinized in order to maintain the quality of any quantitative study. Fowler (2002) categorises non responses into two different groups; non-response to individual questions and non-response of the entire study. In this study, the first category was totally absent while the second category made up 43.3%. This group is subdivided into two groups; those whom the data collection procedures did not reach and thereby not giving them a chance to answer the questions and those asked to provide data but refused to do so (Fowler, 2002). During the administrative phase of the questionnaires, all respondents selected in the sample were issued questionnaires. This means that the 43.3% were issued questionnaires and they refused to provide data. According to Fowler (2002) the research procedures used have effects on the response rate and these depends on two things; the percentage not responding and the extent to which those not responding are biased. The difficulty in achieving a high respondent rate was because most of the questionnaires were mailed to the respondents and mailed questionnaires have a very low return rate. The data was analysed using frequency tables and graphs in the form of pie and bar charts with the use of the statistical Software SPSS 17.0. The output obtained from SPSS is presented in the next chapter.
3.6  Research credibility

In this section the research approach for the study is discussed, the authors made sure that the method selected, the instruments used for data collection, the sample size from which data was collected maintain a high degree of reliability and validity. This section discusses how close the method, sample size and instrument were to the measurement concepts mentioned above.

3.6.1 Reliability

According to Ghauri and Gronhaug (2005, p.81), reliability refers to the stability of the measure. This simply means the extent to which data collection techniques produce consistent findings, or simply how there is transparency in the way sense was made from the raw data collected. On the other hand, “quantitative data are data which can be sorted, classified, measured in a strictly ‘objective’ way and are capable of being accurately described by a set of rules or formulae or strict procedures which then make their definition unambiguous and independent of individual judgements” (Harvey, 2002). The study methodology is quantitative and the data collected is quantitative because it is objective and can be measured for better comparisons to be made. It has a high reliability and is generally very easy to replicate if explained in detail and the results can be reduced to numerical statistics and interpreted in a few statements (Reason & Rowan, 1981). The current study was in line with this measurement requirement because the authors have used scientific sampling methods, and should another researcher conduct a similar study under the same circumstances and use the same research method and sampling technique, the conclusions will not be too different.

3.6.2 Validity

Saunders et al. (2007, p. 614) defines validity as “the extent to which data collection methods accurately measure what they were intended to measure”. This study fulfils this mission because the research questions from which questionnaires were formulated were deeply rooted in the theoretical framework that covers the study. The questions formulated in the questionnaires correspond to the TAM and NDM models, and follows the current literature discussed in the study. The questionnaires also gave room for unstructured questions allowing the respondents to express their opinion about the study topic.
4 Empirical findings

This chapter presents the empirical data collected for the study. It is divided into two main sections; the background to the study area which provides information about the geographical location of Cameroon and other basic features of the country. This section also presents secondary data on common disasters in Cameroon alongside number of people killed or displaced by each disaster, and lastly ICT at a glance in Cameroon. The second section presents the responses from the respondents divided into; the demographic profile of respondents, natural disaster types, ICT accessibility, ICT use response, factors influencing ICT use and problems.

4.1 Background to the study area

According to the CIA world fact book Cameroon (2010), Cameroon is found in Sub Saharan Africa (SSA), located in Central Africa, boarded to the North by Chad, East by Central African Republic, West by Nigeria and in the South by the Republic of Congo, Gabon and Equatorial Guinea. It has a total land surface area of 475,440sq km and a population of about 18.88 million just slightly larger than California in the USA. The Country is divided into 10 administrative provinces each headed by a governor and 58 administrative divisions each headed by a local administrator called a Divisional officer (CIA world fact book 2010). Cameroon is a bilingual country with English and French as the two official languages and 24 major African language groups. The English speaking part is located in West Africa while the French part is found in Central Africa. Its political capital is Yaoundé and economic capital is Douala. The Communaute Financiere Africaine francs (XAF) is the currency used in Cameroon and other five Economic Union of Central African States (CEMAC) countries in the region with a current exchange rate of 1$ to 484.7 XAF (CIA world fact book 2010).

Cameroon is one of the fewest countries in Africa to have had three colonial masters-Germany, France and Britain, and has passed through Anglo-French Trusteeship, Federalism, and the unitary state, to what is today just the state (Nkwi, 1990). But for five decades running the country had had only two presidents; Ahidjo from 1960 to 1982 and Biya from 1982 to this moment. Although Cameroon has enjoyed some stability since independence compared to surrounding regional countries as Chad, Central African Republic, Nigeria and Congo, from 1992 to today there is widespread discontent in the country (Nkwi, 1990). This is because the developing strategy used since independence had not established an economy that creates jobs and real development. About 60% of the working class live on survival wages (less than $1 a day) that is insufficient to pay for escalating living costs. In addition, 80% of graduated in all lines of knowledge are jobless. The energy crisis experienced by the whole continent in general and Cameroon in particular is not helping either. It is hampering small enterprises’ productivity and slows down economic growth.

Apart from these manmade hazards, there are also natural hazards like disasters, particularly natural disasters which are an increasing threat to the world in general and Cameroon in particular. In Cameroon, there are many thermal springs and indications of current or prior volcanic activities spotted throughout the country; Mount Cameroon with a height of 4,095 m. from the Atlantic sea is the highest mountain in Sub-Saharan West Africa, and is an active volcano, erupted in 1982, 1999 and 2002 but the lava flow was slow, flew downhill for about fifteen kilometres, damaging all the vegetation and fortu-
nately no one was killed. Other natural hazards in the country include volcanic activity with periodic releases of poisonous gases from Lakes, for example lake Nyos (killed about 1700 people in 1986) and Lake Monoun volcanoes, floods, mud slides and epidemic, which kill lots of people on a yearly basis (UNDP Cameroon: Risk reduction units, 2007).

<table>
<thead>
<tr>
<th>DISASTER</th>
<th>DATE</th>
<th>No KILLED</th>
<th>No AFFECTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood</td>
<td>Jul-2008</td>
<td>0</td>
<td>10,296</td>
</tr>
<tr>
<td>Flood</td>
<td>2-Aug-2007</td>
<td>0</td>
<td>25,000</td>
</tr>
<tr>
<td>Epidemic</td>
<td>1-Jan-2004</td>
<td>0</td>
<td>2,924</td>
</tr>
<tr>
<td>Volcano</td>
<td>1999</td>
<td>0</td>
<td>3010</td>
</tr>
<tr>
<td>Epidemic</td>
<td>Jan. 1998</td>
<td>239</td>
<td>0</td>
</tr>
<tr>
<td>Epidemic</td>
<td>Nov. 1997</td>
<td>60</td>
<td>0</td>
</tr>
<tr>
<td>Epidemic</td>
<td>June. 1996</td>
<td>378</td>
<td>2865</td>
</tr>
<tr>
<td>Epidemic</td>
<td>Feb. 1993</td>
<td>513</td>
<td>4070</td>
</tr>
<tr>
<td>Epidemic</td>
<td>26th Feb. 1992</td>
<td>713</td>
<td>7865</td>
</tr>
<tr>
<td>Epidemic</td>
<td>1991</td>
<td>308</td>
<td>0</td>
</tr>
<tr>
<td>Epidemic</td>
<td>Sept. 1990</td>
<td>118</td>
<td>0</td>
</tr>
<tr>
<td>Drought</td>
<td>1990</td>
<td>0</td>
<td>186,900</td>
</tr>
<tr>
<td>Epidemic</td>
<td>Jan-1989</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Volcano (lake Nyos)</td>
<td>24-Aug-1986</td>
<td>1,746</td>
<td>10,437</td>
</tr>
<tr>
<td>Drought</td>
<td>Jan-1971</td>
<td>0</td>
<td>400,000</td>
</tr>
</tbody>
</table>

Table 4.1: Top 10 natural disasters in Cameroon from 1900 to 2010 with numbers killed and displaced (Source: Adopted from EM-DAT: The OFDA/CRED International Disaster Database)

In terms of ICT, data from the CIA world fact book (2010), provides that out of a population of 18.88 million, there are 198,300 fixed telephone lines, 6.161 million mobile telephone subscribers and 725000 internet users as at 2008. The telephone line connections stand at less than 1 per 100 persons with old and outdated equipment, thus making connections with many parts of the country so unreliable. The increase in the number of mobile-cellular usage to a subscription base of 33 per 100 persons is a reflection of the poor condition and general inadequacy of the fixed-line network. The cable and microwave radio relay are just too scattered.
<table>
<thead>
<tr>
<th>ICT TYPE</th>
<th>ACCESS PER 100 PERSONS</th>
<th>YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet users</td>
<td>3.8</td>
<td>2008</td>
</tr>
<tr>
<td>Fixed telephone</td>
<td>0.6</td>
<td>2005</td>
</tr>
<tr>
<td>Mobile telephone</td>
<td>32.2</td>
<td>2008</td>
</tr>
<tr>
<td>Personal computers</td>
<td>1.1</td>
<td>2008</td>
</tr>
<tr>
<td>Television set</td>
<td>23</td>
<td>2008</td>
</tr>
<tr>
<td>Radio set</td>
<td>163</td>
<td>1997</td>
</tr>
<tr>
<td>Fixed internet subscription</td>
<td>0.1</td>
<td>2008</td>
</tr>
</tbody>
</table>

*Table 4.2: ICT types and users per 100 persons in Cameroon, (Source CIA world fact book 2010)*

4.2 **Responses from the questionnaires**

This section shows the data collected from the respondents. The data is presented using frequency tables, pie and bar charts. The data presentation is categorised into the following groups: demographic profile of respondents, natural disaster types, ICT accessibility, ICT use, subdivided into degree of ICT use, ICT use and preparedness, and ICT use and response; factors influencing ICT use, and lastly, types of problems encountered during ICT use.

4.2.1 **Demographic profile of respondents**

The demographic profile of the respondents was divided into four sub groups: gender, educational level, organisational type of respondent and position in the organisation. The categorisation was deemed important by the authors as this had an important role on the understanding of the questions in the questionnaire. A total of 150 questionnaires were administered, out of this number, 30 were administered by email, 80 were mailed and 40 were administered by personal contact. Out of the 150 questionnaires administered, 85 were returned giving a respondent rate of 56.7%. The figures and tables that follow present the responses obtained from the respondents in terms of gender, educational level, organisational type of respondent and position held in their organisation.
Figure 4.1 showing distribution of respondents by gender

Figure 4.1 shows the distribution of the respondents according to gender. Out of 85 respondents, 58 (68.24%) were males while 31.8 were females. This is typical of Cameroon where men are over represented in almost all professions.

Figure 4.2: Showing respondents by educational level

The second issue on the respondents profile was their educational level. The number of respondents who indicated that they had a Bachelors degree or equivalent was 43(50.59%) while 25.9 % had a high school leaving certificate, 22.4 % had a master’s degree or equivalent studies and 1.2 % had a PhD or equivalent studies.

Figure 4.3: Showing the percentage of respondents according to organisational type
The bar chart shows that out of the 85 respondents to the questionnaires, 27 (31.76%) were NGOs, 24 (28.24%) governmental ministries involved with disaster management, 20 (20%) were local administrators, 8 (9.21%) members of the Cameroon Red Cross movement, 6 (7.06%) from religious organisations, 2 (2.35%) from International NGOs in Cameroon and one member of the Press.

![Position Held by Respondents](image)

**Figure 4.4: Showing position held by respondents in their organisations.**

The respondents ranged from ordinary members of their various organisations to managers. Directors made up 35.3% of the respondents, followed by Divisional officers with 23.5%, members with 12.9%, assistant managers with 10.6%, priest and pastors made up 9.4% and managers 8.2%, giving a total valid percentage of 100.

**4.2.2 Natural disaster types**

The second part of the questionnaire was focused on the types of natural sudden impact disasters in Cameroon. The respondents were asked to identify a disaster type common in their locality.

![Disaster Types](image)

**Figure 4.5: Disaster types in Cameroon**

The respondents identified five common disaster types in their areas. Volcanic eruptions top the list with 31.8%, followed by Toxic gas disasters from lakes with 24.7%. Landslides had 21.2% of the responses, 15.3% indicated that floods were common in their area and 6% selected wild bush fires.
4.2.3 ICT accessibility

This section had three questions structured to get responses from the respondents on how they get information about disasters; on ICT accessibility and on type of ICT that they could easily access.

![Figure 4.6: Easily accessed ICT types for disaster information gathering](image)

The respondents indicated that 54.1% of the information they got about natural disasters was through the radio, 12.9% through the use of the internet, 10.6% got the information by watching the Cameroon radio and television channel (CRTV), 8.2% through the fixed and mobile phone respectively and 5.9% by watching foreign television channels.

![Figure 4.7: Degree of general ICT ownership or accessibility](image)

The respondents accepted that they owned or could have easy access to at least one of the ICT systems in the study with an acceptance rate of 91.8%, while only 8.2% indicated that they did not have any ICT system at all. Asked to identify the type of ICT they owed or could easily access, the respondents give the following responses;
Out of 85 organisations that answer questionnaire, the mobile phone was the ICT with the highest ownership rate of 41.18%, while 27.00% indicated that they owned radio sets. The percentage of respondents that had a fixed phone was 10.59 while those who indicated that they could easily access the internet were 9.41%. Those who had their TV sets connected to foreign TV channels were 3.53 and 2.35 owned desktop computers.

### 4.2.4 ICT use

This section presented data on questions that were structured to capture respondents’ use of the ICT systems they had or could easily use to prepare for disasters or to respond to disasters in their locality. In order to get this information, respondents were asked whether they would use the ICT they had or could easily access to prepare for or during disasters in their areas. Soliciting responses on whether they will use the ICT they had at all during emergencies such as natural disasters, they give the following responses;

![Figure 4.9: Degree of ICT use for preparedness and response](image)

The respondents indicated that 98.81% would use the ICT they had to prepare for or during disasters in their localities while only 1.19% said they would not use the ICT systems at their disposal. The next issue was to find out what type of ICT they would
use most to prepare for disasters. In this respect, they were asked to select from the list given the type of ICT system they would prefer to use to prepare for disasters.

**Figure 4.10: Showing ICT types use in the preparedness phase**

Out of the number of ICT systems listed, 55.29% of the respondents indicated that they would use the radio to create public awareness about the negative effects of disasters. The local TV was second with 31.76% and lastly 12.94% of the responses were for using the internet to prepare for disasters. The last issue in this section was on the use of the ICT in the response phase of disasters.

**Figure 4.11: ICT types used in the response phase**
The respondents indicated that if they are already in a disaster they would use the mobile phone and the internet to send and receive information. The mobile phone accounted for 70.59% of the responses, the responses for internet usage was 25.88% while the local and foreign TV and radio accounted for 1.18 respectively.

4.2.5 Factors influencing ICT use

This section tried to sample respondents’ opinion on reasons for choosing to use a particular ICT type either to enable the communities to be prepared for disasters or during disasters. The questions here were structured to limit the respondents from going out of topic and for easy coding and analysis. The frequency table below describes the responses gathered from the respondents.

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>FREQUENCY</th>
<th>PERCENTAGE</th>
<th>VALID PERCENTAGE</th>
<th>CUMMULATIVE PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast</td>
<td>59</td>
<td>69.4</td>
<td>69.4</td>
<td>69.4</td>
</tr>
<tr>
<td>Reliable</td>
<td>16</td>
<td>18.8</td>
<td>18.8</td>
<td>88.8</td>
</tr>
<tr>
<td>National coverage</td>
<td>4</td>
<td>4.7</td>
<td>4.7</td>
<td>92.9</td>
</tr>
<tr>
<td>Affordable</td>
<td>3</td>
<td>3.5</td>
<td>3.5</td>
<td>96.5</td>
</tr>
<tr>
<td>Accessible</td>
<td>3</td>
<td>3.5</td>
<td>3.5</td>
<td>100</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.3: Factors influencing ICT use

4.2.6 Problems encountered in ICT usage in Cameroon

This section presented data on the degree to which the respondents saw that they encounter problems in using ICT and the type of problems which they encountered. The figure below describes the degree to which respondents acknowledged that they will encounter problems using ICT.
According to the survey, the respondents answered “yes” 76.47% there are problems when using any of the ICT they selected to prepare for disasters or during disasters, while 23.53% said there will be no problems. When asked to enumerate the type of problems, figure 4.13 below describes their responses.

<table>
<thead>
<tr>
<th>Type of problem</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Valid Percent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited network coverage</td>
<td>25</td>
<td>29.4</td>
<td>29.4</td>
</tr>
<tr>
<td>Limited internet access</td>
<td>10</td>
<td>11.8</td>
<td>11.8</td>
</tr>
<tr>
<td>Poor TV and radio signals</td>
<td>15</td>
<td>17.6</td>
<td>17.6</td>
</tr>
<tr>
<td>Unreliable TV and radio information</td>
<td>10</td>
<td>11.8</td>
<td>11.8</td>
</tr>
<tr>
<td>Lack of money to purchase ICT</td>
<td>5</td>
<td>5.9</td>
<td>5.9</td>
</tr>
<tr>
<td>Poor ICT infrastructure</td>
<td>2</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td>No interest in TV/radio news</td>
<td>10</td>
<td>11.8</td>
<td>11.8</td>
</tr>
<tr>
<td>Government policy</td>
<td>8</td>
<td>9.4</td>
<td>9.4</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.4: Showing types of problems encountered during ICT use in Cameroon

Table 4.4 presents the main problems faced by the respondents in using ICT. These problems are related to the different types of ICTs used during disasters. Limited network coverage was the major difficulty as 29.4% of the respondents stated it was a problem. The next problem was poor TV and radio signals with 17.6% of respondents.
Limited internet access, Unreliable TV and radio information and No interest in TV/radio news each had 11.8% of the respondents identifying them as problems. 9.4% of the respondents’ thought Government policy was affecting the use of ICT negatively while 5.9% stated that Lack of money to purchase ICT was a problem. Lastly 2.4% indicated that Poor ICT infrastructure was a problem.
Analysis, Interpretations and Conclusion

This chapter connects the empirical findings to the frame of reference by reviewing the data collected during the study critically. The research questions asked during the study are answered here by analysing the data. The findings related to each question are discussed and the conclusions drawn based on discussions.

5.1 Natural disasters in Cameroon

A disaster is a serious disruption that physically affects the functioning of a system as a whole posing a significant and widespread threat to human life, health, property or the environment and can be natural or manmade disasters as well as SID which strike without notice or slow onset (Wassenhove, 2006). Natural disasters are natural events which have catastrophic consequences for living things and property in the vicinity (Blaikie, 1994). In table 2.2, a list of top natural disasters in Cameroon from 1900 to 2010 is presented with the number of people killed and displaced (OFDA/CRED International Disaster Database). This table supports the fact that disasters occur in Cameroon with catastrophic consequences on the population. In order to go deeper and understand the specific disaster types in Cameroon the respondents representing their organisations in the study were asked to identify from a list of disasters, a common type in their locality. The reason for this was for the authors to actually understand that the respondent organisations have witnessed disasters or have dealt with at least one type of a disaster in Cameroon. From the result obtained in table 4.5, volcanic eruptions top the list with 31.8%, followed by toxic gas disasters from lakes with 24.7%, landslides had 21.2% of the responses, 15.3% indicated that floods were common in their area and 6% selected wild bush fires. To complement this data on disasters in Cameroon, the authors tried to compare the data with the data on table 4.1 which was collect from EM-DAT which is an International Disaster Database. The results were clear, supporting the fact that disasters SID occur in Cameroon. One thing that was realise in the compares was the fact that the frequency and number of some slow impact disasters such as epidemic and drought was high and secondly also that SIDs such as earthquakes and cyclones are not among the SID types that occur in Cameroon. The continuous occurrence of the above disasters in Cameroon with catastrophic consequences on the population, property and the environment raises the need for information sharing between the national actors involved in DM in Cameroon. This is because there is the need for information on how to prepare for such disasters and how to response to such disasters to be disseminated to the vulnerable communities. This leads to the issue of how to disseminate this disaster information, thus the need for the use of ICT by the actors in disasters for fast information and material flow.

5.2 ICT use and disaster information needs

Beynon-Davis (2009) defines IT as any technology used to support information gathering, processing, distribution and use and is composed of hardware, software, data and communication technology. ICT can be a powerful lubricant for supply chains because appropriate information systems enable disaster response to be more agile, as the disaster develops (Tomasini & Van Wasserhove, 2009). ICT usage could be seen as an indicator of adoption, acceptance as well as diffusion of innovation (Usluel et al., 2008). In order to study the use of ICT in disasters in Cameroon, the TAM model was used. The idea here was based on the fact that the general user intension of ICT in Cameroon was
influenced by the perceived usefulness and perceived ease of use. To measure these aspects, the respondents were asked to explain why they use ICT. The results were presented on table 4.3. According to the respondents, 69.4% said they used ICT because they are fast while 18.8% said they were reliable. This showed that the users were using ICT in disasters because the ICT were important because that is the only thing they presented as fast and reliable to transmit disaster information. On perceived ease of use the respondents were asked how accessible they were to use any of the ICT listed. The results were presented on figure 4.7 and according to these result, 91% of the respondents accepted that they at least one type of ICT or could easily get access to use one type of the ICT listed on the questionnaire. These findings were at least in line with the TAM. With the results in table 4.7, it was clear that at least one of the many types of ICT listed is in use in Cameroon during disasters.

5.3 ICT and DM in Cameroon

According to Tomasini and Van Wasserhove (2009), DM is a combination of preparedness and response where preparedness addresses the strategy put in place that allows the implementation of a successful operational response. Disaster preparedness basically means putting in place response mechanisms to counter factors that society has not been able to mitigate (Tomasini & Van Wasserhove, 2009). Kissel (2010) explains that preparing ahead of time helps communities to react quickly, and also to learn what to focus on before and after a disaster. He further goes on to explain that when communities are well prepared, the long term hazard risk to life and property is reduced in a cost effective and responsible manner. According to Tomasini and Van Wasserhove (2009), ICT can be a powerful lubricant for supply chains because appropriate information systems enable disaster response to be more agile, as the disaster develops. Figure 4.9: presents the degree of ICT use for preparedness and response. According to the information gathered from the respondents, 98.81% would use the ICT they had to prepare for or during disasters in their localities while only 1.19% said they would not use the ICT systems at their disposal. In an attempt to discover which ICT played what role, the respondents were asked to identify the ICT type they would use most during the preparedness phase. According to data collected (figure 4.10), the radio ranked first, followed by the local TV while the internet came last. These ICT types are used to sensitise the public on the dangers of disasters and how to mitigate them.

The findings seems to be in line with the DITF report (1997) that explains the importance of the use of the radio, television and the internet to dissemination information in other to raise Public awareness during disaster preparedness. According to the results, the radio is the most used while the local television is used to a lesser extent. On the other hand the internet is hardly used for the purpose of information dissemination in disaster preparedness in Cameroon. According to the literature review, other ICT systems that are used during the preparedness phase are warning and monitoring systems (DITF report, 1997). The occurrence of SIDs in Cameroon like volcanic eruptions, wildfires and tornadoes calls for the development and use of early warning and monitoring systems which are absent. Putting all these systems together and comparing them with the use of the radio and the television shows that not all types of ICTs are used in Cameroon for disaster preparedness.

Disaster response is the art of attending to the disaster when it finally occurs (Tomasini & Van Wasserhove, 2009). According to Chandes and Paché (2010), responsiveness is preceded by the gathering and diffusion of information. They further stress that if accu-
rate data on demand during response is not handy during a relief operation, there will be a lot of stress on people, resources and organizational capability. In order to find out how information could be quickly gathered and diffused during a disaster, the respondents were asked to identify the ICT type they would use during a disaster and to explain why they would use that type. Figure 4.11 and table 4.3, provide information gather from the respondents. The mobile phone was ranked first followed by the internet while the local TV and radio came last. The principal reason for their choices was because the ICT types selected were fast, reliable and had a certain degree of national coverage.

According to the literature reviewed, the immediate response phase is time critical and is characterised by rapid, reliable, configurable, controlled-access communication (DITF report, 1997). This calls for the use of systems that can disseminate information faster between actors for immediate action. The use of the mobile phone as shown by the results is a suitable option but the practical issue here is that, the mobile phone alone cannot accomplish the mission of effective information transfer during response. One of the reasons is because of poor network coverage and the inability of the population to use it effectively in other to achieve an effective response. According to the literature review, other ICT systems used during disaster response are; the UNICEF’s Bee, which is an open source emergency telecommunication system that provides internet access in areas where infrastructure is nonexistent, (Underwood, 2010); the wireless local area networks (LANs) with disaster medical response capabilities and remote input devices that could ensure a timely medical response to disasters (Harrison and Harrison, 2008); computer simulation that allows the modelling of potential impact of a natural disasters before they occur (Patterson 2005) and Web 2.0 applications such as twitter, blogs, and wikis which are increasing used as a means of improving disaster response. Comparing these ICT systems for immediate response with the use of the mobile phone and to a lesser degree the internet as is the case with Cameroon shows that the mobile phone as well as the radio cannot provide an effective response. The mean reason for the limited use of ICT in Cameroon is accounted for by the fact that there are many problems that hinder the national actors.

5.4 Barriers or enablers to ICT use in DM in Cameroon

According to the literature review, Mbarika et al. (2005) compare the fact that, although ICT infrastructure are well established in the more developed and industrialized parts of the world, the same is not true for developing countries especially Sub Saharan Africa Cameroon inclusive. They further explain that the use of ICT in Cameroon lags considerably even when compared to other underdeveloped countries, such as those in Central America. Odedra-Straub (1993) supports the issue of infrastructure by arguing that in developing countries, simple infrastructure for widespread public information such as television broadcasting, telephone services, educational institutions, and public libraries are seriously deficient and this cripples citizens’ ability to gather information and coordinate with each other to solve their problems. To find out whether these problems still exist and if they do what are the problem types, the respondents were asked to say whether they encounter any problems when using the type of ICT they had in disasters in Cameroon. Figure 4.12 and table 4.4 present data collected from respondents on the possible problems encountered. More of the respondents (76.47%) accepted that they encounter problems when using the ICT types while the rest found the use of ICT without any problems. The majority that accepted the prevalence of problems enumer-
ated them as in table 4.4. According to table 4.4, the problems ranged from limited network coverage to limited internet access, poor TV and radio signal, lack of money, poor infrastructure and lack of energy, no interest in TV and radio information because of unreliability of these information, and government policy. On the other hand, the 23.53% of the respondents said there were no problems had their results reflected in table 4.3. Most of them said the ICT they had were fast, reliable, had national coverage, accessible and affordable. This results really were like puzzling but the simple fact to this is that they are some of the respondents who live in urban centres were the infrastructure is well developed and can be compared to certain areas of the developed world whereas there were more of the respondents in rural areas or in towns that lack ICT infrastructure. Comparing these results to this quotation by Brindley (2009), “ICT is the electricity that lets humanitarian staff conduct assessments, communicate requirements and speed relief in the form of shelter, healthcare and food to those affected by natural disasters.” And to this remark by Harrison and Harrison (2008) “the appropriate use of ICT enhances the effectiveness of the disaster response system, thereby safeguarding the infrastructure of the community and the population”, the authors can say that the results were more confirming the conclusions of Mbarika et al. (2005) that the use of ICT in Cameroon lags considerably even when compared to other underdeveloped countries, such as those in Central America. This is because using the problems were more than the enablers and also because very few of the ICT types were indicated as used to prepare for and during disasters in Cameroon. This places a lot of uncertainty on the effectiveness as stressed by Harrison & Harrison (2008).

5.5 Conclusions

The purpose of this study was to examine the use of ICT in the preparedness and immediate response phases of natural disasters in Cameroon. In order to accomplish this mission, the authors had to isolate the key concepts in the study; disasters, ICT, ICT use, and disaster management (disaster preparedness and disaster response) and around these concepts, build a frame of reference upon which empirical material was collected for analysis. A summary of the literature review showed the need of information by national actors in disasters in Cameroon thus the need to use ICT in DM in Cameroon. This summary brought out the link between ICT use and humanitarian logistics in Cameroon. Our theoretical literature and empirical findings presented some sought of bedrock upon which our analyses were conducted. Based on the findings from our empirical data, the following answers have been provided to our research questions:

R1: What types of ICTs are commonly used to prepare for and to response to natural disasters in Cameroon

The increase in the number of disasters in Cameroon has lead to the need by national actors to use ICT. To answer research question one, the authors started by first considering the accessibility of national actors to ICT. Figure 4.8, represents data on ICT accessibility and it depicts that 41.18% of the respondent organisations have access to mobile phones, 27.0% have access to radios, and 10.59 owned fixed phones while 9.41 have access to the internet. Considering what disaster phase national actors use what ICT, figure 4.10 showed the result on ICT use in the preparedness phase, which indicated that 55.29% of the respondent organisations would use the radio to create public awareness about the negative effects of disasters and this could be reduced, while 31.76% opted for the use of the local TV and 12.94 said they will use the internet. Lastly looking at the use of ICT in the response phase, the picture was completely different; figure
4.11 presented the results which depicted that the mobile phone was first with 70.59% of the responses while the internet was 25.88%.

With these results, the authors came to the conclusion that in Cameroon, the national actors in disasters will use the radio to communicate to the general public about the negative impacts of disasters and how this can be reduced. Secondly in a situation where a disaster has already occurred, the national actors will use the mobile phone to communicate with the public about the disaster situation in order to reduce the damages that the disaster might cause.

R2: *What are the barriers or enablers to these commonly used ICT systems in DM in Cameroon?*

Comparing these results to what the literature presents about studies on the use of ICT in DM in the developed countries such as the DITF report (1997), Underwood, (2010), Harrison and Harrison, (2008) and Patterson (2005), they seem to be a direct opposite because these studies are more talking about computer technologies and the use of advanced features on mobile phones and web 2.0 applications which are unheard of in Cameroon. As a result the authors wanted to know why the use of other ICT types such as the internet and computers and even the mobile phone and TV are not used or not optimally used. Figure 4.2 presented the results and according to the respondent organisations 76.47% said they encountered problems while using ICT during the various phases while 23.53 said they had no problems. The number of respondent organisations that said they had no problems were few and the authors also realised that they were in the urban areas were the ICT infrastructure is good.

On the issue of barriers to ICT use, the respondent organisations explained that the problems encountered ranged from the problems ranged from limited network coverage to limited internet access, poor TV and radio signal, lack of money poor infrastructure and lack of energy, no interest in TV and radio information because of unreliability of these information, and government policy. On the bases of this information, the authors concluded that the above mentioned were problems of ICT use in Cameroon. On the bases of these findings the authors the proposed some recommendations on what they taught can be done to better the situation.
6 Discussion and suggestions for further research

This chapter discusses the implication of the result of this study to the NGOs, GO, Religious organisation, disaster prone communities and all with interest in ICT use in DM in developing countries and observations that the authors came across in the course of the study. It also identifies limitations of the study and gives suggestions for further studies.

This study the use of ICT in DM in Cameroon to the best of our knowledge is the first of its kind in Cameroon and through it the role of information and ICT use in humanitarian logistics in the area of DM has been brought out. Through this study the authors hoped to have created awareness about the vulnerable nature of Cameroon to natural disasters and the rising need of information and ICT use to mitigate the negative impacts of these disasters. The study also reveals that although the use of ICT is very important in disasters in Cameroon, the national actors face lots of difficulties using ICT because of existing barriers to ICT use. It is hoped that this study has laid a foundation for further studies in the field of ICT and humanitarian logistics in Cameroon. Despite this contributions the study had quite a number of limitations

One of the most complex issues in the study was in the methodology and this was in the definition of the population for the study. The authors found it difficult to define and distinguish the organisations that were to be considered as national actors. This is mainly because sometimes it is difficult to tell which organisation is involved when there is a disaster and which is not. As such the population chosen for the study was mainly a convenient one. If all organisations were to be considered maybe the result would have been different.

The second limitation is that Cameroon is a very large country and the numbers of organisations are just too many so it was really difficult to have covered all of the country with the questionnaire administration.

Thirdly the respondent rate was low and the data obtained was analysed with charts and graphs without an in depth us of SPSS and as a result no real hypothesis was formulated or tested for the study although it was a quantitative study.

The study took too much into consideration and this made the work so difficult at the end. For example the study was on ICT use in DM. These two concepts are too broad and if parts of the concepts were considered the study would have been much better.

6.1 Recommendations

The first and most important recommendation is that the Cameroon government should make ICT infrastructure available by investing more and improving on the telecommunication the country. This will solve the problem of poor ICT infrastructure, poor radio and TV signals and limited network coverage in Cameroon.

- The government should liberalize policies toward Internet connectivity and invest more in making connectivity available to all provinces, divisions and sub divisions in the country.
- All government establishments should be connected to the internet to make information flow faster this will go a long way to solve the problem of limited internet access and the acceptance of the internet as a moving technology that has come to stay.
• ICT should be included in the school curriculum as one of the compulsory subjects, same as mathematics, French and English Language in the Cameroon general certificate of education. In this way many Cameroonians will be able trained on the use of ICT.
• The government should institute and implement an import policy facilitated by free or reduced import duties for all ICT materials coming into the country.
• National actors should invest more on ICT in order to be able to use them in their everyday operations.

All these policies if implemented will help the national actors in their fight to mitigate the impact of SIDs and will also enable them achieve an effective response because of the enabled ICT infrastructure. Life, property and the environment will be saved as the local communities will be able to accept, diffuse and use ICT as a moving technology during disasters.

6.2 Suggestion for further studies

One of the weaknesses of this study is the fact that it took so many variables into consideration. In the future we recommend that studies in this direction could try to look at the following areas:
• The use of the radio in disaster preparedness in Cameroon
• The use of the mobile phone in disaster response in Cameroon.
• The use of computer technologies in disasters response in Cameroon

In this way some precision can be obtained on how the radio or the mobile phone is used in the preparedness or response phase of disasters. Secondly more might be discovered why the use of computer is low in Cameroon in disaster management.
List of references


List of references


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Appendix 1: Authorisation letter used with the emailed questionnaire

April 8, 2010

To whom it may concern

We the undersigned write to confirm that Bayiah Joseph Ngang and Bong Carine Kuo are Master students in International Logistics & supply chain and Information Technology & Management respectively at the Jönköping International Business School Sweden. They are carrying out a study on "The role of ICT in Disaster Management in Cameroon" as a requirement for the completion of their programmes.

We therefore plead with you to make available to them any information you can share with them and they may need in relation to their studies. Attached to this letter is a questionnaire, a means through which they intend to get the required information. Whatever information provided will be used for the sole purpose of their study, and will not be traced to ind .

Thanks for your cooperation.

Yours faithfully

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Appendix 2: Mailed/faced-to face administered questionnaire

QUESTIONNAIRE

Sir/Madam,

We are Cameroonian students at the Jonkoping International Business School-Sweden carrying out a study on “The role of information and communication technology (ICT) in natural disaster management in Cameroon”. This study is a requirement for the completion of the master program in Information Technology & Management and Business Administration with specialization in Humanitarian Logistics. The study aims at examining the role of ICT in the preparedness and immediate response phases of natural disasters in Cameroon. It is hopeful that the findings of this study will raise national and international awareness on the use of ICT in emergencies in Cameroon and also contribute to the research community on current studies on ICT in humanitarian logistics in developing countries.

For each question, select the alternative(s) that best fits your views on the topic. To answer each question, tick or underline the option(s) that suit(s) your opinion. We are interested in your opinion as there is no right or wrong answer. The information you provide will be confidential.

Thank you for accepting to be part of this project.

1. Gender: A) Male, B) Female

2. Your highest Level of Education Obtained

   A) No formal schooling, 
   B) Primary School Certificate 
   C) Secondary leaving Certificate 
   D) High School leaving Certificate 
   E) Bachelors degree or equivalent 
   F) Master degree or equivalent 
   G) PhD or equivalent occupation 
   H) others (specify) ………………..

3. Select from the list below the type of organization to which you belong:

   A) Governmental institution 
   B) Non Governmental organization 
   C) Religious organization 
   D) The Cameroon Red Cross 
   E) International NGO in Cameroon 
   F) The Media 
   G) Local administrator 
   H) others (specify) ………………..

4. Your recent position:

   A) Manager 
   B) Assistant manager 
   C) Divisional officer/Mayor 
   D) Director 
   E) Priest/Pastor 
   F) Teacher 
   G) Member 
   H) others (specify) ………………..
5. Select a natural disaster(s) which is common in your community and you/your organization have witnessed or got information of in Cameroon?


6. How did you/your organization get to know about the disaster(s)?

A) Internet, B) Fixed phone, C) Mobile phone, D) Desk top computer, E) Lap top computer, F) Local TV channels (CRTV), G) Foreign TV channels, H) Radio, I) Fax, J) Others .................

7. Do you/your organization own or have access to any of the following means of communication; desk top computer, mobile phone, lap top computer, fixed phone, local TV channels (CRTV), foreign TV channels, internet, radio, fax and others?

A) YES, B) NO

8. Select the specific mode(s) of communication that you/your organization own or have access to:

A) Internet, B) Fixed phone, C) Mobile phone, D) Desk top computer & internet, E) Lap top computer & internet, F) Local TV channels (CRTV), G) Foreign TV channels, H) Radio, I) Fax, J) Others....................

9. In the event of a natural disaster would you consider using any of the communication modes mentioned in (Q8) above? A) YES, B) NO

10. If you have to create public awareness about the negative consequences of natural disasters and how to reduce them, which communication mode would you use?

A) Internet, B) Fixed phone, C) Mobile phone, D) Desk top computer & internet, E) Lap top computer & internet, F) Local TV channels (CRTV), G) Foreign TV channels, H) Radio, I) Fax, J) Others....................

11. Select what you will use most to send and receive information if you are already involved in a disaster of the type listed in Q5 above.

A) Internet, B) Fixed phone, C) Mobile phone, D) Desk top computer & internet, E) Lap top computer & internet, F) Local TV channels (CRTV), G) Foreign TV channels, H) Radio, I) Fax, J) Others....................

12. Why would you prefer the mode of communication for sending and receiving information? Because it is:
13. Do you think there will be any problem updating people in other parts of Cameroon and the world about the conditions of their loved ones in the disaster area with the selected mode of communication? A) Yes B) No

14. If yes what kind of problems do you envisage?

THANK YOU
Sir/Madam,

We are Cameroonian students at the Jonkoping International Business School-Sweden carrying out a study on “The role of information and communication technology (ICT) in natural disaster management in Cameroon”. This study is a requirement for the completion of the master program in Information Technology & Management and Business Administration with specialization in Humanitarian Logistics. The study aims at examining the role of ICT in the preparedness and immediate response phases of natural disasters in Cameroon. It is hopeful that the findings of this study will raise national and international awareness on the use of ICT in emergencies in Cameroon and also contribute to the research community on current studies on ICT in humanitarian logistics in developing countries.

For each question, select the alternative(s) that best fits your views on the topic. To answer each question click on the check boxes or radio buttons and write 2 We are interested in your opinion as there is no right or wrong answer. The information you provide will be confidential. Save the document after answering and send it back to my email box.

Thank you for accepting to be part of this project.

1. Gender
   - ☐ Male
   - ☐ Female

2. Your highest Level of Education Obtained
   - ☐ No formal schooling,
   - ☐ Primary School Certificate
   - ☐ Secondary leaving Certificate
   - ☐ High School leaving Certificate
   - ☐ Bachelors degree or equivalent
   - ☐ Master degree or equivalent
   - ☐ PhD or equivalent occupation
   - ☐ Others (specify)
3. Select from the list below the type of organization to which you belong:

- Governmental institutions
- Non Governmental organizations
- Religious organizations
- The Cameroon Red Cross
- International NGO in Cameroon
- The Media
- Local administrator
- Others (specify)

4. Your recent position:

- Manager
- Assistant manager
- Divisional Administrator/Mayor
- Director
- Priest/Pastor
- Teacher
- Member
- Others (specify)

5. Select a natural disaster(s) which is/are common in your locality or that you/your organization have witnessed or got information of in Cameroon?

- Volcanic eruption
- Toxic gas disaster from lakes
- Earthquakes
- cyclones
- Landslides
- Floods
- wildfire
- Drought
- Others (specify)

6. How did you/your organization get to know about the disaster(s)?
7. Do you/your organization own or have access to any of the following means of communication; desk top computer, mobile phone, lap top computer, fixed phone, local TV channels (CRTV), foreign TV channels, internet, radio, fax and others?

- ☐ YES
- ☐ NO

8. Select the specific mode(s) of communication that you/your organization own or have access to:

- ☐ Desk top computer connected to internet
- ☐ Mobile phone
- ☐ Lap top computer connected to internet
- ☐ Fixed phone
- ☐ Local TV channels (CRTV)
- ☐ Foreign TV channels
- ☐ Internet
- ☐ Radio
- ☐ Fax
- ☐ Others
9. In the event of a natural disaster would you consider using any of the communication modes mentioned in (Q8) above?

- ☐ YES
- ☐ NO

10. If you have to create public awareness about the negative consequences of natural disasters and how to reduce them, which communication mode would you use?

- ◯ Desk top computer
- ◯ Mobile phone
- ◯ Lap top computer
- ◯ Fixed phone
- ◯ local TV channels (CRTV)
- ◯ Foreign TV channels
- ◯ Internet
- ◯ Radio
- ◯ Fax
- ◯ Others?

11. Select what you will use most to send and receive information if you are already involved in a disaster of the type listed in Q5 above.

- ◯ Desk top computer
- ◯ Mobile phone
- ◯ Lap top computer
- ◯ Fixed phone
- ◯ local TV channels (CRTV)
- ◯ Foreign TV channels
- ◯ Internet
- ◯ Radio
- ◯ Fax
- ◯ others
12. Why would you prefer the mode of communication for sending and receiving information? Because it is:

- [ ] Fast
- [ ] Reliable
- [ ] Has national coverage
- [ ] Affordable
- [ ] Easily accessible
- [ ] Others(specify)

13. Do you think there will be any problem updating people in other parts of Cameroon and the world about the conditions of their loved ones in the disaster area with the selected mode of communication?

- [ ] Yes
- [ ] No

14. If yes what kind of problems do you envisage?

THANK YOU