

RELIEF SUPPLY CHAIN MANAGEMENT:

The case of National Disaster Management Organization's (NADMO) response to
the 2007 Northern Ghana Floods



A dissertation submitted to the Department of Information and Decision Science, KNUST
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fulfilment of the requirements for the award of the degree of Master of Business Administration.

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DECLARATION

"I hereby declare that this dissertation is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted or accepted for the award of any other degree or diploma of a university or other institution of higher learning."

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ABSTRACT

Natural Disasters are becoming a key concern of many nations. This is because of its associated cost. In 2007 Ghana experienced a massive flooding in the three northern regions. This resulted in the loss of lives, farms and other properties. The effect of this, was shortage of food since the northern regions is the nation's bread basket. In the light of this, it is important to determine the extent to which the National Disaster Management Organization (NADMO) as a Government intervention was successful in the management of these 2007 Northern floods

This thesis examines the management of disaster by NADMO in the area of humanitarian logistics in responding to the 2007 flood and how satisfied flood victims were with NADMO's response. The three communities were clustered on community base, that is, Gumani, Kpalsi and Nyanshegu. Random sampling was used in selecting the respondent in each of the communities. Every third household was randomly selected to administer the questionnaire.

It was interestingly noted that beneficiaries were satisfied with NADMO's response rate in terms of timeliness, adequacy and suitability of the delivery of relief items

The result of the study puts forth a simple framework of supply chain management techniques for managing disasters during relief operations and explains why Governments and other Humanitarian organizations should consider their use.

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DEDICATION

This work is dedicated to my parents. Mr. Peter Donkor and Madam Christiana Addison

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

Disasters are becoming the key concern of many nations it has occurred throughout the world with its associated cost. According to the International Federation of Red Cross/Red Crescent Societies (IFRC), disasters resulted in 24,000 deaths, affected 608 million people, and caused \$27 billion in damage worldwide in 2002 (IFRC, 2003). The numbers show the effects of natural disasters such as earthquakes, floods, and hurricanes, as well as manmade disasters such as chemical accidents. Whether natural or man-made, all disasters have common wide scale human sufferings. In contemporary academia, disasters are seen as the consequence of inappropriately managed risk. These risks are the product of hazards and vulnerability. Hazards that strike in areas with low vulnerability are not considered a disaster, as is the case in uninhabited regions. Some well known disasters are the Indian Tsunami, The American Hurricanes (Katrina) and many more. According to the World Bank report on Disaster Risk Management, developing countries suffer the greatest costs when a disaster hits – more than 95 percent of all deaths caused by disasters occur in developing countries, and losses due to natural disasters are 20 times greater (as a percentage of GDP) in developing countries than in industrialized countries (B. Wisner, P. Blaikie, T. Cannon, and I. Davis, 2004).

The humanitarian needs of people especially during times of disaster and emergencies have received a lot of highlights from international organizations and governments. The provision of these needs require an understanding of logistics. Humanitarian logistics has therefore become a very important area in the Supply Chain Management (SCM).

In 2004, the budget of the top-ten aid agencies exceeded \$US14 billion (Thomas and Kopczak, 2005); their operations and logistics often entail complex management activities deployed in special circumstances. Recent experiences – for example, the tsunami in the Indian Ocean in 2004 or Hurricane Katrina in 2005 – contribute to a greater understanding of the enormous complexities and numerous difficulties that relief operations agencies face (Garner and Harrison, 2006; Thomas and Fritz, 2006; Thomas and Kopczak, 2007). In this context, SCM and logistics may be crucial to ensure the success of relief operations (Chomilier et al., 2003; Gustavsson, 2003; Thomas and Kopczak, 2007), because approximately 80 per cent of all relief operations interact with supply chains at some point during their efforts (Fritz Institute, 2007). Yet few disaster relief agencies pay attention to the design and implementation of supply chain or logistics management operations; fewer still recognise that such operations have a key strategic function (Thomas, 2003a, 2005). Rather, most resources go to support the more visible aspects of disaster relief operations, meaning that agencies typically lack staffs that possess supply chain and logistics management competencies and, in turn that their operations may not be as effective and efficient as possible.

According to the United Nations initiative for an International Decade for Natural Disaster Reduction (1990-99), many developing countries have experienced flooding over recent times causing the death of thousands of people. Over 650000 people have lost their homes due to this type of disaster. Ghana is one of such countries to suffer this disaster. In September 2007, the government of Ghana declared a state of emergency due to flash flood in the Northern Region. Millions of people lost their lives because of the response rate of NADMO in terms of timeliness and adequacy of relief items.

This thesis explores the disaster management approaches and perspectives of NADMO in terms of their adoption of supply chain management techniques to manage disaster during the 2007 disaster relief operations. Using both qualitative and quantitative factors for example statistical model like regression analysis, NADMO's disaster management perspective was analysed and Beneficiaries satisfaction of NADMO's response rate in terms of timeliness, suitability and adequacy of relief items were analysed.. This work is different from others in that it marries supply chain principles from different disciplines (including private and nonprofits,) to benefit humanitarian operations. It also serves to advance the body of knowledge so that future researches can build upon the concept. The result of the study puts forth a simple framework for governments and academics on supply chain management solutions for overcoming disasters during relief operations and explains why government should consider their use.

1.2 PROBLEM STATEMENT

An extensive humanitarian relief community has developed over the years because of increase in humanitarian needs of our people due to population explosion. This has necessitated the Act 517 of 1996 that establishes the national disaster management organization (NADMO). In late August and mid-September 2007, Heavy rains caused massive flooding in the three northern regions of Ghana. This worsened the situation of a region that was already vulnerable and most deprived after facing a period of drought. Results of the floods include the following:-

The displacement of several people and families and quite a number of people killed, crops, food and livestock destroyed, little or no access to food, shelter and transport, a number of houses and schools damaged or destroyed.



Source: UN office for the Coordination of Humanitarian Affairs (OCHA) and Government of Ghana (available at ochaonline.un.org)

In all Twenty out of thirty-four districts were most severely affected. The results of the floods created a humanitarian situation that required an urgent response to address the immediate needs of the people. (www.reliefweb.int/rw/rwb : *Ghana Situation Report on floods*)) Preliminary assessments by the Ministry of Food and Agriculture suggest that drought and floods affected 70,500 hectares of farmland, resulting in an estimated loss of 144,000 tonnes of crops, including maize, sorghum, millet, peanuts, yam, cassava and rice. This will affect a total of 1.2 million Ghanaians are currently exposed to food insecurity while another two million remain vulnerable to the problem. (<http://www.IRINnews.org>)

The report released by the United Nations office in Ghana indicated that the figure represented five per cent of the population most of whom were concentrated in the three northern regions. Mrs Diana Boakye, a director, National Disaster Management Organisation (NADMO) said between 1995 and 2007, the country experienced three major floods displacing 1.7 million

persons in addition to 80 major epidemics from cholera and Cerebro Spinal Meningitis, which claimed 1,400 lives and affected 17,800 persons between 1997 and 2002. This gives grave concerns for National development. In the light of this, it is imperative to determine the extent to which NADMO has been successful in the management of disasters and those affected by these disasters especially in the northern region. (ochaonline.un.org/: Ghana 2007))

1.3 OBJECTIVES OF THE STUDY

The main objective of this study is to examine the management of disaster by NADMO in the area of humanitarian logistics in responding to the 2007 flood disaster. Specifically, the objectives of the study are to;

1. Establish the Disaster Management perspectives of NADMO as applied during its response to the 2007 Northern floods
2. Investigate the adoption of relevant supply chain techniques by NADMO in responding to the disaster.
3. Evaluate the effectiveness of NADMO's response rate in terms of timeliness, suitability and adequacy of relief quantities.
4. Recommend appropriate disaster management concepts for government as a guideline in a comprehensive disaster management plan to improve national capacities to anticipate, manage and respond to disaster.

1.4 JUSTIFICATION OF THE STUDY

The huge economic and humanitarian impact of disaster management has spurred the interest of the public, media, governments, donors and end beneficiaries in the relief operations of NADMO especially in knowing what went into the management of the 2007 Northern floods. This work brings out some disaster management techniques which can be adopted by NADMO in disaster management to reduce the national cost in managing disaster. The National Disaster Management Organization is an area that promises greatest cost efficiency to the country when its management dynamics are better understood. Thus the rationale for studying NADMO's operations in disaster management in Ghana cannot be over-emphasized.

1.5 METHODOLOGY

A case study research design was adopted to facilitate easy assessment of the role of NADMO in the disaster management in the 2007 northern flood. Both primary and secondary source data will be used. The primary data were obtained mainly through a semi structured self-administered questionnaire of key informants of NADMO as well as affected communities and other donor agencies who supported NADMO in the management of the disaster. Secondary data were gathered from newspapers, articles, magazine, internet, and other available and relevant materials. Three communities were clustered on community base and respondents in the communities were randomly sampled.

1.6 SCOPE OF THE STUDY

The study focuses on the pre disaster, immediate response and post disaster management as constructed by NADMO .The northern flood has been purposely chosen because it depicts one of the major disasters that has plagued the nation where the Government of Ghana declared a state of emergency on account of the flash floods under review.

1.7 LIMITATION OF STUDY

This work was constraint by a number of factors. Paramount to this is apathy on the side of respondents during the administration of the questionnaires. Another limitation too was the fact that after two years most of the disaster victims have relocated. Also because of the conflict in the Northern part of Ghana, movement to certain areas (communities) was limited. Language barrier was also a challenge but was minimized by the use of interpreters. These constraints however do not undermine the findings of this research.

1.8 ORGANIZATION OF THE STUDY

The study is organized in five major chapters;

Chapter one deals with the introduction, statement of problems, objectives and Justification of the study, methodology and scope and organization of the study.

Chapter two is devoted to how other have reviewed literature on disaster management

Chapter three deals with methodology and the profile of the NADMO

Chapter four will analyze the main operation of NADMO in the management of disaster. Thus this chapter will includes data analysis findings and discussions.

Chapter five is the conclusion of the summary of major findings, recommendation and suggestions and other implications of the findings and limitations of the study to serve as a guide for future research on this topic.

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CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

During the last decade alone, disasters have significantly affected about 2.5 billion people. The number of people affected by disasters has doubled since the 1990s, with an average of 188 million people affected each year. (The Journal of Turkish Weekly : 2005)

In addition, trends suggest that the impact of natural disasters is intensifying, with an increasing effect on poor nations largely due to growing populations and a greater vulnerability to natural hazards. Factors contributing to this increase in vulnerability include rapid urbanization, poor urban and rural planning and governance, and environmental degradation this result in human suffering, property damage, and the disruption of the day to day activities of the society itself. This places a lot of strain on the ability of the society to cope.

According to Blaike, (1994) crisis are not only referring to an unexpected catastrophe, but also to the slow build-up of environmental, political, or economic factors that act on society's vulnerabilities. This according to him becomes a disaster when the community's capacity to cope is overwhelmed and the status quo becomes untenable. The situation is then declared as an emergency and assistance is requested from others. Natural disaster refers to the impact natural disasters have on communities. They can be rapid-onset such as volcanic eruptions, tsunamis, earthquakes or hurricanes, or slow-onset such as flood, famine and drought. The impact of the disaster is determined by effect it has on the community. Many authors have however argued that most disasters as natural as they might seem are as a result of human error consciously or unconsciously. The basis of their arguments is that the factors that increase vulnerability to

extreme stress are created and reinforced by human systems. Vulnerability to the effect of hazards is affected by poverty levels and other inequalities. Nature is not the determinant of the distribution of vulnerability but rather people control and choose to live in harm's way. (Blaike : 1994)

2.2 DEFINITION OF DISASTER

The term "disaster" is usually reserved for "a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of the affected people to cope using only its own resources" (United Nations, 1992, p. 21). Furthermore, existing literature classifies four types of disasters (Van Wassenhove, 2006):

Natural, sudden onsets (e.g. earthquakes, hurricanes, tornadoes);

Human-made, sudden onsets (e.g. terrorist attacks, coups d'état, industrial accidents);

Natural, slow onsets (e.g. famines, droughts, poverty); and

Human-made, slow onsets (e.g. political and refugee crises).

In this context, relief refers to "the emergency food, shelter and services provided in the immediate aftermath of a natural or man-made disaster" (Thomas, 2003b, p. 4) and often entails a foreign intervention into a society with the aim of helping local people (Long and Wood, 1995). Therefore, the basic goal of disaster relief agencies is to minimise the impact of disasters and reduce the suffering of affected people (Kelly, 1995).

During the past two decades, the number of natural disasters, including floods, cyclones, and droughts, has quadrupled (Oxfam, 2007); as a result, disaster relief operations now rank high on political agendas (Kovács and Spens, 2007). Worldwide, an average of 400-500 natural disasters strike per year, up from a yearly average of 125 in the early 1980s. The number of people affected by such disasters has risen from some 174 million to more than 250 million per year (United Nations, 2007). Various reasons may explain the growth of disaster events, including increased urban concentrations and environmental degradation (BBC, 2004). Human-made disasters add to the totals with incidents caused by political instability, such as terrorism, war, and ethnic cleansing, or social factors, including racism, exclusion, and religious persecution (Oliver-Smith, 2006). Social factors in turn often create political instability, which may lead to conflicts due to the displacement of people (Kolmannskog, 2008; Oliver-Smith, 2006). A clear relationship also emerges between a given geographical location's vulnerability to disasters and its level of social, economic, and technological development. For example, between 1990 and 1998, approximately 94 per cent of major natural disasters and more than 97 per cent of all natural disaster-related deaths occurred in developing countries (World Bank, 2001). Predictions suggest the number of natural and human-made disasters will increase five-fold in the next 50 years (Thomas and Kopczak, 2005); hence, the need for efficient disaster relief operations is clear (McEntire, 1999).

The Center for Research on the Epidemiology of Disasters (CRED: 1984) in Brussels, Belgium, uses the following definition. "A disaster is a situation or event which overwhelms local capacity, necessitating a request to a national or international level for external assistance." CRED maintains a database of disaster events from 1900 to present. Much of their data is derived from relief groups, including the Red Cross/Red Crescent Agency.

A disaster may also be defined as a "situation or event which overwhelms local capacity, necessitating a request to national or international level for external assistance; an unforeseen and often sudden event that causes great damage, destruction and human suffering" (Hoyois *et al*; 2007). In order to understand disaster, mere knowledge of the number of deaths or extent of economic damage alone is insufficient. The symbolic component requires knowledge of the sense of vulnerability, the adequacy of available explanation and the society's imagery of death and destruction. In this sense Barkun (1977) sees disaster as a "mental construct imposed upon experience."

2.3 DISASTER / HAZARDS IN GHANA

Disasters which are either natural or man-made (human- induced) occur in all parts of the world from time to time. Ghana is no exception and suffers at various places. Some of the disasters occur at any time while others occur periodically or seasonally. The disasters that have been identified in Ghana fall under the following broad headings

- a) Geological
- b) Hydro meteorological
- c) Fires and Lightning
- d) Pests and Insects
- e) Diseases and Epidemics
- f) Radiological
- g) Man- made

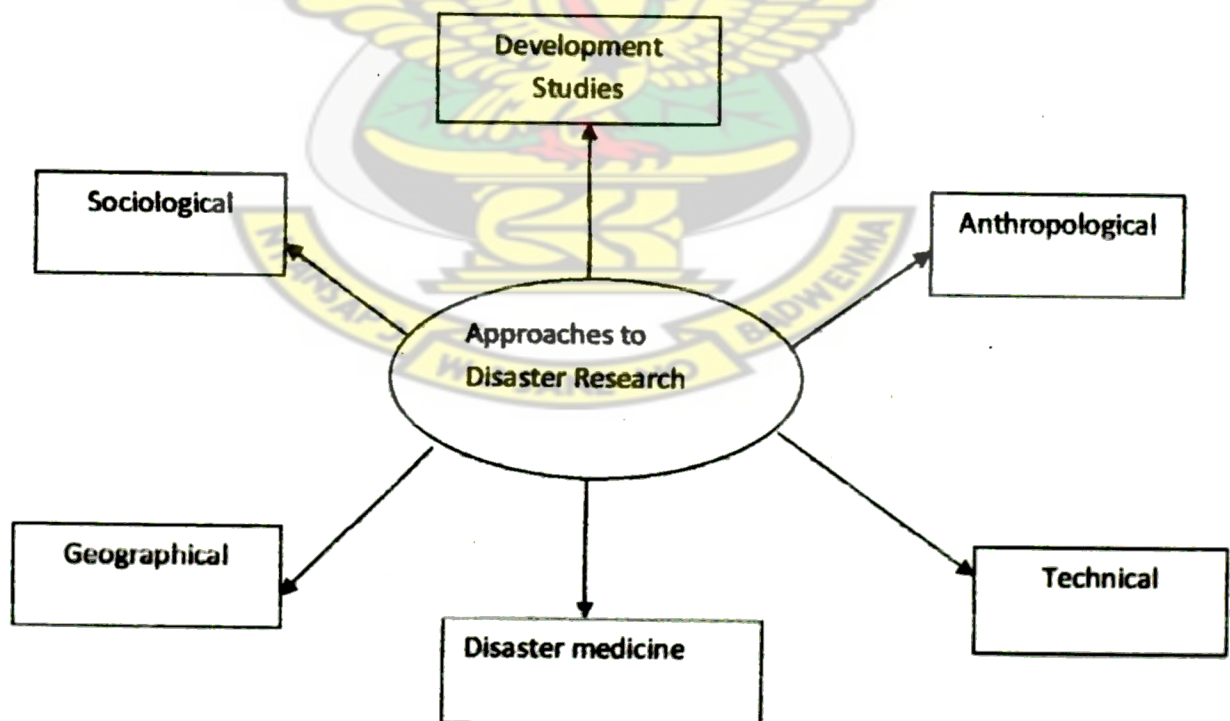
([www. Nadmo.org](http://www.Nadmo.org))

2.4 APPROACHES TO DISASTER MANAGEMENT PERSPECTIVES

Disaster is the strongest ruler of the day making colonies in each continent and at each nations of our world. Every news channel every news daily features desperate faces of disaster drawn people struck by cyclones , quakes, floods ,tidal waves , building collision ,etc. Change is only in location, nature and impact of the disaster.

Disasters have been recorded as far back as the Great flood (The Holy Bible, Genesis 7 and 41) but regular research on disaster was recorded after World War II between 1949 and 1954 at the University of Chicago (Drabek and McEntire, 2003). Alexander (1993) cited in Nasreen (2004) identified six schools of thought on natural hazards and disaster studies: the geographical approach, the anthropological approach, the sociological approach, the development studies approach, the disaster medicine approach and the technical approach.

Figure 2.1: Approaches to disaster management and research



Source: (Alexander, 1993)

The geographical approach is concerned with "... 'spatio-temporal' distribution of hazard impacts, vulnerability and people's choice and adjustment to natural hazards." Social science methods are widely used in this approach.

The anthropological approach emphasises the "role of disasters in guiding the socio- economic evolution of populations" by investigating why communities in the developing countries fail to provide basic requirements for their people's survival and the 'marginalisation syndrome' caused by impoverishment of disadvantaged groups in developing countries.

The sociological approach deals with "vulnerability and the impact of disaster upon patterns of human behaviour and the effects of disaster upon community functions and organisation" along three general thematic areas: behavioural response approach, social change approach, and political economic/environmental approach.

The development studies researches the problems of distributing aid and relief to developing countries and focuses on refugee management, health care and the avoidance of starvation.

The disaster medicine and epidemiology approach focuses on the management of mass casualties as well as the treatment of severe physical trauma and other post disaster diseases.

The technical approach focuses on geo-physical approaches to disaster such as studies in seismology, geomorphology and volcanology and seeks engineering solutions.

Among these approaches two disciplines, geography and sociology, have dominated the field of disaster research since the 1950s and have emphasised the environmental and behavioural aspects of disaster. Drabek and McEntire (2003) further posit that much of these research was "guided by ideas of collective behaviour," using sociological conceptual and analytical frameworks. This became the paradigm of quick response field studies made before, during,

and after disasters, and merged with a focus on community and organisational changes during disasters.

2.5 DISASTER MANAGEMENT PERSPECTIVES

White and Haas (1975) were some of the first to draw attention to, and build the foundation for research on the economic, social, and political aspects of adjustment to natural hazards.

Since then, the literature on disaster has transitioned between two main perspectives: the functionalist perspective and the vulnerability perspective.

The functionalist perspective, exemplified by Fritz (1961) define disaster as "actual or threatened accidental or uncontrollable events that are concentrated in time and space, in which a society, or a relatively self-sufficient subdivision of society undergoes severe danger, and incurs such losses to its members and physical appurtenances that the social structure is disrupted and the fulfillment of all or some of the essential functions of the society, or its subdivision, is prevented," (Fritz, 1961 cited in Russell, 2005). This perspective is rooted in functionalist assumptions that problems originate outside the system; are event-focused, rather than process-focused; and views disasters as beginning at the time of impact. The second perspective focuses on vulnerability and how it is created and views the causes of disaster as internal to the social order. This view looks towards society for the problems and the processes that lead to disaster. It is based on the assumption that society not a seamlessly integrated system, but characterised by inequalities and potentials for conflicts which create differentially vulnerable groups (e.g. Aldunce and Leon, 2007; Alexander *et al.*, 2006; Gounder, 2005).

Kovacs and Spens (2007) however recognise two disaster management perspectives based solely on geography: regional perspective which considers disaster management in terms of

risk management (preparation phase) crisis management (immediate response phase) and continuity planning (reconstruction phase); and extra-regional perspective which considers disaster management in terms of strategic planning (preparation phase) short-term project (immediate response phase) and long-term project (reconstruction phase).

2.6. HUMANITARIAN/RELIEF LOGISTIC

The definition of Humanitarian Logistics varies by organization depending on the objectives of the organization in question. It is however generally agreed that the common understanding of the importance of logistics leads to resource allocation for the planning, implementing and controlling the efficient, cost-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 alleviating the suffering of the vulnerable people.

Relief agencies require the right assistance to the right place at right time at the right cost. Most relief agencies face enormous challenges, among them are;

- The future and scope of humanitarian needs are increasing and changing rapidly.
- Funding is scarce and increasingly competitive.
- The stakes are high, and work is usually carried out under emergency situation with zero lead time, dangerous conditions, unreliable information, and ad hoc coordination.
- Communication (with decision-makers, staff, beneficiaries, or partnering organization) is exceptionally challenging due to lack of infrastructure, electricity, and appropriate technologies. (Cottam, Roe & Challacombe 2004 & WorldFoodProgramme, 2005)

The Fritz Institute sees Logistics as a very important aspect of relief operation due to the following reasons:

- a) The sector of humanitarian logistics management is still in formation and not yet generally recognized beyond shipping or traditional logistics.
- b) Interagency collaboration is just developing, and partners are also often competitors.
- c) Logistics serves as a bridge between disaster preparedness and response through the establishment of transport conditions. The speed of response for major humanitarian programmed involving health, foods, shelter, and receives supplies at the site of the humanitarian relief effort. (Fritz, 1961)

Since the logistics department is usually involved in the every stage of relief effort; it is a rich repository of data can be analyzed to provide post event learning.

Just like the business sector and the military, relief operations have the same needs for coordination, collaboration, visibility, and logistical information due to the fact that often human lives are at stake.

More so, these disasters often occur away from major traffic lanes. They occur in the less developed regions with inadequate infrastructure according to Long & Wood, (1995). Locations are frequently unknown until the demand occurs. Short lead times dramatically affect in inventory availability, procurement, and distribution. Transportation and supply information is unreliable, incomplete, or non-existent. Due to the high stakes, many relief operations are ad hoc and poorly structured. Recently researches have begun on the correlation between relief supply chains and both military and business supply chains. Beacon (2004) compared and

contracted the commercial supply chains and humanitarian relief chain and discourse of challenges faced by relief chain logistician In practice and research. The World Food Programme (WFP) is currently working with the logistics company TPG (Royal TPG post, the national postal operator in the Netherlands active in 23 worldwide) to bring business insights into the world of humanitarian assistance. By offering services to ensure WFP's existing logistics, TPG reduced operating and delivery costs enabling WFP to feed more people according to Shelter, (2004). Other research has focused on measurement of supply chains that function in disaster and complex emergencies.

Thomas, (2002) described a method to qualify the reliability of supply chains. Using Reliability Interference Theory (UIT), Thomas measured reliability in contingency operations, such as national disasters, that require immediate responsive operations. During the Humanitarian Logistics Conference held in the year 2003, Maria Ray, of the Georgia Institution of Technology spoke about web-based benchmarking and humanitarian logistics metrics. She was of the view that the establishment of key performance measured enables the alignment of organization's strategic objectives to its logistics strategy. Ray suggested a benchmarking to highlight areas that need more attention to determine if there are leaders in the humanitarian sector. Also, according to Long & Wood (1995) Organizations provide relief for different reasons. Government provides relief as a proxy for diplomacy and surplus grain distribution while NGOs are motivated by humanitarian concerns.

2.6.1 Humanitarian relief chain versus commercial supply chains

From the reviewed literature above, there are specific characteristics of humanitarian relief chains that differentiate them from traditional commercial supply chains. These include:

- Zero (or approximately zero) lead times, dramatically affecting inventory availability, procurement, and distribution.
- High stakes (often life-and-death).
- Unreliable, incomplete, or non-existent supply and transportation information.
- Many relief operations are naturally ad hoc, without effective performance measurement systems in place.
- Variable levels of enabling technology availability (Thomas, 2003).

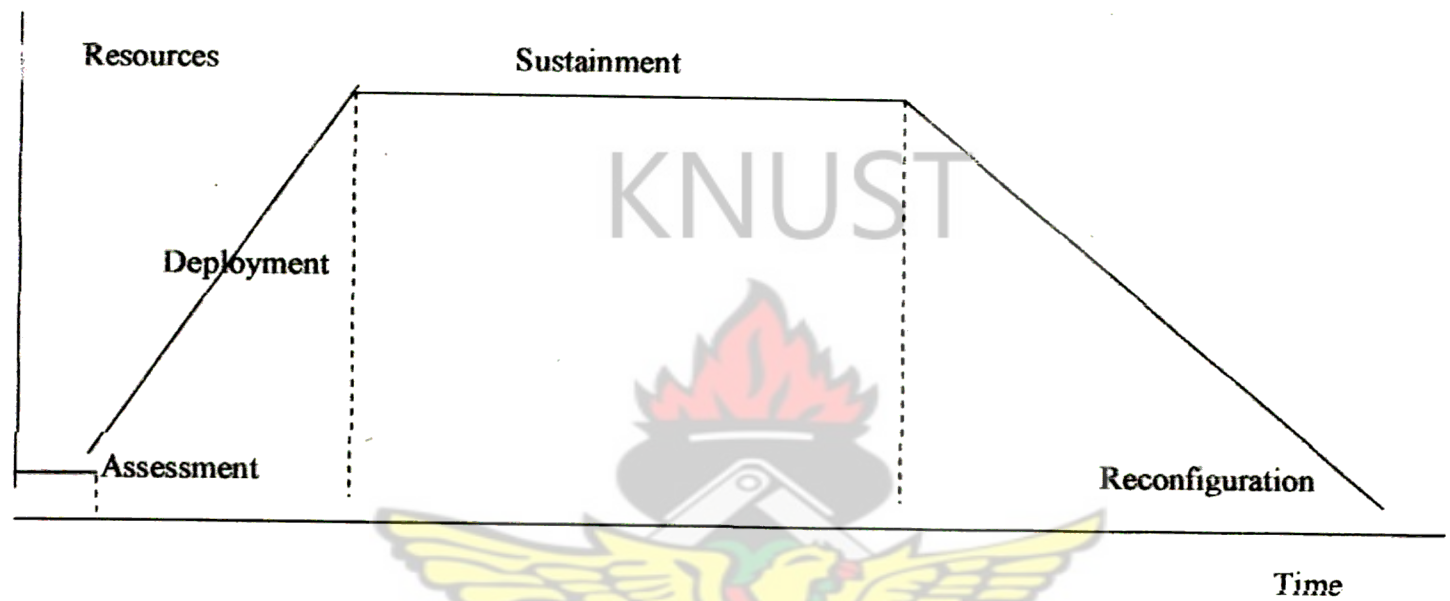
2.7 DISASTER MANAGEMENT LIFE CYCLE

One major difference between the two types of supply chains is the demand pattern. For many commercial supply chains, the external demand for products is comparatively stable and predictable. Often, for the commercial chain, the demands seen from warehouses occur from established locations in relatively regular intervals. The demands in the relief chain are supplies and people, and those demands are lumpy (they occur in irregular amounts and at irregular intervals) and occur suddenly, such that the locations are often completely unknown until the demand occurs.

It is illustrative to describe the life cycle and relative resource requirements for a relief mission. There are four distinct phases of the life cycle, the last three of which are identified by Thomas (2002): (1) assessment – minimal resources are required to identify what is needed, based on

disaster characteristics, (2) deployment - resource requirements ramp up to meet a need, (3) sustainment - operations are sustained for a period of time, and (4) reconfiguration - operations are reduced, then terminated.

Figure.2.2: Relief Mission Life Cycle



Source: [Benita M. Beamon, 2004 modified from Thomas (2002)]

A relief organization will experience this life cycle each time they respond to a disaster. It is important to note that after the reconfiguration cycle of the relief mission, another deployment cycle may occur related to the development effort. In this way, the initial relief response to a disaster may lead to additional efforts to rebuild infrastructure and ensure long-term stability in the region.

Although many of the concepts associated with commercial supply chains can be applied to humanitarian logistics, the unique characteristics of the humanitarian relief delivery process present many challenges.

Our study contributes in two major areas. First, although differences between commercial and disaster relief supply chains certainly exist, the skills and competencies required to excel in commercial supply chain and logistics management generally are the same skills and competencies that are needed to carry out disaster relief operations (University of Arkansas, 2005). Cross-learning opportunities therefore could provide agencies with significant insights into how corporations master the process of planning, implementing, and controlling their supply chain operations (Thomas and Kopczak, 2007; Van Wassenhove, 2006). The expertise, technology, and infrastructure employed in the commercial sector, for example, could contribute to the development of more effective and efficient supply chain and logistics relief operations (Thomas, 2004; Trunick, 2005). Using supply chain and logistics management literature and examples drawn from real-life cases, we contribute to literature by providing various insights into modern corporate achievements in supply chain and logistics management and then detailing how they might help disaster relief agencies improve their efforts. In particular, we highlight and identify current practices in disaster and relief supply chains; some particularities of such supply chains; challenges, or even barriers, to developing more effective and efficient relief supply chains; and the potential benefits of collaboration between corporations and disaster relief agencies

2.8 THE RELIEF CHAIN

According to Cottam, Roe & Challacombe (2004), World Food Programme,(2005), Humanitarian logistics involves delivering the right supplies to the right people, at the right place, at the right time and in the right quantities. It includes traditional supply chain activities such as planning, forecasting, procurement, transportation, warehousing and delivery, and

supplemental ones such as appeal and mobilization. The vital role of the relief supply chain is clearly seen in the context of disaster management cycle; the relief chain links all of the stakeholders in the relief process – donors, humanitarian organizations, military, governments and beneficiaries.

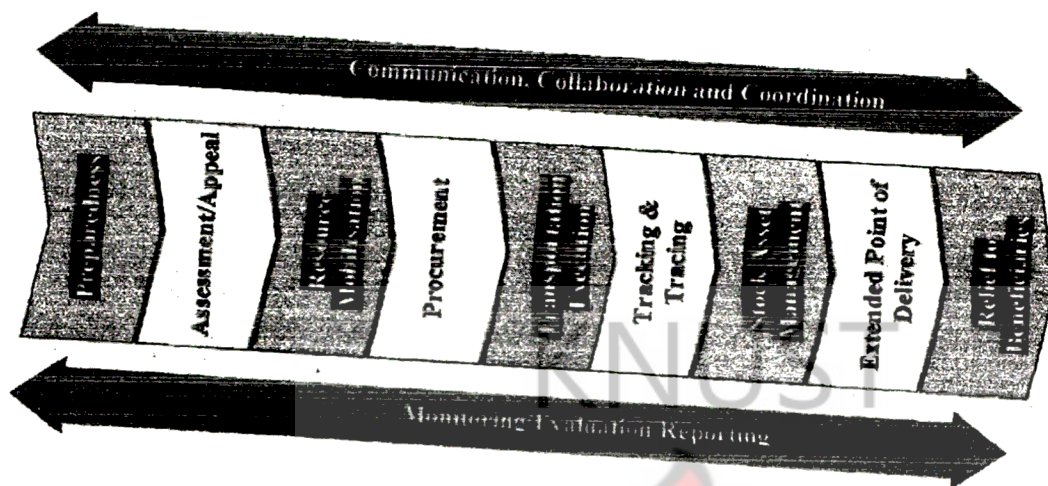
2.9 RELIEF CHAIN PROCESSES

Supply chain uses diverse models for analyses, in the traditional business setting for instance, SCC's (2006) Supply Chain Operation Review model, SCOR-model (Huan *et al.*, 2004), from which Burgess and Singh (2006) developed a framework of analysis that emphasized supply chain political relationships, using a public sector corporation as a focal organization.

In relief operations, logisticians are required to organize and implement the efforts of organizations responding to a crisis, this is not a simple matter. Often many people and large amounts of food, shelter, clothing, heavy machinery and medical supplies must be moved in and around the disaster area using many different modes of transportation. Haghani and Oh (1995) described the relief chain as a multi-commodity, multi-modal network flow problem with time windows. This is one of the most complex network flow problems in operations research. The management of this difficult supply chain directly affects program quality.

Thomas' (2004) presented the model in figure 2.3 for conceptualizing the relief supply chain for analysis

Figure 2.3: A Relief Supply Chain Model



Source: (Thomas, 2004)

2.9.1 Planning and Preparedness

Anticipating how crises would evolve is impossible, but it is advantageous to have a plan. If enough planning is in place with realistic ‘if-then-else’ cases, implementation can be less challenging according to Koech, (2005). A typical relief operation plan includes the procedures for task determination, procurement, training of personnel, assignment of responsibilities and the prepositioning of supplies (Anonymous, n. d.). Their scopes may be national or regional based on the vulnerabilities of the infrastructure the logistical support in the area, and governmental emergency response abilities (Billa *et al.*, 2006; Manyena, 2006; Perry, 2007). Olurontuba (2005) Catts and Chamings (2006) and Perry (2007) particularly concur on the view that local employees and volunteers should be given important roles because they are usually more familiar with the needs of the affected population.

2.9.2 Demand Management/Needs Assessment

Logistical needs assessment in relief chain management parallels demand management in traditional business supply chain management (i.e. demand forecasting, planning, etc). Much of the rather scanty humanitarian supply chain literature clearly show a dearth of research on needs assessment, whether conceptual or empirical (Kovacs and Spens, 2007). In practice, however, assessments are typically composed of such activities as survey data collection/interpretation, forecasting, monitoring, etc (Anonymous, n. d.). Methods used to obtain data range from visual inspection and interviews by specialists to statistical sampling and checklists. As assessments are just snapshot in time, they should be revisited and compared with previous results. An assessment reports would normally include the current food, health, water and sanitation, and shelter situation as well as capability/capacity of local resources and if any effort at coordination is underway. It may also describe how to get relief to people, the state of the roads, seaports, airports, and the costs and availability of transportation (Chaikin, 2003; Chomilier *et al.*, 2003). Without performing a basic assessment, it is difficult to know what is needed, how much is needed and where it is needed.

2.9.3 Transportation

Transportation makes it possible for assistance to reach those in need, transportation in a disaster or humanitarian emergency can run the gamut. Transportation may be military transport, commercial transport, non-commercial transport, third-party logistics firms, freight forwarders, charter aircraft, or even local beasts of burden, e.g. mules and donkeys (Young, 2006) which may be outsourced (Cottam *et al.*, 2004). Transport management decisions are typically influenced by the extent to which the disaster has affected infrastructure, relative cost

and the likelihood of shrinkage (i.e. thefts and spoilage) due to political and/or criminal issues (Scanlon, 2003).

2.9.4 Tracking and Tracing

The terms "tracking" and "tracing" are used in conjunction as they describe the process of gathering information about the current position or status of shipments. Tracking is the process of building a history of shipment movements from origin to destination. Tracing on the other hand describes the process of retrospectively determining where a shipment was during the course of a move. Tracing is particularly of potential benefits for relief SCM as it is important to know what has been promised, ordered, is on the way, or has already arrived. A lack of visibility into inbound shipments impedes the task of receiving, clearing customs, shipping to intermediate warehouses, and distribution at each step of the supply chain (Olurontuba, 2005). This is the area where software can contribute, for example, Humanitarian Logistics Software (HLS) developed by the Fritz Institute for use by the IFRC. It is a web-based solution that proved visibility from the shipping origin to the destination, this allow both the donors and the organization to have overall pipeline visibility. The web-based nature of HLS speed up information sharing and allows logisticians the opportunity to plan appropriately for customs, off-loading labor and transportation requirements.

2.9.5 Inventory Management

In the relief chain, stock collection sites can act as transshipment points, warehouses, and as places to prepare and pack goods. They could be located in impacted areas or near ports, border crossings, or airports. This is where and when notifications of the receipt of goods are sent,

records of inbound supplies maintained, and supplies secured to prevent shrinkage (theft and spoilage). Reverse logistics can take place where contaminated goods are returned, given to livestock, or destroyed (Olurontuba, 2005).

The last two links in the chain encompass the last mile of relief work. An extended delivery point is an inland destination close to the affected area where goods can be staged before the final distribution of relief to beneficiaries. In most relief operations, supplies are brought close to the refugee camps for storage. Daily relief organizations bring food aid to camps, prepare it if necessary and disperse it, humanitarian logistics endeavors to bring assistance to people affected by a disaster. The assistance must be distributed to those who truly need it in proportion to their needs in a culturally appropriate manner. To ensure these conditions are met there must be monitoring not only at the storage stage but throughout the distribution of supplies. They take care to ensure vulnerable population receive their share of the food distribution, this can take the form of distribution via identity cards or by giving female heads of household food for the family.

2.9.6 Monitoring, Evaluation, and Reporting

There is an increasing trend for stakeholders to demand accountability from relief organizations (Davison, 2007; Gray *et al.*, 2006; Parson, 2002; Unerman and O'Dwyer, 2006). To meet the informational demands of both internal and external stakeholders, effective monitoring, evaluation and reporting must be taken seriously by relief organizations. Monitoring is the regular collection, analysis, and utilization of information about the supply chain performance.

Evaluation is the periodic assessment of the relevance, efficiency, effectiveness, impact, and sustainability of the supply chain.

It is done in order to adapt the supply chain to current circumstances. Reporting is completed after information has been collected, compiled and summarized. The information is used to formulate conclusions and recommendations for the supply chain. According to Beamon (2004) and Beamon (1999) most humanitarian organizations do not measure their relief chains performance beyond the time from order to delivery. She proposed that humanitarian organizations could measure their relief chain's budget performance, velocity performance, efficiency, and quality. Monitoring and evaluation create the information base for decision-making during the implementation of the relief chain. At least, a simple monitoring system enables management and staff to evaluate the differences between planned and actual performance. The difficulty for humanitarian organizations is that information technology (IT) system that can provide the data necessary to correct performance are expensive and require training. Many relief organizations prefer to spend their money on programs rather than IT systems. Regrettably, the quality of relief provided suffers in the end because institutions do not have a clear picture of their own performance.

2.9.7 Communication, Collaboration and Coordination

Communication is often difficult in a disaster setting, but it can make all the difference. Accurate information or even just visibility into the rest of the relief chain helps. Humanitarian organizations often use the terms collaboration and coordination interchangeably. Collaboration however conveys cooperation between two or more agencies along a single relief chain or network of supply chains, while coordination denotes the organization of efforts by a group.

Congestion often limits the availability of relief supplies. Competition for locally available commodities and services (such as trucking or housing) can drive prices up (Perry, 2007; Thomas and Fritz, 2006).

Coordination can be strategic, in pursuit of a common policy or strategy, or it can be operational, such as regular sharing of logistics or programme information. Effective coordination begins before a disaster occurs and continues throughout the event (Kaatrud *et al*, 2003). Coordination strives to prevent duplication of efforts between different aid organizations; at best, it ensures all of them fit into a coherent and successful response. Even though coordination is usually seen in a positive light, it is not without pitfalls to individual humanitarian organizations. As operators in what Parson (2002) calls "charity market" they must all generate and sustain resources in order to survive. Fundraising strategies depend on skills such as the marketing of suffering, enhancing image, buying donor fashions, competing for credit and visibility, and selectively avoiding coordination mechanisms. These observations notwithstanding, advantages can be found in pooling information and resources and in forming alliances that allow each organization to contribute its core competence. While these advantages are significant, Holmes (2007) cautions that care must be taken to ensure that impartiality and independence, both fundamental principles of humanitarian assistance, are not compromised.

2.10 CONCEPTUAL FRAMEWORK

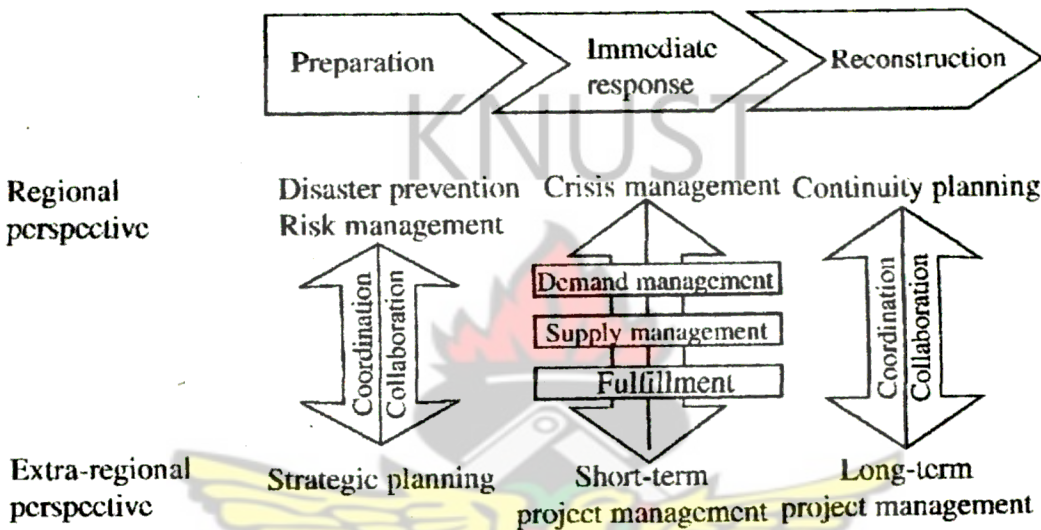
If the research field of humanitarian logistics is relatively virgin (Kovacs and Spens, 2007) then SCM orientation in humanitarian operations is even more pristine. Following the Asian tsunami

in 2004 SCM was publicly acknowledged to play an extremely important role in relief logistics (Thomas and Kopczak, 2005) yet many organisations continue to underestimate the importance of SCM in disaster relief operations and still focus on fundraising activities only (Murray (2005) cited in Kovacs and Spens (2007).

So far no dedicated journal exists, nor has any journal or other outlet been identified that focuses on this important genre. Moreover, academic literature on humanitarian logistics tends to concentrate on the preparation phase of disaster relief while donors focus on the immediate response phase immediately after a disaster (Russell, 2005; Buatsi, 2007) even though all three phases of humanitarian SCM - preparation, immediate response, and reconstruction are important in overcoming the vagaries of disasters. Obviously, military, humanitarian and business logistics have important learning to do from each other (Ernst, 2003; Kovacs and Spens, 2007; Peck, 2005; Sheffi, 2002) albeit to differential extents, since it is argued that the aid sector is old-fashioned and still regards SCM as a necessary expense. It also lacks operational knowledge and has insufficient investments in technology and communication as well as knowledge of the latest methods and techniques, e.g. mathematical modeling (Gustavsson, 2003; Buatsi, 2007; Oduro, 2007). There is usually a shortage of SCM experts; the supply chain processes are largely manual; assessment and planning are inadequate; and limited collaboration and coordination are not uncommon. In the light of the foregoing, simple but comprehensive frameworks are direly needed to promote research in relief SCM as well as assist practitioners in their work. There are a number of models for analyzing commercial supply chains (e.g. Cooper *et al.*, 1997; Croxton *et al.*, 2001; Lambert *et al.*, 1998; SCC 2006)

but only a few for the aid sector (e.g. Thomas, 2004; Rytla and Spens, 2006; Perry, 2007) most of which are based on research related to 2004 tsunami.

Figure 2.4: A framework of disaster relief logistics



Source: Kovacs and Spens (2007)

The conceptual framework adopted in this research is that of Kovacs and Spens (2007) depicted in figure 2.4 above. Their humanitarian SCM model is based on a topical literature review of academic and practitioner journals to draw parallels between SCM and business SCM. Being conceptual in nature, this work is an empirical research to test the practicability of the framework. It is hoped the outcome of this work would provide practitioners with a tool for planning and carrying out humanitarian operations in order to provide the "right people, equipment and material, in the right place, in the right sequence as soon -as _possible, to deliver the maximum relief at the least cost - saved lives, reduced suffering and the best use of donated funds" (CIL T, 2006).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter discusses how the research was carried out. It comprises the following sub-headings; the research design, sample and sampling technique, data collection instruments, validity and reliability of the instrument, research procedure and data analysis.

3.2 RESEARCH DESIGN

A case study research design within Northern Region was adopted for the study in order to carry out an in-depth evaluation of SCM principles and processes adopted by NADMO in disaster management. Notwithstanding its weakness of limited extrapolation, this design was adopted because it is one of the best for obtaining reliable and relevant research results for application to similar organizations.

(Saunders et al, 2007)

3.3 POPULATION

The total population of 1400 people consisting of the three communities, namely; Gumani, Kpalsi and Nyanshegu with population of 350, 480 and 570 respectively was targeted for the study.

3.4 SAMPLING METHOD AND SAMPLE SIZE

The three communities were clustered on community base, that is, Gumani, Kpalsi and Nyanshegu. Random sampling was used in selecting the respondent in each of the communities. Every third household was randomly selected to administer the questionnaire.

In all 420 people were sampled from the three communities.

3.5 DATA COLLECTION INSTRUMENTS

Data was collected using a semi- structured self –administered questionnaire for A semi-structured self-administered questionnaire for NADMO staff and management (see appendix D) and a 5-point likert-type scale close-ended questionnaire for beneficiaries (see appendix E) . For the views of relief actors, ten persons from NADMO Head Office were selected for structured interview as NADMO collaborators Perception statements were adopted from Russell (2005) and other literature related to humanitarian logistics and SCM. These were adapted to suit the Ghanaian socio-cultural situation. The items on the beneficiary questionnaire had options that best suited the extent to which they agreed with the statements (1=strongly disagree, 2=disagree, 3=agree, 3=strongly agree 5= didn't receive any).

3.6 VALIDITY AND RELIABILITY OF THE INSTRUMENTS

To ensure that the data collection instruments were actually measuring intended metrics (i.e. validity) initial queries and consultations were made with field and management relief workers,

course mates and research supervisor. The questionnaires were also pre-tested among target group to fine-tune them, albeit on a limited scale.

Methods for qualitative studies as described in Creswell, 2003. Specifically, triangulation, recognition of bias, findings of negative or discrepant information, the use of peer debriefing, and the use external auditors (Creswell, 2003:196) will help bring validity to the study.

3.7 DATA ANALYSIS

Data were computer-analyzed with the aid of SPSS package. ANOVA (analysis of variance) was used because data was categorical and ordinal or nominal (Saunders et al, 2007).

The overall beneficiaries satisfaction of NADMO's response to the flood were analysed as a dependent outcome against three critical factors: timeliness, suitability and adequacy.

3.8 ORGANIZATIONAL PROFILE OF NATIONAL DISASTER MANAGEMENT ORGANIZATION (NADMO)

3.8.1 History

In the 1980's it was observed that the number of disasters and their impact were increasing world wide. This situation alarmed the United Nations Organization, which held various conferences on the issue, leading to the UN Declaration GAD 44/ 236 of 1989 declaring the 1990s (1990-1999) as the International Decade for Natural Disaster Reduction (IDNDR) .The IDNDR was brought into force to increase the awareness of the general public to the need for

disaster prevention and encourage member states to establish agencies to manage disasters. The Yokohama strategy for a 'safer world' and Plan of Actions for the second half of the Decade were introduced to place greater emphasis on public awareness of issues facing vulnerable communities as well as programmes that promote community based approaches to vulnerability reduction.

In response to the declaration, Ghana created the National Disaster Management Organization (NADMO) by Act 517 of 1996, to manage disaster and similar emergencies. The organization started operating in January 1997, prior to that, there was an adhoc committee, the National Disaster Relief Committee that provided relief and other logistics to assist communities affected by disasters. This committee operated under the Ministry of Interior, under the Chairmanship of the late (Brig. Rtd.) Dr. G.K. Dei, the then commanding officer of 37 military hospital. Representatives were drawn from the Ministries of Health, Finance, Social Welfare, Interior, Information, National Mobilization Programme (NMP), Ghana Armed Forces, NGOs among others.

The National Mobilization Programme (NMP) which was established after the 1982- 1983 crisis of drought, bushfires, famine and deportation of 1.2 million Ghanaians from Nigeria, served as the implementing Agency of the Disaster Relief Committee until 1994.

NADMO was then established with Mr. Kofi Portuphy who was a member of the relief committee and instrumental in coordinating the drafting of the Act, as its first National Coordinator (Jan 1997- June 2001). He was succeeded by Brigadier General (Rtd.) Joseph Osei (June 2001- Aug 2006) who was also succeeded by Hon. George Isaac Amoo, former member of parliament for Ayawaso West Wuogon (Aug 200 to date)

3.8.2 Mission

- To manage disasters by coordinating the resources of government institutions and developing the capacity of voluntary community based organizations to respond effectively to similar organizations
- To set u a monitoring system to aid the identification of disasters in the formative stages with the capacity to disseminate same for public consumption and awareness

3.8.3 Objectives

Disaster management focus

- To create and equip the organization to handle all aspects of disasters in Ghana
- To focus on preventive aspects of disaster as a means of reducing the effects of their occurrence on society
- To provide the first line initiative in the event of disaster.
- To assist in rehabilitation and reconstruction effort after disaster.
- To assist and motivate community based organization to serve as voluntary organizations to assist in fighting disasters.

3.8.4 Social mobilization / employment focus

- To harness material and human resources of communities to develop the potentials and strengths especially in agricultural development

- To mobilize and train the youth and unemployed for the purpose of equipping them with the necessary know-how to enable them assist in managing disasters and also enhance their potentials in various economic activities
- To assist communities to understand and participate in government programmes and activities
- To sensitize communities to contribute towards the provision of social amenities

Source: www.madmo.org



- To mobilize and train the youth and unemployed for the purpose of equipping them with the necessary know-how to enable them assist in managing disasters and also enhance their potentials in various economic activities
- To assist communities to understand and participate in government programmes and activities
- To sensitize communities to contribute towards the provision of social amenities

Source: www.nadmo.org

KNUST



CHAPTER FOUR

DATA ANALYSIS AND DISCUSSIONS

INTRODUCTION

This chapter discusses the analyses of data collected.

4.1 NADMO's ACTION PLAN FOR DISASTER MANAGEMENT

NADMO had a well planned disaster management plan according to the various disaster management phases. Below shows the activities of the Organization

The activities of the organization under the various phases of disaster were as follows;

A Pre Disaster phase

(These are the activities we undertake to prevent man-made disasters and minimize the effect of natural ones).

These activities included;

- Identification of hazards or emergency situations that may degenerate into disasters.
- Education and Training for awareness creation and skill acquisition for disaster prevention and management.
- Acquisition of relevant data and basic reference materials designing and equipping of emergency operations and casualty centres and earmarking of spaces for relocation of victims.
- Identification, acquisition and storage of resources needed in relief programmes
- Purchase and storage of relief items.

- Identification and preparation of data base on collaborating institutions or agencies.
- Formation and training of volunteer corps.
- Recommendations on storage of supplies and emergency care training needs of health personnel and volunteers.

B Emergency Phase

These are immediate measures we undertake to meet the requirement of victims. These included the following;

- Formation of task force.
- Assessment of disaster and registration of victims.
- Search and rescue operations.
- Evacuation of victims and provision of food, shelter clothing and medical reliefs.
- Emergency shelter and protection of victims.

C Post Disaster Phase

- Reconstruction of permanent structures for accommodation.
- Promotion of self reliance/income generation activities e.g. provision of agricultural production package.
- Restoration of utility services.

4.2 PRE-DISASTER PHASE PREPARATION

The first phase of the SCM is the preparation stage which involves forecasting demand for, and pre-positioning of relief items. NADMO undertook disaster impact assessment in the areas affected. This enabled it to know the immediate, medium and long-term needs of the victims.

This information was used by the Government to assist the victims to regain their livelihoods, and thereby strengthening their resilience to the impacts of disasters. In a bid to identify the urgent needs of the affected population, a joint UN/NGO/Government assessment was conducted from 17 to 20 September 2007 and coordination meetings were held in Accra with the participation of UN/NGO/UNDAC team. The Relief Operation will assist 75,000 vulnerable individuals, who have been directly affected by a recent wave of floods in vulnerable regions of the Republic of Ghana (15,000 in upper east, 50,000 in northern region and 10,000 in upper west).

The total Central Emergency Respond Fund (CERT) funding of \$2.5 million will be used to cover drugs, food and non-food items for approximately 75,000 men, women, adolescents and children in the affected districts.

Initial field assessments carried out by the Government through the National Disaster Management Office (NADMO), and partners estimated that 260,000 people had been affected, and 20 killed including the destruction of houses, crops, roads and other public infrastructure. Disrupted infrastructure is a major impediment to accessing the affected areas and the distribution of relief assistance.

Final field assessments carried out by the Government through the National Disaster Management Office (NADMO), and partners estimated that 332,600 people had been affected, and 56 killed. (Ghana News Agency, Sept 8 2007: Northern Ghana NADMO dispatches Rescue Teams)



Source: UN office for the Coordination of Humanitarian Affairs (OCHA) and Government of Ghana
(available at ochaonline.un.org)

Material damage reported includes the destruction of houses, crops, roads and other public infrastructure. Disrupted infrastructure is a major impediment to accessing the affected areas and the distribution of relief assistance. Most of the affected populations have been relocated to school buildings, while some families are staying with relatives and friends. There is an urgent need to relocate families hosted in schools to alternate shelters to avoid further delays in opening of the school year which should have started on 11 September. (United Nations Office for the Coordination of Humanitarian Affairs (OCHA) available at www.ghanaweb.com)



Source: UN office for the Coordination of Humanitarian Affairs (OCHA) and Government of Ghana (available at ochaonline.un.org)

4.3 IMMEDIATE RESPONSE PHASE

Flooding in the Upper East Region, Upper West Region, Northern Region and parts of the Western Region have affected 332,600 people and caused the death of 56. According to NADMO, some 35,000 houses, 1,500 kilometres of road and thousand hectares of crops have been destroyed. During recovery, destroyed infrastructure (roads, bridges, houses) were reconstructed in such a way that they are stronger than they were in the pre-disaster period. Risks are therefore reduced. Presently, the Ghana Government has set up a reconstruction task force to oversee the reconstruction of roads and bridges destroyed by the 2007 floods. It is also to assist all those who lost their houses to re-build them. (Relief Web Document Ghana: Situation report on floods, 11 October 2007 available at www.reliefweb.int)



Source: UN office for the Coordination of Humanitarian Affairs (OCHA) and Government of Ghana (available at ochaonline.un.org)

4.3.1 Food and Non- Food Response

Food is identified as one of the major needs, with vulnerable populations in the affected areas resorting to one meal per day as a coping mechanism. Market prices have doubled for most commodities. Lack of safe drinking water remains another major concern. Moreover, health workers report an increase in the number of malaria and diarrhoea cases. Immediate needs include food, safe drinking water, mosquito nets, medicines, shelters, sanitation kits.

To address the issue of protection and the associated risks of over crowding, (i.e. rapid spread of communicable diseases, exposure of the most vulnerable, especially women and children to sexual exploitation and abuse,) Immediate sector interventions focused on providing temporary shelter and the distribution of Non Food item packages. In two major operations items such as tents, kitchen sets, jerry cans, blankets, sleeping mats, and soap were distributed to a 1,000 most vulnerable families while another 10,000 families received mosquito nets, blankets, tarpaulin, sleeping mats, soap, jerry cans, tents, buckets, basic farming tools, and some building materials. These distributions were made available by UNHCR and IOM through the Red Cross respectively. The sector also undertook the following activities: -

- Distribution of food items.
- Community sensitization on hygiene, sanitation & health promotion.
- Construction of a health post in one community.

The sector also made 9 Trucks available for transporting items to the communities. As the humanitarian activities move beyond the emergency stage, the construction of a two bedroom house each for 320 families has started in some communities. Plans are underway to build extra houses for 55 families. The Sector actors are also establishing new operational alliances with non traditional partners for more support.

4.3.2 Health

The sector focused its response on malaria prevention and treatment, provision of ORS for diarrhoea control, and ensuring access to quality basic health services in flood-affected areas. In order to enhance the health services capacity treating an eventual cholera outbreak, ringer lactate was supplied to health facilities. Efforts to prevent malaria were intensified and some 50,000 insecticide treated nets (ITN) and 50,000 doses of ACT were distributed in the three affected regions. Reproductive health kits have also been supplied. Training of Community based "Disease Surveillance Volunteers" and the retraining of Ghana Health Service field staff to ensure detection of cholera and assist in the distribution of health and nutrition supplies will be done in 2008.

4.3.3 Education

The immediate response of this sector consisted of the supply of items including teaching and learning materials and tarpaulin to ensure continuation of education in the affected areas. Detailed assessments were carried out in all three regions to gather better information on the actual damage and status of education. These assessment reports identified a total of 217 schools as having been, however recent figures were lower. A medium-term response plan was prepared to undertaking a technical assessment and construction of temporary learning spaces. Sector lead will provide support for the construction of 35 semi-permanent three-classroom pavilions that can later be fully constructed and upgraded into permanent structures. Construction should be completed during the first quarter of 2008.

4.4 DEMOGRAPHIC ANALYSIS OF RESPONDENTS

This section discusses the age, sex and occupation of respondents. It goes further to compare the sex with age and occupational distribution of the respondents.

4.4.1 Age Distribution of Respondent

Table 1: Age Distribution of Respondent

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 18-30	39	25.8	25.8	25.8
31-45	57	37.7	37.7	63.6
46-60	55	36.4	36.4	100.0
Total	151	100.0	100.0	

Source: Author’s field study

Data collected from the field shows that 39 of the respondents representing 25.8% fall within the ages of 18 to 30 years. 57 fall within the ages 31 to 45 years and 55 falls within the ages of 46 to 60 years representing 37.7% and 36.4% respectively.

4.4.2 Sex Distribution of Respondents

Table 2: Sex Distribution of Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Female	36	23.8	23.8	23.8
Male	115	76.2	76.2	100.0
Total	151	100.0	100.0	

Source: Author's field study

Table 2 shows the sex distribution of respondents. Data collected from the field shows that 36 of the respondents representing 23.8% are female and 115 (76.2%) are male.

4.4.3 Occupational Analysis of Respondents

Table 3: Occupational Analysis of Respondents

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid unemployed	24	15.9	16.2	16.2
farmer	88	58.3	59.5	75.7
trader	36	23.8	24.3	100.0
Total	148	98.0	100.0	
Missing System	3	2.0		
Total	151	100.0		

Source: Author's field study

Table 3 shows the occupational distribution of respondents. Out of the 151 respondents, 24 are unemployed, 88 are farmers and 36 are traders representing 15.9%, 58.3% and 23.8% respectively.

4.4.4 Comparison of Sex and Age Distribution of Respondents.

Table 4: Comparison of Sex and Age Distribution of Respondents

	Age			Total
	18-30	31-45	46-60	
Sex Female	9	6	21	36
Male	30	51	34	115
Total	39	57	55	151

Source: Author’s field study

This table indicates that female respondent between ages 18 to 30 are 9, 6 between the ages of 31 to 45 years and those between the ages of 46 to 60 years are 21. The number of male respondents falling between ages 18 to 30 years, 31 to 45 and 46 to 60 years are 30, 57 and 55 respectively.

4.4.5 Comparison of Sex and Education Distribution of Respondents.

Table 5: Comparison of Sex and Education Distribution of Respondents

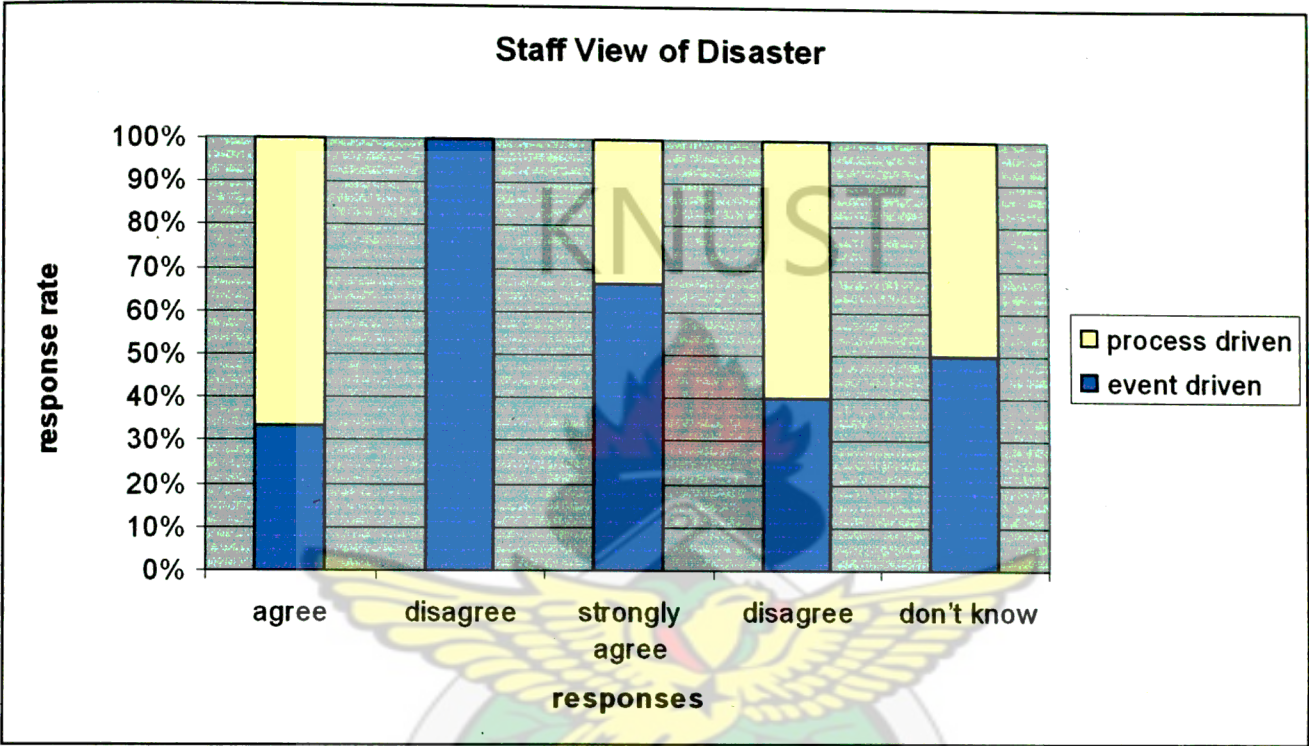
		Highest Education Attained					Total
		elementary/basic	certificate/advance	diploma/HND	university degree	none	
Sex	Female	12	15	0	6	3	36
	Male	40	48	3	6	15	112
Total		52	63	3	12	18	148

Source: Author’s field study

Table 5 compares the sex and education distribution of respondents. The number of female with elementary or basic education is 12 while male is 40. 15 female had a certificate advance (Cert. A) while 48 males had Cert. A, makes a difference of 33 more than female. No female had an HND or diploma but 3 male had an HND/ Diploma. The number of female with university degree was 6 which were the same as the male. 3 female respondents had no education and 15 male respondents said they had no formal education. Further observation reveals that the ratio of sex to education that is male to female is 112: 36. Thus it can be concluded that the more males have formal education than females. This could be attributed to the fact that girl-child education is low in the Northern part of Ghana.

4.5 DISASATER MANAGEMENT PERSPECTIVE

Table 6: Staff View of Disaster



In trying to know the management perspective of NADMO, out of the responses on how staffs view disaster, 45.45% out of the 10 interviewed agree to the statement that disaster is an uncontrollable event. Followed by, 18.18% who strongly agreed that disaster is an uncontrollable event.

4.6 EFFECTIVENESS OF NADMO's RESPON IN THE 2007 NORTHERN FLOODS

This section describes the factors that affect beneficiaries' satisfaction in NADMO's response rate in the 2007 Northern floods. It goes further to explain the critical success factors that affects the effectiveness of NADMO's responses.

4.6.1 Impact of NADMO's Timely Delivery of Relief Items on Beneficiaries' Satisfaction

Table 6: Timeliness of relief items on Beneficiaries' Satisfaction

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.212	.191		1.109	.269
Food arrived at time needed	.102	.044	.115	2.339	.021
Clothing arrived at time needed	.322	.075	.351	4.315	.000
Building materials arrived at the right time	.290	.067	.307	4.358	.000
Farm input i received arrived at the right time	.217	.064	.226	3.407	.001

a. Dependent Variable: Beneficiaries' Satisfaction

Source: Author's field study

The table 6 describes how timeliness of NADMO’s response in the delivery of relief items affects beneficiaries’ satisfaction. Beneficiaries rank timely delivery of relief items as follows; Clothing (32.2%), Building materials (29%), Farm inputs (21.7%) and Food (10.2%) and they are all statistically significant in explaining the variations in the level of beneficiaries’ satisfaction. It can be observed from the table above that a 1% change in timely delivery of food items will cause 0.102% change in beneficiary satisfaction. The timeliness of food delivery has the least impact on beneficiary’s satisfaction. This could be attributed to the fact that most of the respondents are farmers reference to table 3 (58.3% farmers) so there have food stuffs in their farms. It can be observed again that, timeliness arrival of clothing is the highest rank with 32.2% thus, the highest impact on beneficiary satisfaction.

ANOVA 6

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	168.423	4	42.106	75.825	.000 ^a
	Residual	81.074	146	.555		
	Total	249.497	150			

a. Predictors: (Constant), Farm input i received arrived at the right time, Food arrived at time needed, Building materials arrived at the right time, Clothing arrived at time needed

b. Dependent Variable: My greatest needs and that of my household were met

Source: Author’s field study

The table above shows that the model is statistically significant. This means the model is a good fit in explaining the variation. Thus, timeliness is a critical success factor in determining beneficiaries' satisfaction level of NADMO's response rate.

4.6.2 Impact of NADMO's delivery of Adequate Relief Items on Beneficiaries'

Satisfaction

Table 7: Adequacy of relief items on Beneficiaries' Satisfaction

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	.136	.211		.642	.522
Food distributed was right quantity	.287	.057	.311	5.071	.000
Clothing and bedding distributed was quantity I needed	.157	.063	.161	2.505	.013
Building materials was the quantity I needed	.110	.074	.112	1.478	.142
Farm input was at the right quantity	.416	.074	.411	5.585	.000

Table 7: Adequacy of relief items on Beneficiaries' Satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.136	.211		.642	.522
	Food distributed was right quantity	.287	.057	.311	5.071	.000
	Clothing and bedding distributed was quantity I needed	.157	.063	.161	2.505	.013
	Building materials was the quantity I needed	.110	.074	.112	1.478	.142
	Farm input was at the right quantity	.416	.074	.411	5.585	.000

a. Dependent Variable: My greatest needs and that of my household were met

Source: Author's field study

The table 6 describes how adequacy of NADMO's response in the delivery of relief items affects beneficiaries' satisfaction. Beneficiaries rank timely delivery of relief items as follows Farm inputs (41.6%), food (28.7%), clothing (15.7%), and building material (11%) and they are all statistically significant in explaining the variations in the level of beneficiaries' satisfaction.

It can be observed from the table above that a 1% change in timely delivery of farm input will cause 0.416% change in beneficiary satisfaction. The timeliness of food delivery has the least impact on beneficiary's satisfaction. This could be attributed to the fact that most of the respondents are farmers reference to table 3 (58.3% farmers) so there have food stuffs in their farms. It can be observed again that, adequate farm inputs are the highest rank with 41.6% thus, the highest impact on beneficiary satisfaction.

The quantity of building material was not a determinant of respondent's satisfaction of NADMO's response to the flood because most of respondent said during the disaster most of their farms were destroyed so they needed enough farm inputs to farm since their main livelihood is farming.

ANOVA 7

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	146.594	4	36.649	51.998	.000 ^a
	Residual	102.902	146	.705		
	Total	249.497	150			

a. Predictors: (Constant), Farm input i received arrived at the right time, Clothing and bedding distributed was quantity i needed, Food distributed was right quantity, Building materials was the quantity i needed

b. Dependent Variable: My greatest needs and that of my household were met

Source: Author's field study

The ANOVA table above shows that the model is statistically significant. This means the model is a good fit in explaining the variation. Thus adequacy is a critical success factor in determining beneficiaries' satisfaction level of NADMO's response rate.

4.6.3 Impact of NADMO's delivery of Suitable Relief Items on Beneficiaries' Satisfaction

Table8: Suitability of relief item on Beneficiaries' Satisfaction

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.445	.200		2.231	.027
	Food distributed was what was needed	.227	.069	.251	3.308	.001
	clothing were what i needed	.089	.072	.100	1.232	.220
	Building materials was what i truly needed	.158	.078	.162	2.039	.043
	Farm inputs i received was what i needed	.360	.076	.375	4.714	.000

a. Dependent Variable: My greatest needs and that of my household were met

Source: Author's field study

Table 8 shows the dependency of suitability of relief items provided by NADMO on beneficiaries' satisfaction. A ranking of relief items which were critical in determining beneficiaries' satisfaction puts farm input as the most important relief item. ($p < .001$) that is to say a 100% change in farm inputs in terms of suitability will cause a 36% change in beneficiaries' satisfaction level. Next to farm input is food (22.7%) followed by building materials (15.5%). Suitability of clothing was not considered a factor in determining satisfaction of beneficiaries. This can be attributed to responses of beneficiaries that what was important to them was to get the right farm inputs, food and building materials. Food was a critical factor because of cultural differences and taste acquired for certain kinds of food, farm inputs because farming is their main occupation. Clothing was not important to them all they wanted was clothing and not the kind of clothing whether it was trendy (fashionable) or not.

ANOVA 8

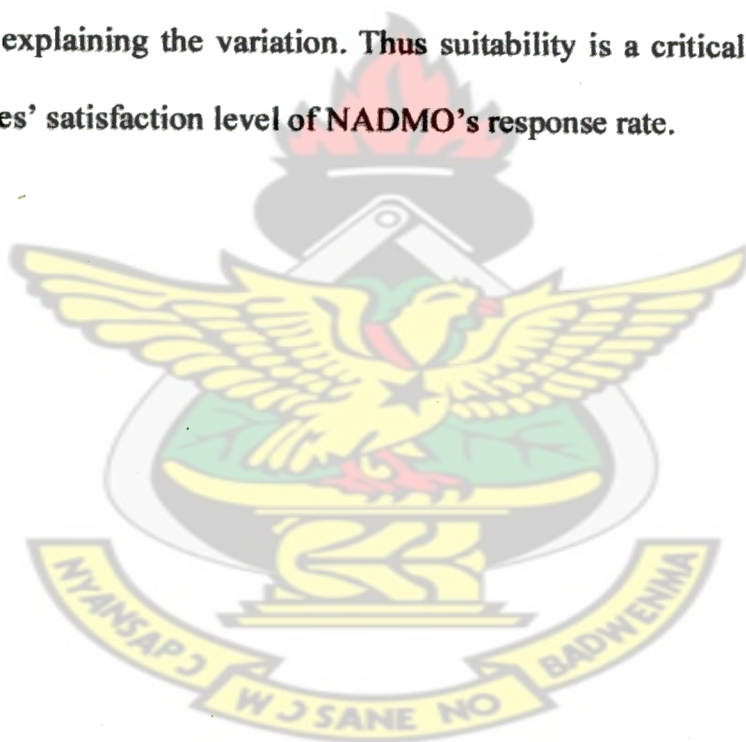
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	152.345	4	38.086	57.236	.000 ^a
Residual	97.152	146	.665		
Total	249.497	150			

a. Predictors: (Constant), Farm input was at the right quantity, Food distributed was right quantity, Clothing and bedding distributed was quantity i needed, Building materials was the quantity i needed

b. Dependent Variable: My greatest needs and that of my household were met

Source: Author's field study

The ANOVA table above shows that the model is statistically significant. This means the model is a good fit in explaining the variation. Thus suitability is a critical success factor in determining beneficiaries' satisfaction level of NADMO's response rate.



4.6.4 Impact of Timeliness, Adequacy and Suitability of relief items on NADMO's response rate

Table 9: Timeliness, Adequacy and Suitability of relief items on NADMO's response rate

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	2.091	.386		5.412	.000
relief items arrived at the right time(food,clothing, building materials and farm input)	.280	.078	.281	3.604	.000
adequacy of relief items (food,clothing, building materials and farm input)	.153	.082	.156	1.882	.062
suitability of relief items (food,clothing, building materials and farm input)	-.062	.080	-.064	-.771	.442

a. Dependent Variable: My greatest needs and that of my household were met

Source: Author's field study

Analyses of table 9 shows that responses gathered from questionnaires administered to beneficiaries to measure their satisfaction with NADMO's intervention – in terms of timeliness, quantity and suitability – was used to gauge the level of effectiveness and success of the NADMO's relief supply chain management. Generally, beneficiaries were by far more satisfied with the timeliness (28%) of relief supplies distributed than with adequacy (15.3%) which was in turn better appreciated than suitability (6.2%) in the immediate response phases.. In most cases, demographic features like age, occupation and educational background of respondent significantly affected the degree of satisfaction of beneficiaries with timeliness, quantity and suitability of relief,

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.587	3	8.529	5.555	.001 ^a
	Residual	227.229	148	1.535		
	Total	252.816	151			

a. Predictors: (Constant), suitability of relief items (food,clothing, building materials and farm input), relief items arrived at the right time(food,clothing, building materials and farm input), adequacy of relief items (food,clothing, building materials and farm input)

b. Dependent Variable: My greatest needs and that of my household were met

Source: Author's field study

The ANOVA table above shows that the model is statistically significant. This means the model is a good fit in explaining the variation. Thus timeliness, suitability and adequacy are critical success factors in determining beneficiaries' satisfaction level of NADMO's response rate.

4.7 AGE DISTRIBUTION OF BENEFICIARIES'S SATISFACTION

4.7.1 Age Distribution of Beneficiaries satisfaction in terms of timeliness

Table 10: Age Distribution of Beneficiaries satisfaction in terms of timeliness

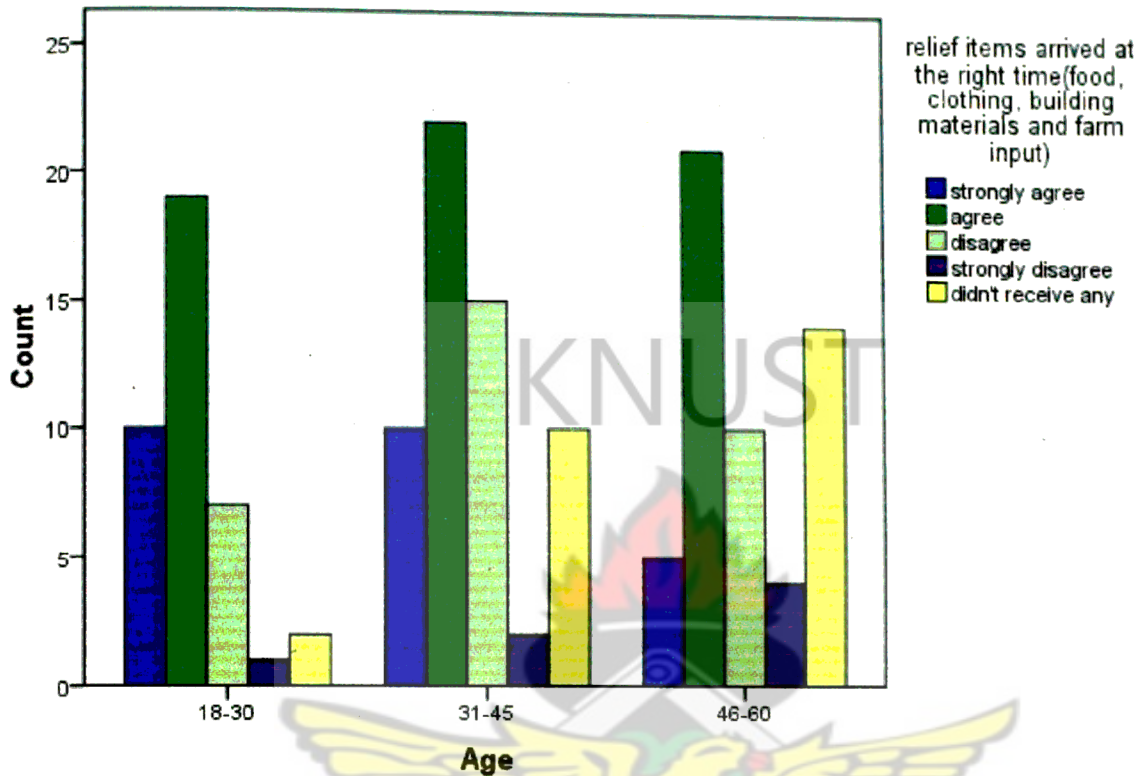
Age * relief items arrived at the right time(food,clothing, building materials and farm input)

Crosstabulation

Count							
		relief items arrived at the right time(food,clothing, building materials and farm input)					Total
		strongly agree	agree	disagree	strongly disagree	didn't receive any	
Age	18-30	10	19	7	1	2	39
	31-45	10	22	15	2	10	59
	46-60	5	21	10	4	14	54
Total		25	62	32	7	26	152

Source: Author's field study

Bar Chart



Source: Author's field study

The above chart describes how age of beneficiaries affected their satisfaction of NADMO's response in the delivery of relief items in terms of timeliness. 56% of respondents were satisfied at the timely delivery of relief items and 44% were unsatisfied with the arrival of the items. It can be observed that there is not much significant difference in the ages of respondents who agree to the fact that relief items arrived on time. Out of the 25 who responded to the "strongly agree and agree" it is fairly distributed among the ages of 18 to 30, 31-45 and 46 to 60years. What is worth noting is the significant differences in the ages of those who said they "didn't receive any" this is skewed to those in the ages of 46 to 60years.this could be explained

by the fact that those in the ages of 18 to 30 years are more mobile and were the once sent mostly to go to NADMO’s distribution point to collect these relief items.

4.7.2 Age Distribution of Beneficiaries satisfaction in terms of adequacy

Age Distribution of Beneficiaries satisfaction in terms of adequacy

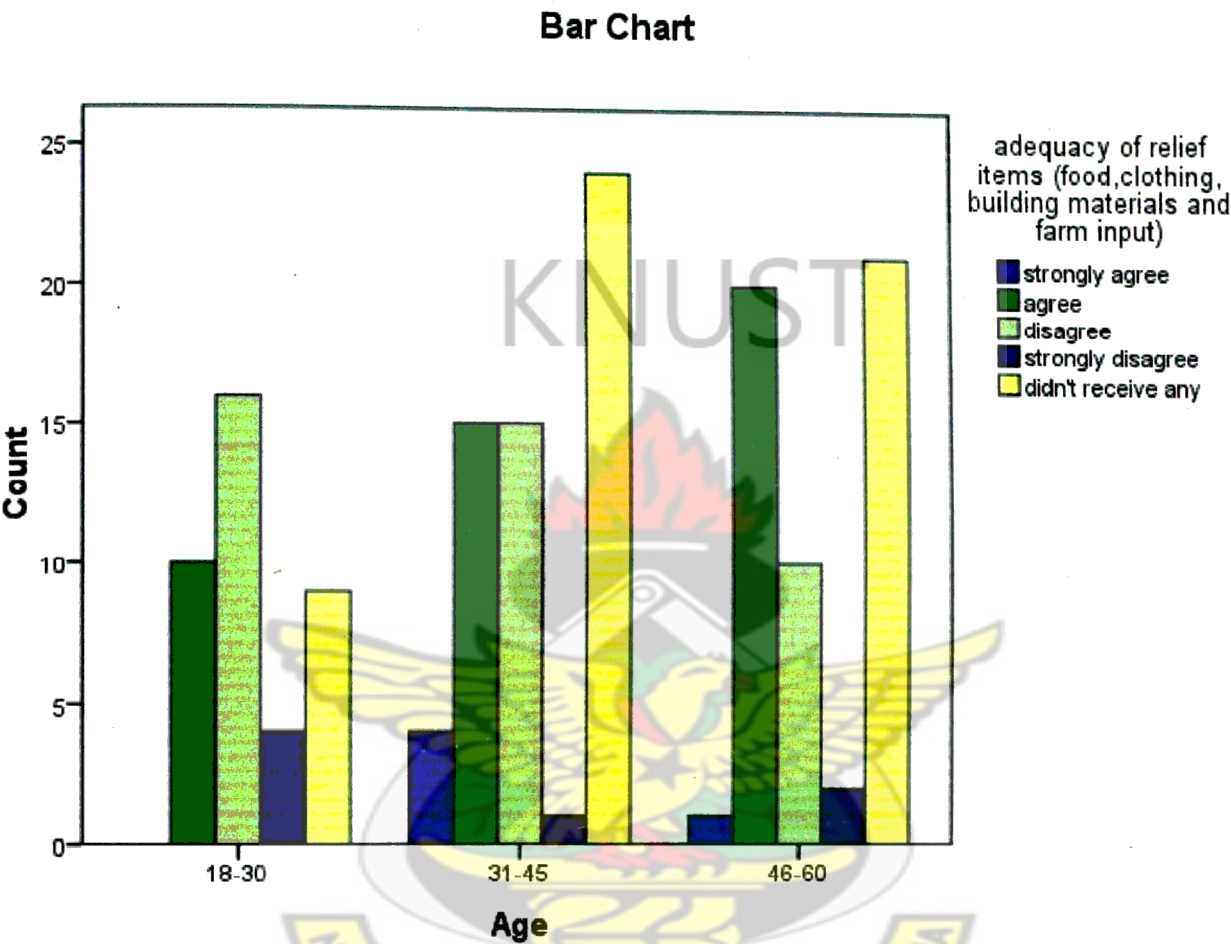
Table 11: Age Distribution of Beneficiaries satisfaction in terms of adequacy

Count							
		adequacy of relief items (food,clothing, building materials and farm input)					Total
		strongly agree	agree	disagree	strongly disagree	didn't receive any	
Age	18-30	0	10	16	4	9	39
	31-45	4	15	14	1	24	58
	46-60	1	20	10	2	21	54
Total		5	45	40	7	54	151

Source: Author’s field study

The graph shows the age distribution of beneficiaries’ satisfaction on adequacy of relief items. About 50 of the respondent were satisfied with the adequacy of the relief items, 47 were not satisfied and 54 did not receive anything, thus were not satisfied. It is observed that those who were not satisfied fell within the ages of 31 to 60 years. This age group had families so were

more concerned about adequacy of items as such given the same quantity of items they were more likely to be dissatisfied. This depicted in the bar graph below



Source: Author's field study

Table 12: Age Distribution of Beneficiaries satisfaction in terms of suitability

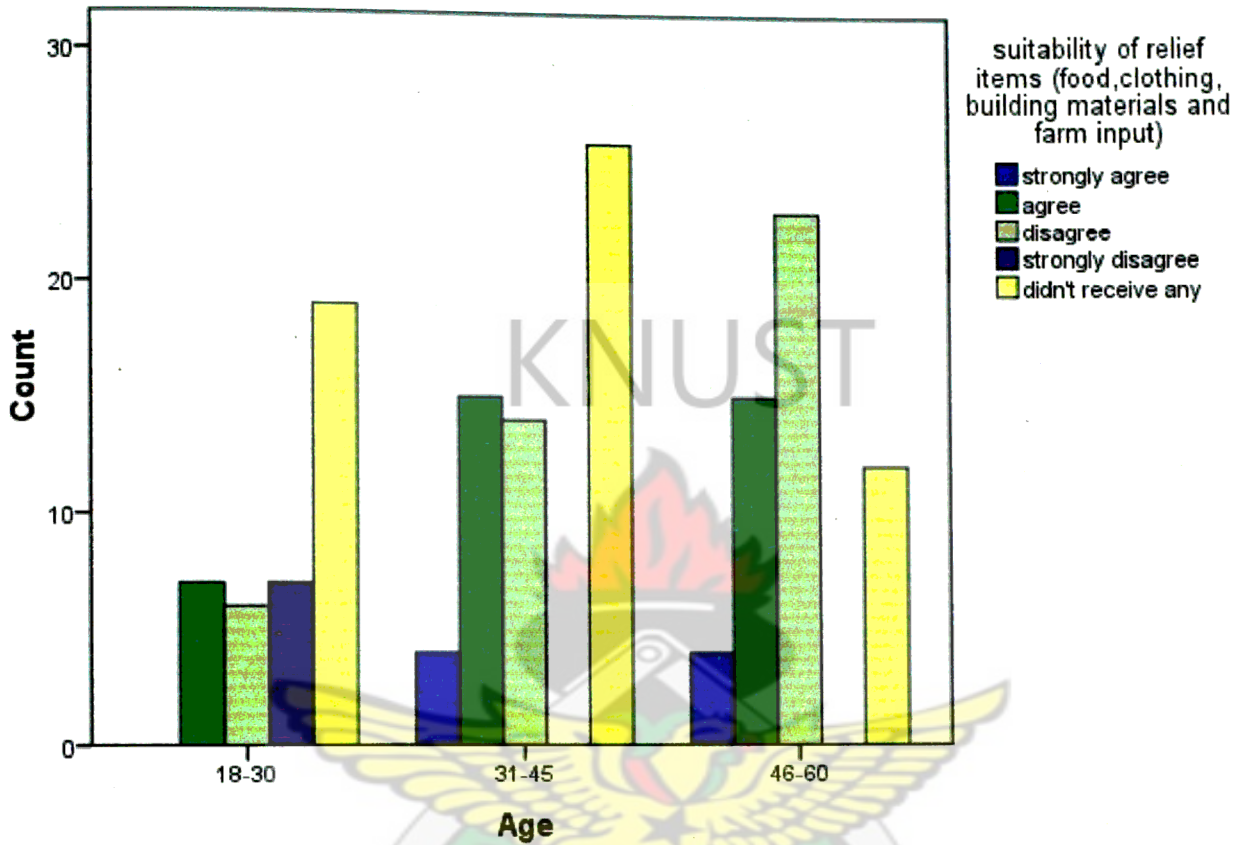
Age * suitability of relief items (food,clothing, building materials and farm input)

Crosstabulation

Count							
		suitability of relief items (food,clothing, building materials and farm input)					Total
		strongly agree	agree	disagree	strongly disagree	didn't receive any	
Age	18-30	0	7	6	7	19	39
	31-45	4	15	14	0	25	58
	46-60	4	15	23	0	12	54
Total		8	37	43	7	56	151

Source: Author's field study

Bar Chart



Source: Author's field study

The graph shows the age distribution of beneficiaries' satisfaction on adequacy of relief items. About 50 of the respondent were satisfied with the suitability of the relief items, 47 were not satisfied and 54 did not receive anything, thus were not satisfied. It is observed that those who were not satisfied fell within the ages of 31 to 60 years. This age group had families so were more concerned about adequacy of items as such given the same quantity of items they were more likely to be dissatisfied.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

A summary of findings of and general conclusions drawn on the basis of this study are presented in this chapter. It is concluded with recommendations for three (3) entities: NADMO and other relief and development organizations; the Government of Ghana and governments in Africa; and the research community.

5.2 SUMMARY FINDINGS

5.2.1 Relief Supply Chain Processes

With the deployment of its supply chain management facilities and resources NADMO was poised to deliver relief aid to its victims of the disaster. The various Supply Chain processes thus deployed are summarized as follows:

Pre-Disaster preparedness Process: NADMO had a process to create a plan for the relief effort but was unable to tell at this stage whether their plan met operational needs. Neither could relief staff confirm that relief plan action was distributed according to established guidelines, a situation that aggravated the no-prepositioning situation and the effectiveness of resource mobilization.

Needs Assessment/Demand Management Based on the findings of the Joint UN/NGO/Government Assessment and strategic planning by actors leading to a common Humanitarian Action Plan, the Flash appeal was launched to raise funds to improve and sustain humanitarian ongoing efforts to address the emergency needs of 75,000 most affected people in the 9 main areas listed below for a period of 6 months. Currently the flash appeal is about 63% funded.

Through the appeal the following humanitarian actors are focusing on the listed priority sectors.

<u>Sector</u>	<u>Sector lead and actors</u>
Education	<u>UNICEF</u>, World Vision, Plan Ghana
Food Security	<u>WFP</u>, FAO, Concern Universal, Care, ADRA, Oxfam, CRS, Plan
WASH	<u>UNICEF</u>, Church of Christ, Concern Universal, World Vision, Plan
Logistics	<u>UNDP</u>, NADMO
Nutrition	<u>UNICEF</u>, FAO
Health	<u>WHO</u>, UNFPA, Concern Universal, ADRA, Oxfam, Plan
Shelter /Non food Items	<u>REDCROSS</u>, UNHCR, IOM, World Vision, CRS
Coordination	<u>UNDP</u>
Sustainable Livelihood	<u>UNDP</u>, FAO, Concern Universal, Care Int. , Oxfam, Plan, , Africa 2000 Network and Opportunities Industrialisation Centres International
Other bilateral	<u>USAID , WORLD BANK ,</u>

Source: www.nadmo.org

- Builsa, Bawku Municipal and Garu Tampane in Upper east Region and East Mamprusi in Northern Region

- ***Procurement/Supplier Relationship Management:*** there were established procedures for procurement and these were used during the operation in question. There were however no long-term framework contracts or formalized agreements with supplier even though arms' length relationship exist. Relief items, which did not include gifts-in-kind nor unsolicited donations, were all procured within Ghana. So far the Government has spent the equivalent of US\$6.2m in trying to provide food and non food items to the affected regions. The supply from government which started a little over a month lasted for a period of two months. The frequency of the re-supply is dependent on when the affected people will have their first post flood sizeable harvest. To that effect, government is committed in providing resources for re-cropping. In close collaboration with the Ministry of Food and Agriculture (MOFA) and other UN and NGOs partners in the Food Security Cluster NADMO project of \$252,413 will immediately cover the purchase of 180 metric tons of fertilizers to be distributed to 7100 flood affected farming families. It will target the vulnerable farmers whose crops survived the floods in the three affected regions of Ghana.

- ***Transportation and Communication:*** although the floods exacerbated the already poor infrastructure transportation execution did not pose any major challenges as cargo haulage was outsourced from private into the affected area while NADMO used the hardy motor bicycles within the operational area. Majority of beneficiaries used manual head loads for light material (e.g. blankets, seeds, etc). Most of them live within 3km of end-user distribution points located within local communities. Telecommunication facilities were operational within 24 hrs of the onset of disaster.

- **Track and Trace:** updates and tracking were completely manual and were communicated to the field on ad hoc basis, while tracing was done with the aid of fixed-line/cellular telephony. Even so, NADMO office and field staff thought they received accurate and timely information on what was in the pipeline most of the times.

- **Stock Asset Management:** NADMO does not use centralized stock location. NADMO had systems and procedures in place which were perceived to have met the needs of the operation.

- **Monitoring, Evaluation and Reporting:** To some extent NADMO has risk information management systems. At the governmental level, a system is underway in building an information management system for disaster risk reduction. Some international NGOs, like the Ghana Red Cross Society and World Vision International have information management system in place for disaster risk reduction. The information is collected by their staff and disseminated through Radio, Television, Brochures, Posters, Symposia, Workshops, Seminars and Durbars. Main users include the general public, NADMO and affected communities. Academic and research communities in the country are linked to institutions dealing with disaster reduction. Some experts from the academic and research institutions are members of the Technical Committees of NADMO.

- **Coordination:** Sector activities have enhanced the coordination and information management capacity of NADMO at the regional and district levels, with the provision of technical assistance and ICT equipments for NADMO offices in the 3 Northern Regions as well as the Western and Central Regions. NADMO's regional offices in Tamale, Bolgatanga and

Wa now have functional wireless internet connectivity which now makes it possible to transmit electronic information/data about relief operations directly to their Headquarters in Accra. The designation of a NADMO focal point for coordination and data management has also enhanced information sharing. Through sector meetings NADMO officials at national level have become more informed about humanitarian activities in the affected areas. There is still room for capacity improvement for NADMO. Discussions are on going with NADMO to identify ways of building their human resource and technical capacity on disaster preparedness. To enable the Inter – ministerial Task Force monitor relief operations, support was provided to upgrade the castle intranet portal to include information on relief operations

- **Collaboration:** On 9 October an appeal for international assistance was launched by the government for the reconstruction of flood devastated areas. The organization utilized already established working relationship as a development partner in the district at the last mile of the supply chain but did not work with other agencies in setting up their supply chain. They worked with local authorities, District Assembly, Area Councils, traditional chiefs, and various district offices of MDAs, all of which highly rated their relationship with the NADMO(i.e. a consensus of positive collaboration experiences).

5.2.2 Beneficiary Satisfaction

Analyses on responses gathered from questionnaires administered to beneficiaries to measure their satisfaction with NADMO's intervention – in terms of timeliness, quantity and suitability – was used to gauge the level of effectiveness and success of the NADMO's relief supply chain management. Generally, beneficiaries were by far more satisfied with the timeliness (28%) of relief supplies distributed than with adequacy (15.3%) which was in turn better appreciated than suitability (6.2%) in the immediate response phases. In most cases, demographic features

like age, occupation and educational background of respondent significantly affected the degree of satisfaction of beneficiaries with timeliness, quantity and suitability of relief,

Satisfaction ratings were by the highest for timeliness (28%) followed by adequacy (15.3%) and suitability (6.2%) for of relief items; but adequacy was rated higher (15.3%) than adequacy/quantity (6.2%) while timeliness remained highest (28%) in the reconstruction phase.

In most cases, demographic features like age, occupation and educational background of respondent significantly affected the degree of satisfaction of beneficiaries with timeliness, quantity and suitability of relief,

5.3 CONCLUSIONS

In conclusion, it can be deduced on the basis of the foregoing and field observations that:

- In terms of management perspectives, NADMO operates with a development orientation more than a relief paradigm underpinned by a modern vulnerability-driven in the stead of a fundamentalist agency-driven perspective on disaster management. Geographically, the NADMO partnership viewed and responded to the Ghana floods from a regional as against an extra-regional perspective. Moreover, its supply chain configuration suggests that NADMOG has a 'relabeling' perspective on SCM-logistics relationship where SCM is perceived as being equals to logistics.

- On the adoption of SCM best practices, NADMO lags behind in adopting business SCM best practices and where there were strengths, most were ad hoc and by default rather than by plan

and design, e.g. demand management is by 'push' instead of 'pull' strategy. Again, the greatest challenges were in the pre-disaster phase of the supply chain.

- On effectiveness of NADMO's response rate, although beneficiaries were largely grateful for the aid received, effectiveness of the supply could have been much enhanced by a better attention to timeliness, suitability and quantity of aid distributed. It can be concluded that timeliness, adequacy and suitability of relief items were clearly critical factors in determining beneficiaries' satisfaction of NADMO's response in managing the disaster under review.

5.4 RECOMMENDATIONS

In the light of the foregoing, the following recommendations are put forth for three (3) categories of independent entities: NADMO Ghana as a focal organization as well as other relief and development organizations operating in developing countries; the government of Ghana and governments in West Africa and the research community.

5.4.1 Recommendations for NADMO and Other Humanitarian Organisations

For NADMO and other relief and development organization, it is recommended that:

- Humanitarian organizations should adopt pre-positioning of relief items stocks in strategic locations, especially near disaster-prone areas to enhance supply chain agility and efficiency. In the meantime, the government can make greater investments in information technology to enhance tracking and tracing of relief items as they enter and move through the supply chain.
- They should also give more visibility to logistics and supply chain professionals in their humanitarian efforts as at every stage of the process, since logistics were typically takes up

over 80% of the expenditure on relief operations. This could be done through recruitment of logistics and supply chain professionals, as well as training to enhance relief work.

- On the basis of the concept of differential vulnerability to disasters, it is strongly recommended that a strategy of 'mass customization' be adopted in determining quantities of relief items distributed to each household. This is expected to avoid the all-sizes-fit-all' situation as experienced in the operation under review. This way, beneficiary utility and satisfaction maximized in future operations.
- Considering that a key characteristic desirable of SCM is the integration of processes and structural components into a seamless machinery of delivering to beneficiaries' satisfaction, NADMO would need to consider enhancing collaboration between, not only Supply Chain function and also the rest of the functions.

5.4.2 Recommendations for Government of Ghana

- It is further recommended for the government of Ghana, which is the only entity with the mandate to declare a 'state of emergency' to do so in a timelier manner to allow relief organizations source external assistance early.
- Government should enhance the disaster preparedness of the state and citizenry through planning and education in the light of numerous perennial and potential disaster scenarios in the country (e.g. Perennial northern floods, potential dam breaks).
- Government should consider sponsoring research into disaster management and logistics/supply chain in general in view of the potential benefits that would inure to the nation from logistics businesses from our land-locked West Africa neighbours.

- Government should explore greater areas of cooperation with its neighbours especially with Nigeria, Burkina Faso, Togo, Mali, The Gambia, Niger, Senegal, Côte d'Ivoire, Liberia, Mauritania, Sierra Leone and Benin to seek long-term integrated solution to flooding, since natural disasters do not recognize geopolitical boundaries.

5.4.3 Recommendations for Further Research

Future research will hopefully carry on the idea of using SCM in humanitarian relief. The goal of future efforts should be to explore the concept through case studies, surveys, and perhaps even designed experiments to help the concept evolve towards more quantitatively rigorous validation. Due to the limited time resources available for this research, it is recommended for a similar enquiry to be made, but with a multi-case and/or longitudinal research design for a number of Government agencies and NGOs operating in Ghana or the West Africa sub-region. Finally, there are no benchmarks and Performance Indicators against which to measure performance. It is recommended that Performance Indicators be researched into in general for relief supply management.

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www.nadmo.org

www.reliefweb.org



APPENDIX A

SAMPLE QUESTIONNAIRE ADMINISTERED TO BENEFICIARIES

2007 FLOOD RELIEF OPERATIONS

1. Personal Data: kindly provide the following information about your household/ family:

d. Sex of HH:	[1] Female [2] Male
e. Age (tick one)	[1] under 18 [2] 18-30yrs [3] 31-45yrs [4] 46-60yrs [5] 61-75yrs [6] over 75yrs
f. Occupation	[1] Unemployed [2] Farmer [3] Trader [4] Public/civil serv [7] Other.....
g. Religion	[1] Christian [2] Muslim [3] African traditional [4] Other (specify).....
h. highest education attained	[1] elementary/basic [2] certificate/adv. cert. [3] diploma/HND [4] univ. degree [5] postgraduate degree [6] none [7] other (specify).....
i. Ethnic group/Tribe	[1] Grune/Frafra [2] Dargati [3] Dagomba [4] Mamprusi Ga/Adangme [6] Ewe [7] Akan [8] Grushie [9] Other (specify).....

2. Location: kindly provide the following information

a. town/village	b. zone:	
Where was your household	c. immediately before disaster struck?	
	d. where evacuated to (if evacuated)	
	e. present location?	f. approx. distance from Bongo(km)
	g. size of household	

3. End beneficiary distribution: to what extent do you agree with the following statements with regard to how NADMO responded to last year's floods? (Tick only 1 box per statement)

	Strongly agree [4]	Agree [3]	Disagree [2]	Strongly disagree [1]	Didn't receive any [5]
Food items (maize, rice, yam, cassava, cooking oil, etc					
a. the FOOD NADMO distributed to my household arrived at the time it was needed (timeliness)					
b. the FOOD NADMO distributed in my household was the right quantities needed (quantity)					
c. the FOOD NADMO distributed to my household was what was needed; it was familiar and we used it (suitability)					
Clothing & bedding (cloth, dress, footwear, mattress, bed sheet, etc					
d. the clothing and bedding materials NADMO distributed to my household arrived at the exact time (timeliness)					
e. the clothing and bedding materials NADMO distributed to my household was the exact quantity i/we needed. (quantity)					
f. the clothings NADMO distributed to my household were what we truly needed and so we used it/ them (suitability)					
Building materials (cement, roofing sheets, wood, etc)					
g. the building materials NADMO distributed to my household arrived at the exact time I/ we needed it (timeliness)					
h. the building materials NADMO distributed to my household was the exact quantity I/we needed (quantity)					
i. The building materials NADMO distributed to my household were what we truly needed and so we used it/them (suitability)					
Farm inputs (seeds/planting materials, livestock, cutlasses, hoes, fertilizer/ammonia, pesticides etc					
j. The farm inputs NADMO distributed to my					

household arrived at the exact time I/we needed it (timeliness)					
k. The farm inputs NADMO distributed to my household was the exact quantity I/we needed (quantity)					
l. The farm inputs NADMO distributed to my household were what we truly needed and so we used them					
GENERAL OPERATON : (i.e. overall NADMO's operation regarding this flood relief)					
m. Overall, my greatest needs and those of my household were adequately met through the operations of the NADMO in my area.					

4. Distribution of relief items: how did your household/family transport the following items?

	NADMO's point of distribution & distance from home (KM)	Means of transport (e.g. motorbike, donkey, car, head-load, etc)	Comment/challenge(s) (e.g. problems encountered, special help, etc.)
a. Food			
b. Clothing/Bedding			
c. Building materials			
d. Farming inputs			
e. others (specify)			

5. Final comment : write your final comments and/ or suggestions below:

APPENDIX B:

SAMPLE OF QUESTIONNAIRE ADMINISTERED TO STAFF AND MANAGERS OF NADMO

2007 NORTHERN GHANA FLOODS – Relief Supply Chain

Introduction: this 3-part questionnaire would require about 15-20 to complete. It aimed at gathering your candid view about how relief items were effectively mobilized and distributed to the victims of 2007 flash floods in northern Ghana by NADMO. Thank you in advance.

PART 1: GENERAL INFORMATION

1. Personal Data

Date

Q1. Kindly provide the following information

a. current position:
b. how long you have been working with NADMO?
d. your duty post (tick one) [1] district [2] sector office [3] headquarters [9] other
f. age (tick one): [1] under 18 yrs [2] 18-30yrs [3] 31-45yrs [4] 46-60yrs [5] over 60yrs
g. type of engagement with organization. (tick all that apply , especially between august, 2007 and now). [1] full time [2] part time [3] other
i. responsibility (tick all that apply to you): [1] administrative [2] relief worker [9] other
j. state your specific duties:
k. how long have you been involved in an emergency relief operation ? (please tick) [1] this is my first time; date involved and place [2] 2-3 years; date first involved & place [3] 4-5 years; date first involved & place [4] more than 5 years date first involved & place
l. place(s) you personally worked in during operation? (state district, town, village etc where applicable):
m. date flood started in that/those place(s)?

PART 2: RELIEF CHAIN PROCESSES

Preparedness

Q2 **Before** this particular flood disaster,

- Did you have an existing plan of action for disaster management? [1] yes; [2] no; [3] don't know (DK)
- Did you have an existing process for developing your plan of action? [1] Yes; [2] no; [3] don't know (DK)
- Did you follow the action plan for this emergency according to the guidelines established by your organization? [1] Yes; [2] no; [3] no action plan [3] don't know (or DK)

III. Needs assessment

Q3a. How did your organization conduct initial assessment of what logistics were needed for this operation

- Independent assessment
- Joint assessment; if joint, with whom?
- Relied on others' assessment; if others' assessment, whose?

Q3b. how did your organization conduct *comprehensive assessment* of what logistics were needed for this operation?

- Independent assessment
- Joint assessment; if joint, with whom?
- Relied on others' assessment; if others' assessment, whose?

Q4a. How soon after flood did the *initial assessment* team reach the flood affected area? (Please tick one)

Time after the onset of floods in Ghana (24 th august, 2007)					
[1] within 24 hrs;	[2] 1-3 days;	[3] 1-2 wks;	[4] 2-4 wks	[5] over 4wks	[8] don't know (DK)

Q4b. How soon after flood did the assessment team reach the flood affected area? (Please tick one)

Time after the onset of floods in Ghana (24 th august, 2007)					
[1] within 24 hrs;	[2] 1-3 days;	[3] 1-2 wks;	[4] 2-4 wks	[5] over 4wks	[8] don't know (DK)

Q5a. When did you start to receive LOGISTICS information from the *initial assessment* team?
(Please tick one).

Time after the onset of floods in Ghana (24 th august, 2007)					
[1] within 24 hrs;	[2]1-3 days;	[3]1-2 wks;	[4]2-4 wks	[5]over 4wks	[8] don't know (DK)

Q5b. When did you start to receive LOGISTICS information from the *comprehensive assessment* team? (Tick one)

Time after the onset of floods in Ghana (24 th august, 2007)					
[1] within 24 hrs;	[2]1-3 days;	[3]1-2 wks;	[4]2-4 wks	[5]over 4wks	[8] don't know (DK)

Q6. Compare **quantities estimated** by assessment information and **actual quantities** required in the field for this operation. How much was '**actual quantities**' more than estimated? Please **tick one** for each commodity. (Scale: 5=actual same as estimate; 4=actual slightly more; 3=actual slightly less; 2=actual very much more; 1=actual very much less)

Accuracy of assessment information	
	5 4 3 2 1 N/A DK
a. food	
b. shelter and non food items	
c. medicals	
d. vehicles	
e. Other (specify)	

IV. inventory/warehouse management

NB: for Q7, Q8 and Q9, please think of all relief operations in the recent past as well as this operation.

Q7. How are your relied stock location organized? (Tick one).

[1] Central warehouse [2] Decentralized stores [3] DK [9] other
c. within Ghana? [1]yes and used in this operation [2] yes, but didn't use it in this operation
[3]no [8]DK

Q10. Based on your experiences in disaster response, how do you rate the quantity of following inventory/stock management processes? (Scale: 5= excellent, 4=good, 3=average, 2= needs improvement, 1=very poor).

	Quality of inventory control process						
	5	4	3	2	1	N/A	DK
a. receiving							
b. storing							
c. dispatching							
d. reporting							

Please, indicate DK if you don't know or N/A if not applicable.

V. Procurement

Q11. How important are the following criteria in deciding who/what resources to use for this operation. (Scale: 5= most important, 4=very important; 3-important; 2=less important; 1=least important).

	Quality of inventory control process						
	5	4	3	2	1	N/A	DK
a. availability (how easily we can find the resource)							
b. Cost (how quickly we can resource into our supply chain)							
c. Compatibility (how easily it fits into the whole supply chain)							
d. Compatibility (how easily it fits easily into the whole supply chain)							
e. Political (how much it satisfies interest of senior managers)							
f. Donor (how much it satisfies interest of our donors)							
g. Other (specify)							

Q12a. Please, estimate the percentage of each type of the following commodities procured (purchase& donation) within Ghana Before the disaster.

	Food	Shelter and non food items	Medicals	Vehicles	Other:
Percentage procured from Ghana (%)					

Q12b. Please estimate the percentage of each type of the following commodities procured (purchase& donation) within Ghana After the disaster.

	Food	Shelter and non food items	Medicals	Vehicles	Other:
Percentage procured from Ghana (%)					

Indicate DK if you don't know.

KNUST

VI. Transportation Execution

Q13. Please estimate which modes of transportation were utilized most frequently within each location indicated below. (Please tick):

	Within Ghana	Within Affected Area
a. Air transport		
b. Rail transport		
c. Road transport		
d. other (specify)		

Indicate DK if you don't know

Q14. Please rate the quality of transportation modes utilized in terms of quantity, suitability and timeliness for each location indicated. (scale: 5=excellent, 4=good, 3=average, 2=poor, 1=very poor, 0=none)

	Within Ghana	Within Affected Area
a. Air transport		
b. Sea transport		
c. Rail transport		
d. Road transport		
e. other (specify)		

Indicate DK if you don't know or N/A if not applicable.

VII. Communication /collaboration/coordination

Q15. For each mode communication used in this operation, please indicate the timeframe in which each became operational. (Please tick one answer for each mode):

	Time after onset of floods (24/08/2007)				
a. Internet/E-mail	[1] within 24hrs; DK	[2] 1-3 days;	[3] 1-2wks;	[4]over 2 wks;	[8]
b. mobile phone	[1] within 24hrs; DK	[2] 1-3 days;	[3] 1-2wks;	[4]over 2 wks;	[8]
c. satellite phone	[1] within 24hrs; DK	[2] 1-3 days;	[3] 1-2wks;	[4]over 2 wks;	[8]
d. radio phone	[1] within 24hrs; DK	[2] 1-3 days;	[3] 1-2wks;	[4]over 2 wks;	[8]
e. land line	[1] within 24hrs; DK	[2] 1-3 days;	[3] 1-2wks;	[4]over 2 wks;	[8]
f. other (specify)	[1] within 24hrs; DK	[2] 1-3 days;	[3] 1-2wks;	[4]over 2 wks;	[8]

VIII. Monitoring/Evaluation/Reporting

Q16. How regularly do you report to the following stakeholders? (tick for each stakeholder):

	[1] Daily	[2] weekly	[3] monthly	[4] quarterly	[5] annually	[7] N/A	[9] Other (specify)
a. headquarters							
b. sector office							
c. District/ADP office							
d. Donors							
e. international partners							
f. local partners							
g. beneficiaries							
h. government agencies							
i. media partners							
j. others (specify)							

Q17. List the major collaborators in this relief operation, briefly stating the main roles played by each in the table below. Kindly rate your experience of working with each listed body. (5=most helpful, 4=very helpful; 3=fairly helpful; 2=needs improvement; 1=not helpful; 0=retarded operations)

	Major collaborators	Main role(s) played	Experience rating
A	Government agencies		
B	Local authorities		
C	UN agencies		
D	international NGOs		
E	local NGOs		
F	Media partners		
G	International donors		
H	Local donors		
I	Private companies		
J	Others:		

Q18. To what extent do the following statements apply to the organization working together with other relief agencies in this particular relief operation? (5=applied always 1=never applied).

	5	4	3	2	1	N/A
a. we shared capacity (vehicle space, warehouse capacity).						
b. we coordinated our cargo movements.						
c. we pooled our purchasing power						
d. we communicated on the highest level						
e. we communicate at the field level						
f. we had common training						
g. we competed for the same resource						
h. we used the same service providers						
i. we used the same suppliers						

Q19. To what extent do the following statements apply to your organization working together with your major suppliers in this particular relief operation? (5=applied always; 1=never applied).

	5	4	3	2	1	N/A
a. we shared capacity (vehicle space, warehouse capacity).						
b. we had joint planning.						
c. we communicate on the highest level						

d. we communicate at the field level	
e. we communicate frequently with each other	
f. we share information	
g. we have common training	

IX. Track and Trace

Q20. How did you track your goods and services in each of the following location? (tick one main method of each locations).

	Within Ghana	Within Affected Area
a. manually (pen & paper)		
b. excel spreadsheet		
c. computer software		
d. other:		

PART 3: MANAGEMENT PERSPECTIVES

X. Disaster management perspectives

Q21. To what extent do the following statements apply to your organization? Please tick.

(scale: 5=applies always; 4=applies most times; 3=applies sometimes; rarely applies; 1=never applies)

	5	4	3	2	1	N/A
a. we believe under-developed communities suffer more damage by any given disaster.						
b. intensity of a disaster agent is the most important determinant of damage.						
c. we believe long-term development interventions are more important than emergency relief operations.						
d. we focus on immediate relief for disaster victims						

XI. Adoption of SCM Practices

Q22. Generally, how important are the following practices to your relief supply chain management?

(scale: 5=most important, 4=very important; 3=important; 1=least important; N/A=not practiced)

	5	4	3	2	1	N/A
a. we strive to learn about behavior and needs of the people we serve						
b. we aim at quickly getting the right information and materials to both our						

colleagues and disaster victims, at minimum cost.	
c. we forecast needs of victims and assess our supply capabilities and strive to match the two	
d. we try to provide the exact items requested to those who truly need them at minimum cost quickly.	
e. we have established processes for handling, sorting and packaging relief items for storage or distribution to beneficiaries.	
f. we strive to develop and maintain lasting relationships with our major suppliers	
g. we are always generating ideas and developing better ways of satisfying the needs of our client communities.	
h. we strive to destroy or return toxic or plastic waste, unsolicited or non-user friendly donations.	

KNUST

Q23. Which ones of these SCM practices did you employ during this relief operation? (please, circle all those that apply and state any comments, where applicable)

	Brief comment, instance, example, etc.
We learn about behavior and needs of the people we serve we aim at getting the right information and materials	
b. we aim at getting the right information and materials to both our colleagues for their work and disaster victims at minimum cost quickly.	
c. we forecast needs of victims and assess our supply capabilities and attempt to match the two.	
d. we try to provide the exact items requested to those who truly need them at minimum cost quickly.	
e. we have established processes for handling, sorting and packaging relief for storage or distribution to beneficiaries.	
f. we strive to develop and maintain lasting relationships with our major suppliers	
g. we are always generating ideas and developing better ways of satisfying the needs of our client communities in ways that fulfill our vision and mission.	
h. we strive to destroy or return toxic or plastic waste,	

unsolicited or non-user-friendly donations	
--	--

XII. Final Comments

Q24. Please provide your final comments or suggestions about relief supply chain or any other burning issues that were not directly covered in this questionnaire in the blank space below:

