Emergency Relief Logistics: Evaluation of Disaster Response Models

Based on Asian Tsunami Logistics Response

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Abstract

In the Art of War, Sun Tzu (1772) observes that “[t]he line between order and disorder lies in logistics”.

The logistics response to the Asian tsunami in December 2004 reveals the fragility and inadequacy of the logistics processes. High volatility is part of complex situation, but other factors from external actor can increase this complexity; poor mandates in agencies, inadequate capacity in aid provision, or even weak diplomacy may lead to failure. From this point, specialists have highlighted the little extent given to logistics activities within the relief response. The tsunami failures imposed the international community to review its priorities such as strengthening professional staffing and supporting strategic partnerships and local available expertise. Agencies need to clarify who is to coordinate disaster response and recovery.

Eventually, logistics is a bridge that allows the transition between emergency and development programmes, and links the entire supply chain. This link cannot be ignored by the actors of this particular supply chain because by establishing a long-term process logistics will ensure local development and sustainability.

The dissertation tends to prove Sun Tzu’s statement enabling an early attention to recovery in the relief phase of the emergency to help local populations get back on their feet.
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My mum  
for her love and financial support

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Chapter One: Introduction

1.1 Background of the project

The author of this paper proposes to treat the subject of humanitarian logistics due to her logistics background. She studied logistics in France and in England (university of Huddersfield) and had various experiences in the logistics world. The idea of humanitarian logistics comes from two missions the author carried out during placements in the French Army: vehicle fleet and warehouse management in the fret cell of the logistics regiment and development of a storage management system in a military hospital.

The military concept of logistics was the source of industrial and humanitarian logistics, although they have similarities they remain different. Through interviews and experiences in all three categories of logistics the author wants to create a logistics response model with the best practices of the three environments in order for humanitarian programmes to be more flexible, efficient and effective in terms of time, money, information sharing and most of all people’s welfare.

Moreover the project reflection is related on a previous research dissertation, “Revolution of car industry: to a customer driven strategy – Implication of build-to-order strategy – Application to Rolls-Royce Motor Cars”. This dissertation was based on a work experience at Rolls-Royce Motor Cars Limited (R-RMC), in Logistics and Structure Planning department. In Rolls-Royce case study the author sees some parallels with the humanitarian environment in terms of complexity and volatility: R-RMC supply and its overall supply chain decisions depend on BMW’s strategy; in order to solve partners’ misunderstanding and lack of awareness, R-RMC logistics management mainly focuses on the “complexity management”* and the communication between the

* refer to glossary (appendix K)
different partners of the supply chain (internal and external). However, other areas had to be considered to improve the supply chain and the management behaviour.

The idea of the present dissertation is to evaluate the current strength and weaknesses of humanitarian logistics and to support findings with the previous research of build-to-order process. Through different readings on the subject, the Asian tsunami is presented as the event that has revealed the extent of logistics activities in the success or failure or relief actions. By understanding different processes of response to the tsunami and the consequences on the entire supply chain, the dissertation will demonstrate how humanitarian sector can improve its supply chain and communication management.

1.2 Hypothesis

From articles, reports and interviews the author realised the lack of logistics involvement in humanitarian project and from this, she decided to verify this statement. The hypothesis proposed to open a discussion about humanitarian logistics is the following:

*Humanitarian organisations do not efficiently exploit skills of logistics specialists, during the preparedness phase and all along the relief response program in order to ensure sustainability.*

In the logistics of the French Army, there are five to six persons behind a “combatant”, supporting and ensuring the transport, dispatch and entire logistics of material, information and people flows (Captain Meyer, 2008). In the American Army the ratio is twelve for one “combatant”, according to French military logisticians. This reveals the importance and the awareness of the extent of logistics in war situation but also in military support for aid.

Authors such as Rickard (2006), Oloruntoba and Gray (2006) and Perry (2007) state that logistics specialists are never consulted during the first phase of the preparation of a mission, whereas in several articles logistics is considered as the key interface of
humanitarian programmes (Anon, 1999). This is where the author realised that humanitarian logistics might need to be updated and raised to a more estimated level in the humanitarian sector. If logistics is recognized as an important part of planning and implementation of programmes it would avoid waste and unsustainability.

The solution of the French Army, in a long-term period, would be to outsource its logistics activities for practical reasons in the case of interventions abroad. Moreover several professionals interviewed, in particular Mr. Auton, Chairman of the association HELP centered on humanitarian logistics, explain that logistics is not the core competency of the aid agencies; hence, they advocate the outsourcing of logistics activities to commercial brands specialised in this specific area such as DHL working with the Office for the Coordination of Humanitarian Affairs (OCHA) to build “a global network of Disaster Response Teams” (DHL, 2006).

In this perspective, the topics of improving humanitarian logistics response model will raise questions about collaboration, integration and sustainability of humanitarian agencies programmes and other bodies involved. Eventually the author will try to conceptualise a flexible model to respond to emergency crises.

1.3 Aims and objectives

1.3.1 Project aims and objectives

The project aims at raising awareness on the ability and benefits that logisticians would bring to humanitarian emergency response.

The author will, in the same time, test feasibility of logistics response models implemented by civil agencies and by the Army (French and British if possible) but also through previous results from build-to-order research.

This paper intents to demonstrate that because logistics is not a core competency of humanitarian organisations, logisticians are essential to support the specific needs of
sector. The originality is that it makes a true contribution to both research and practices by providing a new perspective of research in an area which has not been investigated, by suggesting reasonable solutions.

The objectives are the following:

> Argue the inefficiency of the current humanitarian response planning due to the lack of logistics skills.
> Demonstrate the gaps of the current models.
> Verify the viability of the concepts currently developed such as clusters created by the “UN family” as well as industrial solutions.
> Recommend changes and improvements in civil organisations supported by military experience and through outsourcing.
> Suggest the implementation of a logistics response model in emergency situation.

1.3.2 Personal aims and objectives

This research is the achievement of 4 years of training in a country and a language which are not the author’s.

The author is in contact with several agencies (Merlin, HELP), the research being valuable for them as well. This paper attempts to address the future challenges of humanitarian specific supply chain, therefore the author might be able to contribute to the current research on improving humanitarian logistics by working side by side with professionals. Although, contacts are difficult to establish with French organisations as it is not in the French culture to integrate academic world to professional world.

The dissertation research enables the author to develop her logistics knowledge in a new and challenging sector which will allow her to approach her professional aspiration developing her interest in consulting and expertise management. The objective is to widen a specialised language of emergency aid through a scope of supply chain via
three different sectors with different interests: Army, Civil agencies and Automotive sector.

The aims and objectives of the research have been reconsidered to focus on the specificity of Disaster Management. Through qualitative research guides the author has developed methods to coordinate collected data and analysis with hypothesis and objectives, understanding the limits of it.

In terms of personal development, self-confidence has been acquired throughout the evolution of the research, as well as critical skills. Eventually this research will help the author to know what sectors she wants to develop her logistics skills: military, humanitarian, social…

1.4 Research process

1.4.1 Methodology

The diversity of the author’s work experience (military, industry) gave the opportunity to understand the logistics issues of the different “businesses” and their causes. The author contacted some agencies in order to interview logistics experts and collect data regarding supply chain flexibility improvement. These interviews support the theory and provide results on feasibility.

The research has started and been completed by theoretical analysis from academic journals. Literature mainly from articles and reports reveals that the most important issue in humanitarian logistics is the lack of expertise, leading to waste of time, money, energy, which will be linked to the first two objectives. The characteristics of theoretical researches are described through a critical literature review of the topics.

The author included the research methods part into the main body of the dissertation because she thought of it as a part of the logistics process to develop an adequate response (the dissertation).
1.4.2 Evaluation of the results

The project will develop and suggest new ideas for different partners of the humanitarian supply chain. Those ideas might not seem new to logistics specialists, however they will be new to the humanitarians as they are still using, in most situations, former logistics tools and concepts.

Figure 1 illustrates the supply chain of the humanitarian sector; the blue “bubbles” describes the constraints and imperatives to ensure efficiency and sustainability. The project, as an example, will detail the role of the actors in the humanitarian supply chain, the integration of logistics knowledge into planning process of emergency relief response in order to cope with the high volatility of situation of emergency as well as the information technology integration.

Figure 1.1 Humanitarian supply chain

The scope of the project is not comprehensive and will be completed throughout the dissertation.
1.5 Development of the report

Chapter II presents the evolution of logistics concepts from the 4\textsuperscript{th} century to today, and humanitarian logistics and its actors. The section also introduces the Tsunami as the key event in the evolution of mentalities in humanitarian sector regarding logistics activities.

Chapter III describes the methods implemented from the hypothesis. It determines data collection and analysis, and the expected achievements.

Chapter IV focuses on the importance of the logistics integration in humanitarian actions and highlights the barriers impeding the efficiency of existing response models. The study demonstrates the main inhibitors to sustainable supply chain is the lack of coordination and agility in the processes.

Chapter V suggests that findings of automotive logistics could be applied to humanitarian supply chain. It identifies areas involving improvements and describes the changes required for the implementation of a more responsive supply chain. From case studies of medical or refugee-based supply chain, the author proposes different scenarios providing critical analysis to suggest modifications in disaster relief supply chain.
Chapter Two: Humanitarian logistics definition

2.1 Logistics history

Over the last 35 centuries, 8000 wars took place and are taking place in our contemporary history. This military history has provided a support of observation and reflection to understand the evolution of military and civil logistics, according to contexts, strategies and technologies. All along its evolution, logistics techniques have responded to constraints forced by management of flows complexity and means of movement used by organisations (Appendix A).

2.1.1 Beginnings: logistics in the military thinking

Logistics has always been a deciding factor in wars; it enables movement, ensures supplies and injuries repatriation. Sources from the 4th Century before J.C. testify the existence of supply management; techniques developed from the 18th Century into three stages (Anon, 2003):

- Direct supply from the store for static armies;
- Supplies in invaded countries were armies stopped;
- Industrialisation of supplies from more and more faraway rear bases.

During World War II the Army developed and recognised logistics as a full activity in its operations. “It gained its momentum as it contributed to the effective distribution of machinery and supplies to troops; a service delivery failure here may mean an increase in unnecessary fatalities” (About.com, n.d.). Civil logistics was developed concurrently with military logistics thinking due to distinct aims; however, issues at the basis of logistics management were the same.

2.1.2 Logistics in the industry

Logistics has always existed in the industry but it is only at the beginning of the 20th Century that first references to logistics have been observed and in the mid-70s in USA
and 80s in Europe that industry considered it as vital (Anon, 2003). Then deregulations of transport, globalisation and the growth of IT systems have contributed to the development of logistics services in the industry.

✓ From 50s to 70s: infancy

Figure 2.1 Fragmentation of supply chain activities

![Sub-supplier](image1) ![Supplier](image2) ![Warehousing](image3) ![Factory](image4) ![Distribution & sales](image5)

Source: Lognews, 2008

The first techniques were observed in the area of warehousing and transport solutions (Anon, 2008). Logistics is highly fragmented within the company and the problem solving management is segmented: fleet management, stock management or transport management are not interdependent. The main objectives are to increase productivity and reduce costs, technique is known as push flows and Ford production is a relevant example of the technique. The emergence of specialised associations and journals define logistics as a function aiming at offering a product in the right quantity, at the place and time the demand is and at the least cost (Aslog, 1972).

✓ The 80s: integrated logistics defragments organisations

Figure 2.2 Coordination of supply chain entities

![Sub-supplier](image1) ![Supplier](image2) ![Warehousing](image3) ![Factory](image4) ![Distribution & sales](image5)

Source: Lognews, 2008
The industry strategy aims at coordinating all the entities of a company, managing interfaces and integrated flows. During this period logistics function was to increase effectiveness and reduce costs; Porter (1980, cited by anon, 2003) recognizes that logistics has become a competitive advantage. The first software appeared called MRP and ERP to sustainably managed resources and ensure homogeneity of the process. In 1984, the European Logistics Association (ELA) defines logistics as “the organisation, planning, control and implementation of flows of goods from the development and supplies to production and distribution to final customer in order to respond to market constraints with minimum costs and a minimum capital” (ELA, 2008).

 ✓ The 90s: global supply chain logistics management

This is the first time that logistics is seen as a global tool that optimizes flow chain between partners through highly developed information technology systems (ITs). The integration function of ITs is to support inter-entreprises collaboration and is extended to planification and implementation of processes.

Figure 2.3 Partners’ integration and flows optimisation

Source: Lognews, 2008

 ✓ The 2000s: cooperation and communication management

The 21st Century saw a new revolution of logistics management; it is no longer about managing physical flows but synchronizing the implementation of the process to offer value-added services to the customers. Through internet the customer is at the origin of the chain and ITs enable real-time information from suppliers to end customer.
Qualitative measurements, called key performance indicators (KPIs), are added to quantitative ones and are imposed to all customers. This is the era of e-chain.

As demonstrated above, there is not one right logistics but several according to the context and to the part of the chain: upstream (supply, ordering, etc.), downstream (distribution) or production. Logistics strategy includes every actors working on the process optimisation through information technologies; the supply chain management is born.

Car industry is a pioneer in logistics activities. Ford developed the mass production to produce more at lowest costs when the demand was important, and the market was expanding quickly. The current trend is called “Build-to Order” (BTO), or pull system; an improved just-in-time (JIT*) production techniques. This involves a clear supply chain with important coordination between partners in order to produce the car as quickly as possible, but still at lowest price, avoiding any final product stock, scrap and unsold items.

Source: Lognews, 2008
The author believes that it is where humanitarian logistics should tend its philosophy to as it would facilitate aid supply to affected population. This can be explained by the similarity of the context, in terms of logistics; a very volatile market in emergency situations requiring responsive and flexible logistics activities, from “ordering” to supply and dispatching, at low costs.

2.2 Logistics in the humanitarian sector

The humanitarian and commercial logistics requires the same basics; however the humanitarian logistics managers will have to operate in environments with limited or no infrastructures and communications (Rickard, 2006). According to Jane Coyne from MSF (2006) the supply chain management definition of the private sector is only the “tip of the iceberg” of humanitarian logistics. Humanitarian logistics includes “all the step and activities associated with the transformation of raw materials into delivered, finished goods […] plus radio and satellite communications, water and sanitation, construction and rehabilitation of buildings, energy and vehicle management” (p.12). The logistician of humanitarian sector is a mix of a contractor, a dispatcher and an engineer.

According to Josh Kearns from InterAction (2006, p.3) “organisations gave short shrift to the importance of logistics in humanitarian relief”, leading to “slow delivery times of materiel and staff […] and unnecessarily high costs for an industry forever in needs of funds”. This lack of priority on changes of process, explains John Rickard (2006), director of logistics at International Rescue committee, is due to the lack of interest from other departments regarding better training, inter-agency integration and collaboration, supply contracts, third party logistics (3PL) providers, or clear policies and procedures. Eventually, an Indonesian tsunami in 2004 and hundreds of thousand victims later, NGO managers understood the importance of supply chain management.
Now it is clearly established that humanitarian interventions cannot be successful without logistics specialists; that statement has brought, since 2004, more interest and willingness to directly fund logistics.

Table 2.1 presents three definitions of logistical functions in the humanitarian sector. Fauvarque (1999) describes more precisely humanitarian logistics as composed of six main activities:

- Communications: radio, phones, internet, etc.
- Transports: trucks, cars, planes, cargo, horses, etc.
- Sources of energy: fuel, batteries, etc.
- Accommodation or quartering
- Hygiene: water and sanitation
- Procurement: material, food, etc.
- Storage: warehousing and handling
- Shipment: staff, food, special fittings, handling material, etc.

Table 2.1 Definitions

HUMANITARIAN LOGISTICS

The term “logistics” refers to the procurement, distribution, maintenance, and replacement of materiel and personnel. Functions unique to humanitarian logistics include water and sanitation, radio communications, and construction.

SUPPLY CHAIN MANAGEMENT

A term often used interchangeably with logistics, supply chain management (SCM) refers to the panning, procurement, manufacture and distribution of goods in commercial, military and humanitarian sectors. In the humanitarian field, SCM is narrower in scope than logistics as the latter term is taken to cover a number of other functions as well as SCM.
The main role of logisticians is to support the needs of the supply chain; this means they are the first on the programme and the last to leave it. Their role is to assess needs, establish the liaisons with partners and beneficiaries, and to assemble infrastructures often in very difficult conditions.

Many authors (Perry, 2007, Oloruntoba and Gray, 2006, Hale and Moberg, 2005) stress a drastic change in complex emergency with growing interventions and programs in scale and budget due to increased donor and public demand for a better efficiency. This new landscape requires sophisticated levels of supply chain management practice and therefore more professional skills (Rickard, 2006). Moreover it suggests a new way of managing logistics within an organisation and between the supply chain partners. Many associations and institutions such as Fritz Institute or UNJLC have reexamined humanitarian supply chain management (SCM) and developed new practices and skills to adapt to today’s complex challenges.

### 2.3 Supply chain actors and their mission

It was important for the author to present very different actors of humanitarian sectors to describe every aspect of the logistics as possible. The author met military from the French Army specialised in logistics operations, also NGOs like Merlin working in emergency, Pharmaciens sans Frontière (PSF, Chemists without Border), and HELP an association that trains future logisticians for humanitarian field. Then it was crucial to introduce institutions working on SCM improvements like the Fritz Institute and the United Nations Joint Logistics Centre (UNJLC).
Figure 2.5 shows the actors of this particular supply chain, some of them are not directly "linked to the benefits of satisfying the demand" (Kovács and Spens, 2007, p.106).

Figure 2.5. Actors in the supply network of humanitarian aid

Source: Kovács & Spens, 2007

2.3.1 Army: 121st Régiment du Train

The author has some experience in the French army, at the 121\textsuperscript{th} Régiment du Train, in the freight unit and logistics platform. Military interventions, in France, are not combined to humanitarian actions, but military logistics could be used as a model for humanitarian logistics.

The 121\textsuperscript{th} Régiment du Train (121°RT) was created in 1920 and has three main missions:

- In crisis situation, arm a support area of a military group;
- Instruct new soldiers of the two regiments of train;
- Train future drivers to all vehicles used by the regiment

The regiment is composed of several units like commandment and logistics, administration and support, supply, transport and instruction.
2.3.2 Pharmaciens Sans Frontière

Pharmaciens Sans Frontière (PSF) does not intervene in emergency context. Jérôme Schell, logistics manager, presents three distinctive types of missions: post-emergency, pre-development and development.

In 2004, after the disaster of the tsunami, PSF teams arrived during the second wave in order to observe and assess local public sector and primary health, and thus re-establish local health infrastructure. Their main mission was the reconstruction and training of health experts uniting expatriate and local professionals.

2.3.3 Medical Emergency Relief International

Medical Emergency Relief International (MERLIN) is an emergency-focused NGO, specialised in “vital health care and medical relief for vulnerable people caught up in natural disasters, conflict, disease and health system collapse”. Their activities are composed of five missions:

- Rehabilitation of hospitals and clinics
- Water and sanitation
- Distribution of medicines
- Health education
- Primary health centre for refugee centre, since Christmas 2007 5 have been built in DR Congo

For a few months now, Merlin has developed its logistics activities to a real support for its core competencies. Nicolas Tillon, Logistics Officer of West Asia and DRC, reports three main tasks for his office. The first one is procurement, meaning sourcing for international and selection of medical suppliers. The second task is transport, mainly by charter, and is very important to manage the zero stock politic Merlin has adopted; the
goods are stored at the supplier. The last task is logistics support on the field; through standardization of IT systems and clerical work as well as assets management programme and inventory management, important for donors.

### 2.3.4 Humanitarian & Emergency Logistics Professionals

Humanitarian & Emergency Logistics Professionals (HELP) a registered association with professionals who provides information and training in humanitarian logistics. Sixty percent of the members are logisticians, military and medical staff. HELP does not deliver any logistics service, but some members work for Oxfam for example. The author interviewed Bernard Auton, Chairman, who is also director of the Chartered Institute of Logistics and Transport (UK) that formed HELP. He presented three main missions for the association (CILT):

- “Collect, collate, systemise, benchmark and share best practice in the delivery of humanitarian and emergency logistics
- Demonstrate to donors, beneficiaries, agencies and public authorities that investment in education, training and Continuous Professional Development for their Logisticians will mean better planning, delivery and results
- Demonstrate that Humanitarian & Emergency Logistics Professionals provide a stronger foundation for sustained development”

Therefore HELP collaborates with NGOs to improve humanitarian supply chain responsiveness and cooperation between its partners through information technologies (ITs) and logistics clusters.
2.3.5 Fritz Institute

The Fritz institute contributes to humanitarian operation improvement by bringing together “business best practice, technology and academic research” (ReliefWeb, 2002). Fritz, described as a pioneer in the global logistics industry, has created a worldwide network of scholars, experts and resources to research technologies and practices from business sector to apply to aid agencies. Fritz’s objectives are to improve operational processes effectiveness, facilitate the access to ITs, train logisticians to humanitarian field and develop appropriate key performance indicators (KPIs) (Fritz Institute). The institution created the Certification in Humanitarian Logistics (CHL) and a humanitarian Advisory Committee composed of senior NGO and international agency logisticians to prepare the next generation of humanitarian logistics managers. These committee and training respond to new trends in the field which are the growing inter-agency collaboration and a greater interaction with the private sector.

2.3.6 United Nations Joint Logistic Center

The United Nations developed a Joint Logistic Center (UNJLC), an inter-agency Humanitarian Common Service created during the civil war in Zaire in mid-1990s, originally as a short-term emergency response (Samii & Van Wassenhove, 2003). “Its mandate is to facilitate and support the coordination of logistics capabilities among co-operating humanitarian partners” (Logistics cluster). The UNJLC also supports the Global and Field Logistics Cluster as an information platform through the following functions (UNJLC, 2003):

- Collection, analysis and dissemination of relevant logistics information
- Schedule the movement of cargo and staff
- Manage the import, receipt, dispatch and tracking of commodities
- Assess infrastructures, cooperation of partners and needs
The UNJLC contributes to enhance the responsiveness and coordination of humanitarian operations among humanitarian partners, strengthening individual logistics systems and developing “synergies across agencies” (Kaatrud et al., no date, p.11), as shown in appendix B.

An example of UN large scale emergency collaboration is the access to World Food Program (WFP) relief depot to non-UN agencies.

2.3.7 Private sector in the humanitarian world

According to International Rescue Committee (Rickard, 2006), humanitarian field interaction with the private sector provides corporate resources, technology and expertise. More and more academic institutions focus on this particular logistics and big names of industrial logistics offer their technical assistance and fund humanitarian agencies; TNT, specialised in delivery, supports World Food Program’s (WFP) supply chains providing logistical best practice (Appendix C).

2.4 Logistics response to the tsunami at the heart of the response issue

The Asian tsunami of December 2004 was one of the first and biggest demonstrations of the social change consequences due to increasing urbanization and social marginalization (Perry, 2007). As seen on TV documentaries, the most vulnerable populations were the first affected by this disaster: Perry states that one-third of the affected population was living under the poverty line. This vulnerability has been increased by diverse factors; socially and economically they were the poorest people; geographically, mainly fishermen, they were living on the coast; politically, they were powerless and therefore unable to change their situation; culturally, traditions are an important part of their way of living and solutions were not appropriate to this tragedy; finally, psychologically, those populations were not able to prepare, fight and cope. In the 12 affected countries over 300,000 people disappeared and more than one million were displaced (Couldrey and Morris, 2005).
This disaster, which was mostly a horrendous human error, attracted a lot of solidarity around the world. Couldrey and Morris (2005, p.6) state that “sixteen UN agencies, 18 International Federation of the Red Cross/Red Crescent Societies (IFRC) response teams, more than 160 international NGOs and countless private companies and local civil society groups were deployed in the region”. Those NGOs offered their services such as “medical attention, body identification, clearing away rubble and debris, providing transport access and basic survival requirements […] and general living and psychological support” (Perry, 2007, p.410). Mostly successful, the organisation and logistics activities of the post-tsunami relief response were impeded by the wide media covering. Moreover some humane aspects were not taken into account such as psychological damage, land devastation, relocation of shocked populations, etc., which are essential for an efficient and effective response. In addition, military forces from 35 countries assisted and support logistical response offering their specific assets. Civil-Military coordination highlighted inefficiencies and misunderstanding within the humanitarian community. Nevertheless, timely response from all the actors resulted in avoiding major epidemics and six month after the disaster, immediate needs were met.
Chapter Three: Methodology

The present paper is empirical research based on interviews of diverse actors of the humanitarian logistics sector. Interviews and literature review developed ideas, and data from both methods had been confronted to test the chosen hypothesis.

Figure 3.1 Methodology roadmap

![Methodology roadmap diagram]

Source: Tabbara, 2007

3.1 Case study

The research draws on two different forms of study (Punch, 2000):

- **Descriptive study**: through the research process, data was collected, organised and summarised.

- **Explanatory study**: it examines more in depth descriptive information in order to find reasons for work processes implemented.
The Asian tsunami case study is part of the explanatory review focusing on contemporary events of the humanitarian sector. Case studies clarify a decision: “why were they taken, how they were implemented, and with what results” (Schramm, 1971, cited by Yin, 1994, p.12). Though, this needs first theory development to guide data collection and analysis.

3.2 Development of the research

The study investigations exploit empirical information from literature reviews. The observation of logistics processes and their issues provided details to frame the research in terms of hypothesis and research questions, defining aims and objectives. It determined what data were necessary to collect and analyse in order to answer to those questions. It enabled the design of the research which connected the questions to the data, shown in figure 3.2.
Figure 3.2 Development of the research

Source: Adapted from Punch (2000)
3.3 Data collection

3.3.1 Qualitative or quantitative data

Quantitative research provides the conceptualisation of the problem through quantitative methods. Qualitative research enables the interpretation of cultural significance of some behaviour. The latter is more suitable to the present dissertation because it relies on methods application raison d’être and criticises alternative approaches.

3.3.2 Possible research methods

> Interviews

The advantage of interviews is that they are mainly carried out face-to-face and they provide a high response rate. Four types of interviews had been considered:

- **Fully structured interview** requires a structured questionnaire, and gives very precise answer to the questions.
- **Semi-structured interview** is an overall focus covering main areas; the interviewer must have explored the topics before the interview and pre-determined categories in order to ease answer analysis. It may appear to be time-consuming but this method is relatively straightforward.
- **Unstructured interview** offers high level of interaction between the two parties but can lead to unfocused exchange.
- **Group interview** is a very efficient method allowing time optimisation by regrouping different opinions in one interview, but it needs to be organised to enable everybody to participate.

> Questionnaires

Questionnaire approach is popular because it does not involve a lot of expense (email, postal) and is very basic and easy to manage if the author targets a large sample and uses pre-coded answers to simplify the results analysis. It might be difficult to obtain a high response rate, it cannot go into topics in depth and truthfulness cannot be assessed.
> **Observation**

Observation is an analysis of a wide range of situations that permits the record of actions step by step.

> **Documents**

Documents are usually used as a second level of the research. They provide extensive data and a wide variety of qualitative and quantitative analysis.

### 3.3.3 Chosen research method

This paper focuses on qualitative information and necessitated expansive explanation of the topics and its application to the humanitarian sector. Thus, the semi-structured interviews at several organisations were appropriate to embrace the themes required to test the hypothesis. Face-to-face and phone interviews have been undertaken to acquire up-to-date information and experts’ opinions from different backgrounds (medical, military, logistics) to respond to the third and fourth objectives. They enabled the contents of the main trends in literature to be extended. Theories from documents were another key element of the research.

### 3.3.4 Literature

Literature was a highly valuable resource for the qualitative research. The use of theoretical framework through the exploitation of research reports and their findings required coherence and consistency. This literature was complemented by information from critical journal articles that provide analytical approach. All these documents had different purposes:

- Targeting themes of the research;
- Focusing either on central area or offered a more peripheral relevance to examine and interpret the concepts;
- Confirming or refuting the initial findings.

Literature were reviewed, analysed and incorporated as the study progressed.
3.4 Data analysis

The case study should be the basis of the research, but the author faced issues to find the right organisation with deep logistics understanding and experience and moreover, she faces difficulties to find people willing to share their skills and knowledge. The tsunami analysis explained the trend reflecting theoretical propositions.

Figure 3.3 Data analysis

Figure 3.3 illustrates the methods adopted to analyse and link the data. The elements from literature had been classified in order to be interpreted. Pre-determined categories were connected together to compare the details and findings between the interviews and case study and to consolidate the objectives stated earlier. The knowledge obtained had been adjusted to the research topic and verified the hypothesis. Consequently the conceptualisation of a framework enables the suggestions to humanitarian sector specific issues and requirements.
Data Management

1. Examine data from case study (Tsunami)

2. Develop ideas from literature and seek information that need to be further investigated

3. Develop concepts relevant that test the hypothesis

4. Select data from interviews, complementing literature and giving results of change implementation

5. Synthesise and categorise information from different sources into topics to answer to addressed hypothesis

6. Criticise information and results by contrasting and comparing it.

7. Findings and achievements

3.5 Achievement expected

The main achievement is to model new supply chain processes for humanitarian sector, in terms of supply, integration and sustainability related to industrial approach.
Chapter Four

Why focusing on logistics and what are the main barriers

The latest images of Birmese population in need have deeply moved the world. Those images from the media witnessed the dramatic situation of some populations in the 21st Century whereas, in our Western countries thousands of goods and food are thrown out. Therefore, for several decades, projects of international solidarity have been created to send humanitarian containers. These projects are based on donations such as drugs, foods and materials and usually trigger after natural disasters but also epidemics and wars leading to population displacements. These inrushes of good will require organisation and coordination in order to ensure efficiency; nevertheless very few of these projects focus on development, contrary to emergency situations. The author wants to demonstrate why logistics should be the main actor of sustainability.

4.1 What is the driver, who is interested?

Aid initiatives, as noble as they seem, might create issues and ambiguities. Big agencies such as UNICEF, UNHABITAT and the Red Cross have faced them as much as unsolicited projects. The Indonesian tsunami response (Perry, 2007) or even the latest case of Chinese earthquake are perfect contemporary illustrations of logistics planning failure, in terms of coordination of the different actors, relocation of internally displaced populations (IDPs), accuracy of response and material according to needs, etc.

The main driver of the author’s approach is to highlight that logistics enables the transition from emergency to development. The relief response will lie within a long-term framework through tools that logisticians can offer (processes, ITs and communication…).

According to Mr Auton (HELP) there are four groups influencing the humanitarian supply chain and might need to be influenced to facilitate logistics activities. The first
ones are the beneficiaries, the most important. Agencies have to work with donors to assess the use of their money if it is spent efficiently (and not necessarily well). The local government who wants to know where the money is spent on: capacity building, economy, local infrastructure that would give the capability to continue that work. They also insist on the use of national staff in activities; they are the branding organisations that want to go raise money, to do more job and want new customer while retaining existing ones.

The first interested are of course the beneficiaries of this aid; more collaboration between the humanitarian actors will offer responsiveness, sustainability and, on a longer term, self-sufficiency. Logistics tools offer the opportunity to observe the situation and the needs of the affected population, to better respond to those. Throughout the process, logisticians will control the response and ensure the adequacy to the changing context, therefore agencies will adapt their response to this evolution and distribute the right aid at the right people and at the right time; money, foods and goods will be used appropriately and effectively. Eventually, donors will appreciate the development of the process and the immediate and long term result of such actions.

4.2 Disaster management and existing models

4.2.1 Disaster management

Disaster management is “an applied science which seeks, by the systematic observation and analysis of disasters, to improve measures relating to prevention, mitigation, preparedness, emergency response and recovery” (Carter, 1999, cited by Pettit & Beresford, 2005). Several authors present a cycle with three phases in disaster management: preparedness, response and recovery. Table 4.1 shows that preparedness relies on “pre-tested systems and communication” (p.316).
Response activities (table 4.2) are carried out in crisis situations necessitating flexibility of planning and training, to cope, for example, with limited transport capacity due to destroyed infrastructure.

Table 4.2 Disaster management: response

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Assessment of overall requirements in the disaster/crisis area. Determination of initial logistics requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appeals management</td>
<td>Preliminary appeals launch for donations to underpin the relief effort</td>
</tr>
<tr>
<td>Operations planning</td>
<td>Co-ordination of relief supplies with other activities and accounting for factors such as politics, safety and weather</td>
</tr>
<tr>
<td>Mobilisation</td>
<td>Mobilisation of international and local transport and the establishment of an effective supply chain</td>
</tr>
<tr>
<td>In-country operations</td>
<td>Management of inbound supplies and fine-tuning of distribution involving multi-party co-operation</td>
</tr>
<tr>
<td>Co-ordination of agencies' activities</td>
<td>Organisation of competitive tendering for, for example, transport capacity, local commodities and services</td>
</tr>
<tr>
<td>Reporting</td>
<td>Monitoring of the effectiveness of the response and establishment of feedback mechanisms to improve pipeline reliability and performance</td>
</tr>
</tbody>
</table>

*Source: Adapted from Carter (1999) and Thomas (2003).*

Recovery (table 4.3) is a phase that can last many years in order to enable the population to “return to its proper level of functioning”.

39
Emergency relief logistics: Evaluation of Disaster Response Models

Table 4.3 Disaster management: recovery

<table>
<thead>
<tr>
<th>Logistics</th>
<th>Integrated into recovery programmes with increasing reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recovery programmes and projects</td>
<td>Reduction in emergency projects and movement towards long-term development of diverse, integrated programmes</td>
</tr>
<tr>
<td>Decision-making and project implementation</td>
<td>Less emphasis on urgency. Move towards medium- and long-term planning and project implementation</td>
</tr>
<tr>
<td>Management of commodities and suppliers</td>
<td>Changing profile of commodities required and review of supplier and capacity requirements</td>
</tr>
<tr>
<td>Maintenance of transport and transport systems</td>
<td>Ongoing improvement and development of transport infrastructure and systems oriented towards commercial criteria</td>
</tr>
<tr>
<td>Personnel resources</td>
<td>Reduction in emergency personnel and movement towards development of skills required in the long term</td>
</tr>
</tbody>
</table>

Source: Adapted from Carter (1999) and Thomas (2003).

There is no strict boundary between the three phases, especially for the two last ones, where the evolution is likely to happen through a logistics factor described in table 4.3. The relief response may differ in situation of man-made event or natural disaster. The first case implies a better preparation through monitoring; the latter requires a “large-scale response in a very short notice”.

4.2.2. Existing models

Several models have been identified; the author will present only two of them but the reader will find a description of other ones in the appendix D. Every model integrates the key phases of Carter’s disaster management cycle, presented earlier, in totality or partially.

✔ Disaster Response Model: common criteria

The first model can be applied to every crisis adjusting each activity to the particularity of the event. This “recovery model” proposed by Haas et al. (1977) highlights the overlaps and the interlinked stages in a full emergency relief cycle (figure 4.1). Evidently, such supply chain starts with the step of preparedness which timeframe might vary according to the event. Stages of operations such as distribution and transport follow, until the phase of performance measurement. The model gives clear
and common criteria of the disaster response model and allows agencies or military support to integrate their logistics activities adapted to the specific situation.

Figure 4.1 A suggested model of emergency recovery

Source: after Haas et al., 1977

Appendix E presents the humanitarian supply chain, the expenses and specific problem.

✓ Military models

According to Pettit and Beresford (2005), the UK military has not developed any specific model, but value their use for planning and post-operational contexts. The UK army’s role is to “maintain adaptative structures that allow interfacing with non-military organisations” but they face issues during the transition stage of the model due to the lack of “sufficient authority to handover to” (BBC, 2003, cited by Pettit and Beresford, 2005, p.325). Appendix D presents two military models, developed by the Joint
Doctrine Concepts Centre (JDCC); “a tri-unit service operating at the strategic level of the Ministry of Defence (MoD)”, which objective is far from those of humanitarian aid.

The author worked with the French Army in the past and exposes the model developed by the logistics team and adjusted to every mission. In France, there are six men who logistically support one combatant for supplies (food, fuel, drugs, armament…). Germanic and Latin armies have a very different vision of military logistics than Anglo-Saxon armies; logistics is not a social activity but a support for humanitarian programs (Méd. Chef Marchandot and Captain Meyer, 2008). The USA always combine battle times and humanitarian periods during one mission which may confuse soldiers operating in contexts such as Iraq. In France, militaries never carry out any humanitarian action but ensure civilians’ and humanitarians’ security and protection. Military mission is to ensure a base on the intervention area during the emergency phase and to withdraw troops when the infrastructure to dispatch commodities on the field is developed. The humanitarian support from army is often asked by NGOs or if the French government and local authorities agree on missions such as vaccination campaign, because the army might have the skills needed in extreme situation such as water draining or engineering, or deployment capacity.

The following scheme (figure 4.2) is a pull system for logistics and medical supplies; this means there is no stock and no volume. This model works when transport vehicles are available and the field easily enables transport commodities.
Figure 4.2 French Army logistics response model

Source: Author, 2008
4.3 Complex and volatile work environment

“The provision of humanitarian aid and the complex logistics systems that enable the aid to be delivered are often more complex than simply providing disaster relief”: it includes refugee protection, restoring civil order, securing humanitarian aid (Pettitt and Beresford, 2005, p.314).

Locations of disasters unease the implementation of sophisticated logistics techniques and therefore NGOs focus on the response rather than preparedness, being reactive rather than proactive. This means that agencies have developed inappropriate logistics processes that do not support relief delivery and supply chain. According to Thomas (2003), “environmental factors, funding issues, employee turnover, weak use of technology and poor manual processes” exacerbate this lack of focus.

4.3.1 Lack of adaptability when different world regions meet

Political, economic, social and sometimes cultural factors are very important to support public systems like authorities and «sponsors». In 1994 in Haiti, local authorities refused Pharmaciens Sans Frontière intervention and donors refused to give money.

On the economic view, Auton from HELP highlights the dilemma of transport and the use of relevant partners. In humanitarian transport, like in most global transport there are different stages:

- Primary transport to the country, its port of entry, or the airport…
- Secondary transport to the warehouse if there is a necessity to stock the commodities
- Tertiary transport to the beneficiaries

Some agencies use 3PLs specialised in sea, road, or/and rail transports, like Maersk, to a UNICEF warehouse for example to Panama and then they use local drivers who know best the roads and the local infrastructure of their country. Other organisations prefer using private operators for the entire journey, avoiding the risk of kidnapping for e.g.
Logisticians have to think of the dynamic of local trucking industry. However, lack of infrastructure justifies the use of private planes, very expensive.

On the social and cultural side, Nicolas Tillon, from Merlin, explains that sometimes state-employees are not paid, thus there can be tensions and ethnic issues. Some communities do not respond well to food stuff like Muslim community which influence food supply chain for halal products. In some places there can be issues for women to be in contact with men. A logistics-centred organisation called WISE have developed an original concept; Women’s Institute in Supply Chain Excellence. Its founder stated the lack of balanced workforce in the logistics sector. She stresses that if the number of women in logistics and supply increase it would ensure proper aid with dignity to women beneficiaries (O’Honde, 2006).

Another important aspect to take into account is the host country for aid and for refugees. Logisticians need to know the quality and availability of its infrastructure, the political state, and the physical conditions, to ensure an efficient operation (Weiss and Campbell, 1991, cited by Pettit and Beresford, 2005). The neighbouring countries situation, by which aid will convey in transit, are also important to know. Development of distribution network might often be slowed down by political disagreements (Long & Wood, 1995). An example of political barrier is Pakistan where Merlin faced the important issue of buying medicines to the closest country, like India because the government impedes their import.

Diplomacy plays a crucial and vital role in humanitarian action and more especially in the supply chain efficiency and sustainability. During the first weeks, military staff and equipment are required to secure and ensure a robust supply chain; in some extreme cases, humanitarians ask for convoy protection to ensure their security against rebels and might raise the question of neutrality and impartiality; other organisations prefer outsourcing to avoid any responsibility.
4.3.2 Lack of integration and cooperation

Agencies’ logistics objective is to collect data, assess local needs and respond as quickly and efficiently as possible to these needs. Collaboration is not a priority, and professionals recognise difficulties due to this lack of coordination of inter-agencies operations; besides most of the interviewees had difficulties to identify the actors of their supply chain and some like Merlin admitted that their organisation does not want to collaborate with other partners than their teams. The army is the only one that could spot the major actors who influence their decisions: French government defines the mission and the local government where, accordingly to the law, either NATO or UN defines the mission under the *rules of engagement* (ROE). French army cooperates with local civilians like ministry of Foreign Affairs or consulates, especially in case of French citizens’ or other population’s evacuation. Sometimes, the UN buys logistics of contributing countries during external intervention, as during Lebanese crisis in 2006, to better integrate logistics function into their activities.

Another collaboration and communication issue is situated between the donors and the supply chain actors; it can be illustrated by an unequal fight between actual needs on the field and donors’ power. According to HELP chairman, the main issue is the fair distribution of funds. Funding has increased from major donors (government, ECHO, DfID), but there is still a greater amount of money available for emergency than for development missions. There is no collaboration to save money; organisations are “collectively inefficient but individually efficient” (Auton, 2008).

4.3.3 Poor ITs and local infrastructures

Every interviewee in civil organisations made the same statement regarding information system; they are very basic, and largely manual. Auton also presented an overall view of the current situation in terms of communication in the humanitarian sector: a lack of ITs and information sharing. This is explained by poor or non-existent infrastructure on the field and remoteness of most areas of intervention. But it would be easy to discharge agencies of any responsibility; “the inability of IT staff at headquarters to understand
the imperatives of the field, the primacy of financial managers in decisions about software used in organizations, and the need to keep networks secure are the main reasons that humanitarian logisticians cite as the cause of the slow evolution of IT” (Thomas and Kopczak, 2005, p.6). The consequences of IT deficiencies are included table 4.4.

Table 4.4 IT deficiencies

<table>
<thead>
<tr>
<th>UNFLEXIBLE ITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Data must be written out onto multiple forms and keyed into multiple spreadsheets</td>
</tr>
<tr>
<td>• Budget control is inadequate; funds may be misspent as a result</td>
</tr>
<tr>
<td>• Usage of funds is not tracked to the extent that donors have requested</td>
</tr>
<tr>
<td>• Procurement procedures are difficult to enforce; integrity is lacking</td>
</tr>
<tr>
<td>• Tracking and tracing of shipments is done manually using spreadsheets</td>
</tr>
<tr>
<td>• There is no central database of history on prices paid, transit times, or quantities received/purchased</td>
</tr>
<tr>
<td>• Reports are done manually, therefore little reporting and performance analysis is performed, other than reporting to donors on quantities of relief items delivered for a given operation</td>
</tr>
</tbody>
</table>

Source: Hale & Moberg (2005)

However, the Fritz institute has been developing a virtual platform of logistics data for humanitarian workers called Helios. A first try of this information sharing platform failed and the institute is launching an improved version of it used by organisations like Oxfam. It is provided free of charge but users must pay the implementation charge. Although the idea of sharing information is crucial, the development of such software is delicate; Auton wonders how much money do the users have to pay to maintain the software, is it accurate to all agencies, maybe there is a lack of customization? We do not have much information about Helios, if it has been tested on field and what are the
results. Therefore, most NGOs have arranged ITs by Excel but this raises the problem of duplication when agencies work with partners with different databases.

**4.3.4 No professionalisation of logistics personnel**

In response to strategic changes and evolutions, agencies have extended their activities “without long-term strategic planning that might have resulted in more structured and streamlined management systems” (Rickard, 2006, p.7). Organisation are struggling to find people to manage complex supply chain of relief (Thomas and Kopczak, 2005); Rickard stresses that a high percentage of senior management are from technical backgrounds such as nutrition or sanitation, “rather than business and operational background like logistics or finance; “their background do not intuitively lead them to give supply chain management the weight it is due” and results in a “poor alignment of internal processes”.

**4.4.5 Donor pressure on supply chain activities**

Major donors influence the operational environment of aid relief; USAID* and ECHO*, which contributions are shown figure 4.3.

Figure 4.3 Top 10 Donors in 2002

![Figure 4.3 Top 10 Donors in 2002](image)

*Source: Thomas, 2003, Compiled by OCHA based on information provided by appealing agency*
Emergency relief logistics: Evaluation of Disaster Response Models

Crisis in Africa and wars in Middle East have resulted in higher and higher budget for the sector. Reports from specialists like the Fritz Institute highlighted “concentration on funding visible emergencies, increased competition among humanitarian organizations for donor funding and an increased demand for collaboration among humanitarian organizations operating in the same disasters or regions to reduce duplication of effort” (Thomas, 2003, p.4). There is a risk of « too much money ». This does not mean that donor should reduce their funding but if agencies do not spend all the money they cannot use it for other programmes because this money is designated and agencies have to find a way to do more than they initially planned.

Moreover, logistics has been one of the back room activities over the years, with technology, communication, finance and human resources, all directly linked. Funds are allocated to short-term relief and support services like logistics do not receive appropriate funding which may have been a long-term investment.

Table 4.5 sums up the main characteristics of humanitarian logistics and gathers the barriers and inefficiencies of most contexts and supply chain response. The first barrier is the cooperation between the actors of the relief response; Kovács and Spens (2007) highlights the lack of partnership. The environment does not facilitate the implementation of the response; forecasts cannot be accurate, large-scale events impede cooperation and reduce effectiveness of the supply chain is it is not treated as a whole. Moreover, infrastructure destruction hinders the access to the affected and isolated areas for drugs and food. Eventually, the last two barriers comes from the actors rather than the environment; the agencies and their partners lack knowledge of the situation and control of their operations; in the next chapter the author will suggest processes of monitoring and also the use of locals to offset those incompetence.
Table 4.5 Characteristics of humanitarian logistics

<table>
<thead>
<tr>
<th>Humanitarian logistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>The main aim</td>
</tr>
<tr>
<td>Actor structure</td>
</tr>
<tr>
<td>3-phase setup</td>
</tr>
<tr>
<td>Basic features</td>
</tr>
<tr>
<td>Supply chain philosophy</td>
</tr>
<tr>
<td>Transportation and infrastructure</td>
</tr>
<tr>
<td>Time effects</td>
</tr>
<tr>
<td>Bounded knowledge actions</td>
</tr>
<tr>
<td>Supplier structure</td>
</tr>
<tr>
<td>Control aspects</td>
</tr>
<tr>
<td>Alleviating the suffering of vulnerable people</td>
</tr>
<tr>
<td>Stakeholder focus with no clear links to each other, dominance of NGOs and governmental actors</td>
</tr>
<tr>
<td>Preparation, immediate response, reconstruction</td>
</tr>
<tr>
<td>Variability in supplies and suppliers, large-scale activities, irregular demand, and unusual constraints in large-scale emergencies</td>
</tr>
<tr>
<td>Supplies are “pushed” to the disaster location in the immediate response phase. Pull philosophy applied in reconstruction phase</td>
</tr>
<tr>
<td>Infrastructure destabilized and lack of possibilities to assure quality of food and medical supplies</td>
</tr>
<tr>
<td>Time delays may result in loss of lives</td>
</tr>
<tr>
<td>The nature of most disasters demands an immediate response, hence supply chains need to be designed and deployed at once even though the knowledge of the situation is very limited</td>
</tr>
<tr>
<td>Choice limited, sometimes even unwanted suppliers</td>
</tr>
<tr>
<td>Lack of control over operations due to emergency situation</td>
</tr>
</tbody>
</table>

*Source: Kovács & Spens, 2007*

4.4 Tsunami: the stakes of a new supply chain management

To respond to tsunami victims’ needs, aid agencies had to provide relief to a vast geographical area, including India, Bangladesh, Burma, Indonesia, Thailand, Malaysia, Sri Lanka, the Nicobar, and Andaman Islands, the Maldives, Somalia, Kenya and Tanzania (Pettit and Beresford, 2005). Physical and economic infrastructure was in most cases totally destroyed, most of the affected areas were isolated in a mountainous region with severe climatic conditions that reduce the choice of transport for aid distribution. Agencies required military support to, first, get to the worst affected. Indonesia, Sri Lanka and Somalia were already in a complex conflict impacting on delivery of humanitarian assistance; military forces restricted use of satellite systems and asked external military staff for travel permits, hindering any proper interventions and slowing relief efforts. In addition, local forces were the only ones able to collect information and did not always make it available to NGOs (Völz, 2005). This military interference had serious implications for humanitarian neutrality.
Due to the media coverage and the scale of the event, relief actions and actors proliferated and coordination was a sensitive issue; Couldey and Morris (2005, p.6) stress that “humanitarian ‘traffic jam’ […] let to miscommunication”, inaccurate needs assessment, inadequate planning and delays. The staff in charge of the budget never consulted logisticians for decisions in relief operations and 42% of the assessment team, establishing the needs of affected population but are only responsible for the procurement and transport, did not include logisticians. Therefore most bottlenecks were not anticipated and led to delivery delays (Thomas and Kopczak, 2005.).

The most critical issue was the poor collaboration between partners. Military and humanitarian activities overlapped and poor information sharing exacerbated integration problems. During the relief phase, only 26% of the logisticians had access software enabling tracking and tracing of goods. The others used manual processes and Excel spreadsheets and “58% stated that they received accurate and timely information of what was in the pipeline” (Thomas and Kopczak, 2005, p.6). However, manual processes do not offer speed and opportunities to share data with partners, and imply duplication to enter data in partners’ different software. Local knowledge, especially for assessment teams, is crucial; internally displaced populations’ (IDPs*) involvement in planning would have ensured a fair distribution of aid and not reinforced inequalities. Moreover, the high turnover of staff and the inability to maintain experienced and specialised personnel increased unsustainability.

However, Völz (2005) attests of too much coordination with 72 meetings per week in Banda Aceh, Indonesia, with no clear objectives and no clarification of roles, responsibilities or decision-making authority of participants. She justifies that “senior staff spent more time on coordination than implementation” by the fact that “humanitarian community is too fragmented” and NGOs are unable to focus on core business (p.26). As a consequence many “guidelines and standards were developed in isolation” and did not served humanitarian interests. Once the emergency phase was over, the recovery (or development) phase took place, but significant needs were far from being met, as million of households were living in tents years after the disaster.
Chapter Five: Business concepts and agile model

Automotive supply chain has turned to customer-driven strategy. However, the aid consumer of the humanitarian supply chain has no control over supplies; agencies are concerned by donor government for certain aid and therefore “focus on short term direct relief and distribution rather than long term investment in logistics systems and processes” (Oloruntoba and Gray, 2006, p.116). The author proposes logistics best practices from automotive industry to apply to humanitarian supply chain.

5.1 What the industry fundamentals could bring

The author strongly believe that humanitarian and business sector have a lot of similarities in their logistics; “speed is of the essence” (Davidson, 2006), challenging and competitive contexts offer short deployment times for their supply chain.

Logistics best practices have rapidly evolved for the past twenty years; new concepts have been developed and experienced in the automotive industry, a pioneer in logistics. Experts are currently focusing on two main concepts: lean and agile supply chain. The author thinks that those approaches, based on her previous research on build-to-order (BTO, 2007), could be applied to humanitarian logistics and could bring responsiveness and flexibility to the relief response.

5.1.1 Build-to-order concept

“Most vehicle manufacturers have accepted that building cars to order is a desirable goal as a means to improved customer satisfaction as well as increased efficiency” (Brown, 2001 cited by Charbert, p.1). To develop a competitive advantage, the original equipment manufacturers (OEMs) must maintain the choice and, in collaboration with suppliers, reduce order to delivery lead time. Mondragon et al. (2006, p.553) define build-to-order (BTO) as “shifting from a situation where products are pushed through
the supply chain, to one where they are pulled through the chain on demand”. It results from the increasing number of variants and importance of time factor (Reichhart & Holweg). Miemczyk and Howleg (2004) remind that BTO is not a new paradigm but more an improvement of lean production; the fundamentals are still the elimination of waste, the improvement of productivity and quality. The new idea aims at increasing profitability and improving customer service levels by a better flexibility and responsiveness.

The BTO has been attributed to Dell production that combines development of sustainable delivery system and commitment to people and manages simultaneously demand and supply, to anticipate large demand and get feedback from suppliers about “available capacity and potential problems” (Holweg & Pil, 2004, p.202). However Holweg and Pil (2004, p.114) highlight that Dell’s process “works well in a relatively simple environment with few components offered in many possible combinations”. But it appears “unfeasible in the auto sector due to the component variety and risks of obsolescence” (Holweg, 2005, p.605). This would explain auto-industry failure to adopt new strategies towards more responsive vehicle supply. Therefore this technique could not be operational in a volatile environment such as humanitarian supply chain.

BTO offers a multitude of benefits through concepts such as agile production, just-in-sequence supply… The responsive supply chain would produce the right product at the right time, in the right place via enhanced communication network.

Logistics must be a more flexible integrative and planning concept. Table 5.1 illustrates the correlation between flexibility* and responsiveness. It implies collaboration to align processes and move quickly, which would enhance agility across the supply chain. Moreover, a close relationship with the customers would provide information on real demand to share it with partners, and suppliers would meet the precise needs of customers (Christopher, 2005). This implies the need of logisticians in assessment team to better understand the needs of disaster victims.
Table 5.1 Responsive supply chain improves total flexibility

<table>
<thead>
<tr>
<th>Type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexibility</td>
<td>The ability to introduce novel products or to modify existing ones</td>
</tr>
<tr>
<td>Product</td>
<td>The ability to change the range of products made within a given time period</td>
</tr>
<tr>
<td>Mix</td>
<td>The ability to change the level of aggregated output</td>
</tr>
<tr>
<td>Volume</td>
<td>The ability to change planned or assumed delivery dates</td>
</tr>
<tr>
<td>Delivery</td>
<td></td>
</tr>
<tr>
<td>Dimension</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>The total envelope of capability which the production system can achieve</td>
</tr>
<tr>
<td>Response</td>
<td>The cost and time within which changes can be made to the capability envelope</td>
</tr>
</tbody>
</table>

Source: Adapted from Slack (1983, 1991)

Source: Holweg (2005)

Baker stresses that “managing demand chain is… fundamentally different to managing supply chain. It requires […] taking the end user as the organisation’s point of departure and not its final destination”. This is exactly where the humanitarian supply chain starts with the assessment team.

5.1.2 Why not lean system

Lean system application generates a lot of discussions among specialists. In theory lean principles would enable BTO, recognising its logic of elimination of waste (excessive production resources, inventory, unnecessary capital investment, overproduction …). Nevertheless, lean focus on productivity and quality “requires long period for advanced planning” (Hayes & Warburton, 2000, p.32). While this approach led to quality improvements, fast throughput and lower production costs, it did not enhance total supply chain efficiency nor respond to customers’ needs. Manufacturers that have chosen lean methods operate a smooth production generating line balance and minimal inventories, but reducing their flexibility as their stable production plan cannot respond to demand fluctuations (Hayes and Warburton, 2000). Moreover just-in-time philosophy
conflicts with growing supply globalisation (Das & Handfield, 1997). MacDuffie et al. (1996, cited by Holweg, 2005) contradicts previous statements explaining that lean factories have a better control of their volumes and therefore can reduce delays applying JIT concepts.

The three Day Car programme (1999-2001) analysed the situation in UK and demonstrate that lean focuses on flow optimisation through a small part of the supply chain. The research recognises Toyota’s success but only in terms of quality. It reveals that the weakest area of the supply chain is the dealership, providing unreliable data, delayed schedules, leading to shortage of components and longer delivery lead time. Those results are mostly comparable to today’s humanitarian supply chain results.

5.1.3 Agile Supply Chain

Most of the authors indicate that in volatile markets, quick changeovers and small lot production would be too inflexible (Katayama and Bennett, 1996; Harrison, 1999). According to Christopher (2005), the challenge of BTO system is to respond to increasing volatile demand in a competitive environment (frequent product changes, greater variety).

Specialists suggest as “a counter-reaction to the rigidity of the schedules in lean production”, the US manufacturing approach: agility, in order to quickly adjust to demand (Holweg, 2005, p.609). Agility has been defined as “the ability to thrive and prosper in an environment of constant and unpredictable change” (Maskell, 2001); the concept enables a higher adaptability to the demand and the ever-changing context. The issue of the humanitarian supply chain is the customer responsiveness; agencies need to convince and satisfy the donor. Byman et al. (2000, cited by Oloruntoba and Gray, 2006, p.116) state that there may be greater “humanitarian visibility” in providing food or medicine before basic logistical equipment such as forklifts, although the latter may be necessary for effective delivery of the former. Humanitarian agencies work in environment that is “unpredictable, turbulent, and requiring flexibility” and needs more agile supply chain (Oloruntoba and Gray, 2006).
5.1.4 Hybrid Supply chain

Still, both lean and agile paradigms co-exist in the same supply chain to respond to the different demands. Christopher (2005) points out that although agility is required in the entire supply chain (storage, replenishment, distribution...), lean must be a part of it in order to optimize resources (no waste) and to maximize economies of scale. Figure 5.1 reflects those characteristics and the supply chains that are likely to respond to the demand. Leanness responds to a predictable demand of standard low-variety product focusing on efficiency, whereas agility focuses on effectiveness in a fragmented market for customized products with high number of variants. For humanitarian supply chain, agility must “address the unstable nature of fundings, where institutions such as charities are regularly required to raise large amounts of money at short notice to provide emergency assistance” (Bennett and Kottasz, 2000, cited by Oloruntoba and Gray, 2006, p.116).

Figure 5.1 Lean and Agile and supply chain strategies

Hybrid supply chain or leagility is the combination of the two concepts. According to Kidd (1994, cited by Holweg, 2005), “response” buffers, postponment, and late-configuration will increase flexibility.

---

1 Kanban is a continuous replenishment method for predictable and short lead time supply.
The postponement strategy, or “de-coupled” supply chain, involves a strategic inventory, as suggested in figure 5.2. Push phase enables “manufacturer to build in anticipation of demand” and then store the parts until they are required for an order. The pull phase allows the customization of the product. The push-pull boundary is influenced by two primary factors: the amount of product standardization, and the point in process at which the first customization occurs” (Harrison et al., 2005, p. 215).

Figure 5.2 De-coupling points and Strategic Inventory

Source: Adapted from Harrison et al. (1999) after Naylor et al.

There is no ideal scheme, Naylor et al. (1999, cited by Harrison et al., 1999; Holweg, 2005) state that the adoption of either lean or agile depends on the market knowledge, volume and positioning of the de-coupling point.

*Decision point analysis* (figure 5.3) is a mapping tool to determine the processes that operate both downstream and upstream from this point and allows the redesign of value chain eliminating non adding-value and reducing waste.
Figure 5.3 Decision point analysis


Despite the fact that lean and agile may represent two contrasting approaches, humanitarian supply chain will have to adopt elements of both concepts to set up hybrid strategies.

5.2 Changes required

Authors believe that humanitarian actors need to reexamine their internal processes (Hale and Moberg, 2005; Perry, 2007). They explain that many organisations’ first purpose was to get recognition and funding (Rickard, 2006). Owing to the development of these logistics activities, their attention is now turned to educating the actors and their community on this specific process and its technological advances.

5.2.1 Supply chain integration

The transformation of the supply chain from the organizational silos to the pipeline was discussed chapter two. This is a revolution in the entire logistics sector but how to
create this pipeline? The solution is contained in one word: integration. Specialists (Auton, 2008; Tillon, 2008) work on the field to improve partners’ collaboration in the supply chain; “we must better integrate our internal departments and structure ourselves to speed decision-making. The goal being to facilitate an increase in the speed and quality of the service we deliver” (Rickard, 2006). The integration starts with the assessment of population’s needs; too often logisticians are not urged to assess the needs on the field, whereas they are the first responsible of sending food, drugs, water, etc. to the right place, in the right quantity, at the right time, with minimal costs.

The coordination of military and non-military activities is essential. Non-military resources include government, inter-government or NGOs and a combination of those. Military means indigenous and external forces. Military interventions are required in war or civil disorder but natural disasters often imply civilian aspects only. The Commander Chapell (2004) recognises the growing need of more agility “of military logistical support with less emphasis on buffer stock”. Therefore, in the disaster management cycle, military and humanitarian actors will need to cooperate to improve their supply chain effectiveness and ensure the adequate delivery of aid.

Of course, “the greater military involvement, the closer the response becomes to a traditional military response model” (Pettit and Beresford, 2005, p.314). Hence, balance of engagement from all entities involved is essential; in the early stage, military forces will provide a greater support and with time, agencies will extend their effort (figure 5.4).
Eventually, other factors influence the input of civil and military actors. A developed country with available resources and few deteriorated infrastructures will not rely on military forces as much as less developed nations.

UN have developed the concept of “logistics cluster” for large and complex emergencies such as cross-borders crisis including various factors to improve information sharing and even to share transport and storage facilities. This is another “collaborative mechanism” aiming at improving the “predictability, timeliness, and effectiveness of humanitarian response by forming inter-agency working groups around nine key functions such as logistics, health and shelter”; those joint services address more efficiently and sustainably beneficiaries’ needs rather than individual agency mandate. WFP is a lead agency for Logistics Cluster and is "accountable to the Emergency Relief Coordinator for ensuring predictable and effective inter-agency preparedness and response within the concerned areas of activity. This entails the very important element of accountability and where necessary the lead agency becomes the provider of last resort” (UNJLC, 2007).
One drawback of the integration is that it might add complexity. Inability to manage all humanitarian eventualities at the field level dictates a focus on the most important and feasible aspects of an agile supply chain, i.e. an optimal and realistic level of complexity that reflects an adequate degree of supply chain agility (Oloruntoba and Gray, 2006, p.118).

5.2.2 IT solutions
As stated earlier, ITs are not very developed in humanitarian logistics and supply chain efficiency suffers from this lack of adequate communication systems and agreed standards. The humanitarian sector is a very difficult area for collaboration, according to Auton, which explains the use of more basic communication tools. In terms of communication, the Army is in advance with its high performance material; satellite phones reaching network everywhere in the world and secured and dedicated infrastructure called “intra-terre” enabling communication with staff on the field.

More flexible communication systems improve responsiveness due to higher visibility across the supply chain. The request is a development of a standard assessment tool, but the logistics problem is that all have to get to the place. The solution would be a web-based system available to everybody, centrally updated and free of charge. That could take the form of a website with a standard template in collaboration with the UNJLC for example. Moreover, standardization of IT systems, catalogs and processes will improve “communication and cooperation across agencies and with donors” (Thomas, 2003).

5.2.5 Better assessment, control and monitoring (KPIs)
“In general, humanitarian relief organizations have focused on “getting the job done” and have put little effort into performance measurement other than reporting to donors on the amount of relief and usage of funds for a given relief operation” (Thomas and Kopczak, 2005). Consequently, agencies only learn from post-operation evaluations, whereas the automotive industry (Toyota) has developed the continuous improvement process that allows a permanent monitoring and adjustment the supply chain activities
Emergency relief logistics: Evaluation of Disaster Response Models

according to the changing environment. Thomas and Kopczak (p.9) demonstrate the benefits that ITs would bring to performance measurements:

- “Use actual performance as input into future operational plans
- Identify and eliminate causes of performance breakdowns
- Use analysis of current performance to inform continuous improvement of processes
- Use actual data to strengthen voice with donors, suppliers and logistics service providers
- Report performance to donors and the media to enhance the reputation and image of logistics and of the aid agency”

The International Federation of Red Cross has developed Humanitarian Logistics Software that captures the relevant data related to procurement and distribution, to measure SC performance. The organisation uses four indicators to balance speed, cost, and accuracy trade-offs; appeal coverage, donation-to-delivery time, financial efficiency, and assessment accuracy. Davidson (2006) describes how this software operated during the South Asia Earthquake, in appendix F. She raises the issue of cultural change that implies the implementation of key performance indicators (KPIs), especially in the top management of an organisation.

5.2.3 Third-Party Logistics: aviation case

The use of air transport is an interesting case to illustrate the need for change. MacGregor (2005), from Air Serv International, present the current situation as a lack of planning and security. Firstly, during the first hours or days in the aftermath of natural disaster or other crisis, NGOs often “focus on getting humanitarian relief supplies, medical equipment and trained personnel into distant countries while also navigating complex cultural and bureaucratic regimes” and therefore “leaves badly-needed personnel stuck at airports and life saving goods sitting in warehouses” (p.9). Once arrived in the crisis area, NGOs discover bad roads, destroyed bridges and some serious security issues. As a consequence, air transport is a crucial and safest choice for the
early stages of relief. However, MacGregor asserts that too often, the wrong choice of operator will drastically reduce the safety and speed of action. She also suggests that NGOs using the services of an aviation specialist through outsourcing will “save time, money and stress” (table 5.2).

However, this mode of transport has limitations and logisticians need to take them into account. Aircrafts are required in isolated areas, with airstrips without “lighting, access to fuel or other basic services”. This means that the team needs an appropriate amount of fuel to be able to fly away from the harm. Mostly, the planes cannot land safely, even less in the dark; in some countries with high insecurity, flying by night is not recommended.

<table>
<thead>
<tr>
<th>AVIATION PLANNING</th>
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Experience has shown that the following practices may help you get more for your money:

**Combine loads and routes** so that you fly with the aircraft as full as possible much of the time. Sharing services with other NGOs working in locations close to yours may be the best way to do this.

Preposition fuel at both ends of a rotation to allow for maximum **weight allowances** on each leg.

**Schedule maintenance time** into your programs and plan accordingly. Adequate maintenance material and availability of qualified mechanical repair personnel can save time and money and improve safety.

Ensure that your **aviation contract** or plan includes back-up personnel, particularly pilots, ground staff and labor for loading/unloading. Pilots can get sick, and if you only have one, your expensive asset will sit on the ground and your cargo will not get delivered.

*Source: MacGregor (2006)*

Table 5.2 Aviation planning and expertise benefits
5.2.4 Improved human resources management

Professionalisation of logistics managers is crucial to develop effective processes (Thomas and Kopczak, 2005), and transfer between business logistics knowledge and relief logistics is needed. Fritz Institute’s objectives aim at connecting those two worlds and developing systems to improve humanitarian supply chain. By creating a “logistics community” to share knowledge and skills it will increase logistics recognition (Table 5.3).

Logistics community

1. Engaging the skills of a network of academics, humanitarian logisticians and private sector professionals with experience in back-room operations

2. Building a repository of accumulated research and knowledge about logistics and supply chain management in the humanitarian sector

3. Creating common standards, guidelines and/or service requirements that can then be communicated with one voice to donors, technology partners, suppliers, and logistics service providers


Institutional learning is imperative to reflect and improve logistics activities. Intense effort, and high turnover (80% annually for field logistics personnel, Thomas and Kopczak, 2005) impede any transfer of experience from one field to another. In order to avoid losing lessons learned from one disaster, HR should support reflective session on failures and success, suggestions of improvements between all actors of the supply chain.

The following figure (5.5) sums up the challenges and the suggestions to improve the supply chain management of humanitarian response.
5.3 Responsiveness in the supply chain: conceptualisation of a response model

The nature of disaster determines the response, but the author strongly believes that logistical support and replenishment ensure the stabilization of the situation. Therefore the new model should include a transition phase through an “emergency to development continuum” and must be “robust and workable in a range of geopolitical and operational circumstances” (Pettit and Beresford, 2005, p.313). Appendix G reminds the main functions of humanitarian supply chain.

5.4.1 Preparedness phase focus

Making aid supplies available at any time in any place is critical for victims of disasters. Therefore planning team needs to pre-position relief resources where they are likely to be required. Hale and Moberg (2005) suggest an interesting response model based on the existing fundamentals. They focus on a more business-centred logistics, but still directed to disaster response; the location of aid equipment and resources. The main

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concern is to allocate resources where it is the less vulnerable. In order to reach this objective and respond to a more and more complex context, the authors added two stages to the three phases-disaster management cycle: mitigation and detection (Table 5.4).

Table 5.4 Model phases definitions

<table>
<thead>
<tr>
<th>MODEL DEVELOPMENT</th>
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<tbody>
<tr>
<td>MITIGATION</td>
</tr>
<tr>
<td>Is critical to lessen the impact of disasters on supply chain continuity and the length of disruptions</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>DETECTION</th>
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<tbody>
<tr>
<td>Has been added because many disasters or impending events can be complex and hard to evaluate. Including a detection stage as an important part of the process may increase the likelihood that a disaster is identified in a more timely manner (Helferich and Cook, 2002)</td>
</tr>
</tbody>
</table>

Source: Hale & Moberg (2005)

The model design from this idea, presented in appendix H, aims at improving the preparedness stage of disaster management. The authors then suggest three steps to establish the optimized location of aid, i.e. enabling a quick access with minimal costs. The first step is to “identify the emergency resources needed at each secure location” such as critical documents (maps, lists of critical SC actors), water, medical supplies, generators and communication systems. Then, the critical facilities within the SC have to be identified to minimize SC disruption; collaboration would improve this objective. The last point is to “set maximum response time goals for access to emergency resources and minimum distances secure site storage areas must be placed from supply chain facilities”; logisticians need to determine the number of emergency resource storage areas required and the minimum distance between each location.

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5.4.2 Cooperation focus

Figure 5.6 presents the supply chain partners’ roles in the relief response through the three phases cycle – preparation (preparedness), immediate response and reconstruction (recovery). The extra-regional perspective is a parallel to business logistics; these actors will have to combine their methods to humanitarian sector logistics and adapt them to its specific difficulties.

The alignment of headquarters’ focus and field workers’ is crucial to “enable” the former to be concerned with delivery to aid recipients as much with relationships with donors (Oloruntoba and Gray, 2006).

IT integration in the supply chain has proved the enhancement of collaboration between partners. According to Hanaoka and Qadir (2005), the development of a planning model, integrated into a natural disaster logistics Decision Support System (DDS), would “regenerate plans incorporating new requests for aid materials, new supplies and transportation means that become available during the current planning time horizon”. Moreover, real time information regarding the situation changes is crucial in the aftermath of a disaster such as the tsunami; satellite remote sensing evaluation through radio or phones update information to support decision process.
According to Long & Wood (1995), response model should combine military and civil agencies logistics. UN peace keeping military conditional involvement in humanitarian supply chain will improve the effectiveness of aid logistics. Hanaoka and Qadir (2005) state that military forces contributes “in support of Humanitarian Community by 153 helicopters, 84 fixed wings aircrafts, 62 sea-based assets and over 30,000 supporting military personnel delivering a daily average of 68MT of food, 70MT of water and 20 MT of medical goods”. But, military intervention raise the question of impartiality and neutrality as military forces wear their government colours and their actions subsequently imply bias and partiality.

Better coordination within and among organizations clears logistic bottlenecks (Thomas, 2003). Joint investment in common information systems enhances transparency give access to real time information to every entity of the supply chain (table 5.5). Moreover, the development of a network of knowledgeable staff in the field enable the transfer of data and use lesson from a disaster to another.

Working with the private sector in the region allows leveraging resources and infrastructure; joint contracting for transport will reduce rates.

Table 5.5 Roles in supply chain regarding information sharing

<table>
<thead>
<tr>
<th>INFORMATION SHARING and ROLES</th>
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<tbody>
<tr>
<td><strong>Relief Organization</strong></td>
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<tr>
<td><strong>Host Government</strong></td>
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<tr>
<td><strong>Vendor</strong></td>
</tr>
<tr>
<td><strong>Logistics Service</strong></td>
</tr>
<tr>
<td><strong>Application Service</strong></td>
</tr>
</tbody>
</table>

Source: Hanaoka and Qadir, 2005
5.4.3 Agility focus

Figure 5.7 presents the issues raised in this section. Oloruntoba and Gray (2006, p.117) “propose that the shaded areas in the scheme are where academic supply chain research can play an important role in concept development”. As stated earlier, any agile supply chain has a decoupling point combining forecast-based and customer-driven strategies. In aid supply chain, Christopher and Towill (2000) “suggest that there are two decoupling points: for strategic inventory, maintained in a generic form as far downstream as possible (the principle of postponement); and for demand information, which should move as far upstream as possible”. This supply chain should therefore be hybrid; this means producing a hybrid supply chain presenting “a lean and efficient supply upstream and an agile and effective supply downstream”.

Figure 5.7 An agile supply chain for humanitarian aid

Source: Oloruntoba and Gray, 2006
According to Oloruntoba and Gray (2006), the donor’s concern to a cause is based on “agility appeal” but not on long-term investment and lean impacts on the supply chain such as value-adding processes and elimination of waste (Appendix I).

Figure 5.7 integrates the postponement of inventory until orders are received in order to reduce “anticipatory risks of logistics” (Oloruntoba and Gray, 2006). Demand-driven inventory might be cost-effective substitute for pre-positionning suggestion, adjusting distribution of relief supplies according to the evolution of the needs and being as rapid and as adequate. However this cannot be successful without accurate and reliable data from locals (accessibility, weather…), nor without a generic inventory (or buffer stock) that will reduce risks due to insecurity. Eventually, the concept of postponement will increase speed and flexibility of response, and meet the evolving needs.

Responsiveness will be enhanced through effective IT infrastructure and sensitive needs assessment on the field; greater agility will, then, be able to respond to real demand. Information-based supply chain has direct impacts on the budget as the need of forecast will be lessened reducing costs due to inaccurate forcasting.

Beresford et al. (2002) proposed a disaster response model (figure 5.8) focusing on refugee situation and continuous assessment throughout the supply chain. The authors brilliantly inform the reader of the limitations of such model saying that crises like disasters are not natural but man-made and in that nature the context will constantly evolve. Therefore, solutions are only a short term issue and the logistician must “embrace a flexible planning approach to allow different scenarios”.


Figure 5.8 Refugee-focused model

Source: Beresford et al. (2005)

Appendix J presents the supply chain in the global response to HIV/AIDS, its challenges and successes (Fuessel et al, 2006). The objectives of the models suggested in this section are to clarify the options available in logistics and address the key issues that supply chain managers will have to anticipate.
Chapter Six: Conclusion

6.1 Outline of research

The aim of the dissertation was to examine the applicability of logistics industrial concepts to the humanitarian aid supply chain. Relief supply chains have a short and unstable existence, and do not provide any adequate link between emergency and longer-term development projects. Readers can understand donors’ interests in tangible immediate relief materials rather than logistics equipment. This paper suggests that the “academic community has a role to play in disseminating the concepts of its discipline in a way that convinces humanitarian donors of the importance and value of providing resources for appropriate information systems and supply chain processes as much as for tangible relief supplies”.

Moreover, agencies have become more aware of their need to strategically use their resources to align their operations around core competences. Nowadays, there is a tendency to coordination. However there are differing perceptions of what is meant by coordination; it may “comprise voluntary measures to avoid duplication or it may be a more profound attempt to harmonise responses” (Völz, 2005).

There is no single model that represents all elements that might occur but key variables need to be addressed. The most essential is the balance between each partner’s input in the supply chain, especially NGOs and military forces.

6.2 Limitations

The research has been focused on a wide scope, and remained qualitative. It is an initial step toward a more detailed analysis relief model implementation that limitations of this study cannot provide.
Information regarding humanitarian logistics is limited and the risk was to lose focus of this specific supply chain. To overcome it, the author categorised elements of literature review and interviews to highlight relevant data that tests hypothesis.

Confidentiality was another barrier. It was mainly impossible to have financial data from interviews. Moreover no literature on the subject is available and the author was not able to produce the costs and financial benefits of the implementation of a more responsive model.

The limited cooperation from French NGOs obscured the benefits of case study, but had been overcome using serious articles and reports.

6.3 Benefits of the research

6.3.1 Humanitarian partners
This study points out the areas requiring improvement in the overall relief supply chain and more specifically in disaster issue. It gives an overview of the process requirements and suggestions of analysis and implementation of changes, determining the appropriate strategy and why.

6.3.2 Personal review, reflection
Throughout the research, the author developed knowledge in the field of humanitarian logistics, extending her logistical and analytical skills, and report writing.

6.4 Applicability and Recommendations
The next step would be the implementation of changes suggested. A deeper analysis could audit NGOs agility, to respond more accurately to their specific supply chain.

Several opportunities can further develop BTO principles:
- Implementation of logistics clusters
- Performance and measurement: continuous improvement system in humanitarian activities.
- Evaluating the trade-offs between responsiveness and costs through a quantitative study
- Costs and financial benefits of responsive and agile logistics response model
Appendix A: Logistics in Humanitarian Sector

“If she had not been a Secretary of State in charge of American diplomacy but a logistician, Condolezza Rice would have certainly highlighted that the tsunami was a “wonderful opportunity” to show the strategic importance of this specific job, and not the generosity of United-States. In very difficult conditions, it was crucial to convey on the field the extraordinary mobilization of the international community after the Asian tidal wave of December the 26th, 2004. The first who intervene were the Armies of several countries of the region. Armies understood, decades ago, that supply Corps role was not to follow but to support, indeed to precede the movement. With their savoir-faire and important structures used around the world, humanitarian NGOs have taken over Army’s role, ensuring aid transport through airlift, maritime ways and roads to achieve their final objective; using all features of logistics, even if some specificity are sometimes different. This reveals that logistics sector should not be reduced to trailers and warehouses located at the entrance of cities.”

Source: From Sengès, G., 2005, p.1
During large-scale emergencies without military involvement, the UNJLC may be integrated into the structures of the Local Emergency Management Authority (LEMA). The UNJLC could also be under the direct supervision of the Humanitarian Coordinator or the Lead Coordinating Agency, which will most likely be the case in a Peacekeeping Environment. In principle, the LEMA, in consultation with the Humanitarian Coordinator, the UN Agencies will establish humanitarian priorities.

Donors may offer transport assets for common use to the LEMA, the Humanitarian Coordinator or the Lead Coordinating Agency. In such a case, beneficiaries should forward transport requests to Movement Planning which, in turn, publishes the daily transport schedule. Depending on the mode of transportation, the execution will be coordinated between Movement Monitoring and the Movement Execution Cell. After mission execution, the UNJLC Information Management Section will collect and process all necessary reports. If required by the LEMA, the UNJLC Supply/warehousing section may further draw up an inventory, assist in storage and eventually coordinate the allocation of unsolicited humanitarian commodities.

In a Peacekeeping or Complex environment, movements and humanitarian versus military priorities will be coordinated with the respective Logistics Operations Centres of the Department of Peacekeeping Operations (DPKO) or relevant Military Entities.

Source: UNJLC, 2003, Concept
Appendix C: The United Nations chose to outsource to private sector

The UN agency, World Food Program (WFP), defines itself as the biggest humanitarian organisation and has continuously 50 boats, 20 planes and thousands of trailers from private firms. Those logistics costs are close to 900 million dollars per year.

From our office in New York

Logistics has become a major stake when 6 million tons of food are distributed to over 100 million people per year in some 80 countries. This is what WFP accomplished each year, the UN agency, responsible for meeting food needs of populations affected by wars or natural disasters. According to people in charge, it would be inefficient to own a naval fleet or air fleet or trailers. “Our philosophy is not to own our own mean of transport, but to ask private contractors”, explains David Morton, transport and supply manager at WFP. Renting to private sector costs less, according to him, especially because owning a fleet would necessitate maintenance, which, besides, would divert the organisation from its main mission. About 11,000 people work for the UN agency, among which 90% work on the field to support populations. Continuously, about fifty boats, twenty plans and thousands of trailers are rented to private carriers. WFP sometimes departs from the rules for road transport, if it cannot find another way. “Our intervention in Darfour necessitates a lot of vehicles, among which are hired to Sudanese firms, but this was not enough”, explains David Morton. They had to buy trailers. “But we never bought boats or planes.” As a consequence, renting offers some benefits, which are encouraging firms in weakened areas and place money in their economy.

Transport hubs

Considering the perishable nature of food, the World Food Program establishes the most reactive transport hubs possible and located to the nearest to countries from which people are in need. There is not enough big distribution centres around the world. “The food usually comes from donor, who is in charge of the transport, in general by boat, to the nearest place to the area of crisis, says the manager. Then, our mission is to store food and to ensure land carriage as fast as possible; therefore we have a warehouse in the north of Kenya that enables us to bring our products by plane to the South-Sudan.”
The areas in which the agency intervenes are plenty: currently, the principals are Sudan, Angola, Afghanistan, Ethiopia, North Corea, the West of Africa (Ivory Coast, Liberia…), the East of this continent (Rwanda, Burundi…) and the area of South-East Asia affected by the tsunami. The WFP has become a crucial actor of the international transport. That is particularly true regarding maritime transport, through which 90% of food aid they distribute conveys in transit. By air, about 160,000 tons of food had been transported in 2000 in 13 countries. “In a country like Afghanistan, in order to offset commercial transport deficiencies, we also ensure the transport of staff from other NGOS”, highlights David Morton. Because transport is crucial for its mission, the WFP has developed an emergency structure called Alite (Augmented Intervention Team for Emergencies), within which 4 or 5 people are evaluating the needs and the access to transport ways to react as quickly as possible to crisis.

Source: Madelaine, N., 2005

WFP mission can be wider. If the American are used to give items, The European Union tends to send money. “In this case, we try to buy food in the area of intervention or near them, where purchasing are the cheapest”, notes David Morton. In total, food items represent around 2 million of dollars every year, among which two third are given and the rest of it is bought.

The WFP is not the only UN agency needing transport. UNICEF, in charge of education and children’s health issues in underprivileged areas, and the Word Health Organisation, which transports drugs, route also a lot of products. “We coordinate our efforts when we intervene at the same places”, explains David Morton. However, the WFP has developed a more expert logistics because of the extent of its mission and the specificity of food transport. The other UN agencies often lie on its structures.

Source: Madelaine, N., 2005

**World Food Program Budget**

(in million of dollars)

**Total : 3,275** million of dollars

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost (in million of dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procurement</td>
<td>637</td>
</tr>
<tr>
<td>Donations</td>
<td>1282</td>
</tr>
<tr>
<td>Non-food item costs</td>
<td>466</td>
</tr>
<tr>
<td>Transport cost</td>
<td>890</td>
</tr>
</tbody>
</table>

Source: WFP, 2003 data
Appendix D: Existing models

Whittow (1980) devised a flow-chart General Systems Model to illustrate the effect of environmental hazards and the possible behavioural adjustments and human responses to extreme events that can occur. Waugh (2002) considered the adjustments and responses to hazard events, devising models that consider the responses to hazard events in a disaster response model similar to that of Haas et al.’s (1977). In this model, human responses are divided into two general levels of response: biomedical and psycho-social. The biomedical responses tend to be predominantly (although not exclusively) short term, while the psycho-social responses are longer term in their nature. Park (1991) also modelled the funding and distribution of aid, detailing the flow of aid from official and voluntary sources. […]

Two models developed by the JDCC for UK military involvement in conflict/security contexts are the Interstate Conflict Model and the Alternative Conflict Model. The Interstate Conflict Model deals with military force being used for the desired outcome of destruction of will and means, thus enabling the subduing of the opposing forces. In such situations there is unlikely to be any aid provided by any organisation other than the military. Security conditions would dictate that only the military would be able to access such areas while conflict was still occurring. The Alternative Conflict Model involves a much greater complex of state and non-state actors, several points of conflict, and often several factions. The model factors-in the idea of a failed or failing state, with military force being used as part of the conflict, leading to altered will and conciliation. In such circumstances there may be opportunities for HA to be provided by the range of aid organisations, although again the security conditions on the ground are likely to be dangerous (JDCC 2004). […]

A further model developed by the JDCC is known as the RECHIMED Model (JDCC 2004). In this model, a nation or society is seen as a series of strands whereby the interrelationships between the actors are drawn together. In the case of failure of relief operations, it is usually because of the failure of one or more of the key constituents. At the start of a PSO the UK military are likely to be involved in many if not all of the strands; their activities are not limited solely to the military strand. This has an impact on logistics and the supply chain structures because although the military would like to control all of the logistics chain, they recognise that a proportion has to be outside their control. Thus, while the strategic, operational and tactical levels are separate, a “control-at-arms-length” approach may be taken. Decisions taken at the tactical level may have an impact on strategy, an example of strategy affecting the supply of HA⁴ on the ground being the movement of supplies to Um Qasr (Spring/Summer 2003).

Source: Pettit & Beresford, 2005

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⁴Humanitarian Aid
En une décennie, la logistique humanitaire s’est professionnali- sée. Chaque grande organisation dispose de ses propres équipes de logisticiens, en France ou en pays sinistré et utilise les prêta- taires logistiques.

En amont, un travail de fourni d’associations draîne des dons en nature tandis que des centaines d’achats tentent de massifier achats et flux, en se rapprochant autant que possible des théories d’intervention. Ainsi, Médicins sans frontières (MSF) a acquis en Inde et au Pakistan des tapis pour l’Unionsoie et Handicap international des fournisseurs à Sumatra. Rares sont les organismes qui disposent en propre de plate-formes de stockage en France. Les petits stocks tampons sont le plus sou- vent sous-traités auprès de transpor- tateurs, moins chers, qui en a- trait la fermeture d’installation en région parissienne. « C’est à ce moment de reprise, et non aux ONG d’améliorer des moyens et donc des coûts en atténuant les urgences, dit un responsable. »

MSF dispose de moyens propres avec une entité « satellites ». MSF Logistique, basée à Bordeaux (5 000 mètres carrés, 60 personnes, 7 000 tonnes capa- bles en 2004) répondant aux besoins de la France et de la Suisse. Cette plate-forme intégrée autant une maîtrise de la qualité des achats, la traçabilité d’achats et de stockages, préassemblage des kits... La Centrale humanitaire de l’ambulance pharmaceutique (CIMP) (Hôpitaux-Ferrand (63), qui fait la même chose pour la Pharmaceutique sans frontières, a ouvert un nouveau plateau de production à Nairobi au Kenya où sont stockés des génériques achetés en Inde. Bioprest, une autre installation importante, basée à l’aéroport de Lyon Bron, mutualise, pour en répartir les prix, le fret d’une cinquantaine d’associations.

Mutualisation du fret
Il existe au moins une dizaine d’autres structures d’entreprises en province. Certaines, comme Humanitas en Alsace ou la plate- forme de Romans, y associent lo- calisées des démarches d’insur- ance. La cellule d’urgence (UCC) (OSAR) qui gère les interventions directes de l’État dispose aussi des stocks de produits non alimen- taires (bienfaits d’urgence, eau,...) préposés à Mésy- sur- Oise, aux Antilles et la Réunion.

La logistique d’acheminement des marchandises de France ou des pays d’achats vers les pays sinistrés est presque tou- jours assurée par des transpor- tateurs, mais même en France pour l’urgence, en méri- tome pour ce qui est moins. Les afférences directs ne se justifient pas de volumes exceptionnels et l’urgence. MSF Logistique est à l’heure actuelle, par exemple, via des brokers spécialisés, au moment du traf- fic, pour expédier plus de 1 000 tonnes en utilisant 40 cargos charters. Dans les grandes ur- gences, la mutualisation du fret est toujours recherchée, à travers une « cellule sine crise opérationnelle » qui coordonne à Paris les ministres et les organismes non gouvernementaux.

Les transitoires qui répondent volontiers aux appels d’offres des ONG sont une poignée, comme Qualitair du groupe CMA-CGM. À Roissy, l’un des plus spécialisés est Excelco. « Nous gérions les stocks de plus de 120 pays, préparons les commandes, embar- gons et expédions dans un entrepôt de 600 mètres carrés à l’aéroport », explique Eric Duval, son directeur. À Beaudoin, Mory SST, filiale de groupe Mory, répond aussi aux appels d’offres de l’humanitaire et traite à lui seul la moitié des expéditions de MSF logistique « du colis de 1 kg à l’aéronauti- que ». Cette niche où la pression sur le service est forte n’intéresse pas for- cément les grands opérateurs, parce qu’elle suppose une disponibilité permanente, une grande réactivité et un personnel motivé, précise Alain Molina, l’un de ses respon- sables.

Plusieurs missions
En oval, la logistique de distribution doit remplir plusieurs missions allant du délocalement, au sto- cage et à la gestion des stocks, en passant par la maintenance des véhicules, le transport depuis les aéroports ou les ports jusqu’aux stocks et pas de stocks jusqu’aux sinistrés. Le transport final est sou- vent compliqué par la géographie, l’état des infrastructures ou la sécurité, comme dans la province de rébellion de Sumatra.

Pour répondre aux urgences, les grandes ONG envoient des équipes mobiles de logisticiens ou cherchent des associations partenaires locales. Handicap s’est ainsi appuyé sur sa structure, Maëra ou le Groupe Logistique humanitaire de Suisse, ou encore l’association en République centrafricaine... Les associations françaises préfèrent avoir recours au seul spécialiste, Atlass Logistique, qui monte en urgence des plate-formes temporaires dès qu’un besoin apparaît dans un pays sinistré, « pour aider ceux qui aident, en réalisant des économies d’échelle. » Dès que la situation le permet, ils retirent pour laisser le marché local reprendre ses droits.

Source: O.N., 2005

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Les dépenses des organisations de solidarité internationales françaises

<table>
<thead>
<tr>
<th>Rapport des dépenses en %, en 2001</th>
<th>Frais de collecte</th>
<th>Activités dans les pays tiers</th>
<th>Activités en France</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dépenses, en milliers d’euros</td>
<td>17,64</td>
<td>10,94</td>
<td>54,88</td>
</tr>
<tr>
<td>Frais de collecte</td>
<td>86,29</td>
<td>113,36</td>
<td>11,46</td>
</tr>
<tr>
<td>Activités dans les pays tiers</td>
<td>24,52</td>
<td>51,12</td>
<td>1,16</td>
</tr>
</tbody>
</table>

*Source: Rapport de la Commission coordination Humanitaire, décembre 2003*
APPENDIX F: Key Performance Indicators in Humanitarian Logistics

Principles of Performance Measurement from the Commercial and Military Sectors

Supply chain professionals in the commercial sector face many of the same issues of trade-offs in performance as a professional working in a disaster relief operation. [...]The following three principles emerged from business research journals and from research studies of the U.S. Army as the most applicable to the humanitarian sector.

- **Align metrics to the organization’s core strategy (Lambert, 2001).** If a metric is not critical to fulfilling an organization’s core strategy, it should not be included on the scorecard. [...] 
- **Understand the dynamics of how performance is driven (Caplice & Sheffi, 1994).** The faster that goods are delivered to beneficiaries after a disaster, the less likely these goods are accurately meeting the needs of the beneficiaries, and the more likely the operation will be costly. The organization responding must decide in advance how it wants to align itself along the dimensions of speed, accuracy, and cost.
- **Review the metrics periodically as performance improves (Meyer, 2005).** The goal of implementing metrics is to improve performance over time, and as goals are achieved, targets must be re-evaluated and revised as necessary to ensure continuous improvement in the organization’s supply chain.

Framework of Four Performance Indicators

To develop our framework of four performance indicators, we first conducted interviews with the professionals at the IFRC in order to understand their supply chain and their organization’s strategic goals. We then examined the data for the 2005 South Asia earthquake operation that was captured in Humanitarian Logistics Software (HLS). This software was implemented by the IFRC in 2003, to track information relating to the procurement and distribution of goods for all major emergency operations. Using the organization’s goals of how they strive to deliver goods to beneficiaries and using the data available from HLS, we developed the set of four indicators: appeal coverage, donation-to-delivery time, financial efficiency, and assessment accuracy, [...] to help the logisticians get a sense of how well they are achieving their goals related to each “appeal,” the term which refers to the list of items recorded on an operation’s total budget.

1. **Appeal Coverage:** This indicator is comprised of two specific metrics: 1) percent of appeal coverage and 2) percent of items delivered. [...] These two metrics indicate how well the organization is meeting its appeal for an operation in terms of both finding donors and delivering items.

2. **Donation-to-Delivery Time:** This indicator is a measure of how long it takes for an item to be delivered to the destination country after a donor has pledged to donate it. [...] These two metrics help gauge both the average and the consistency of the delivery lead times.

3. **Financial Efficiency:** Three metrics comprise the indicator of financial efficiency:
   - compare the budgeted prices to the actual prices paid for items delivered in the operation
   - a ratio of the total transportation costs incurred over the total costs for delivered items at a point in time. The value of this ratio should decrease over time, as less expensive transport methods are used after the initial delivery phase and as more items are delivered on-site.
4. Assessment Accuracy: How quickly donations are pledged and goods are delivered to beneficiaries relies on how accurately the field personnel assessed the needs of the population affected after a disaster. Assessment accuracy therefore indicates how much the operation’s final budget changed over time from the original budget. […]

Using the Framework in an IFRC Operation

[…] Figure 1 shows what the “Week 1 Scorecard” would have looked like for the 2005 South Asia earthquake operation, had this system been used by the IFRC during that operation. Only the metrics for Appeal Coverage and Donation-to-Delivery Time are included in the Week 1 Scorecard. The financial efficiency metrics are not added until the Month 1 Scorecard, because the IFRC focuses primarily on procurement and delivery during the operation’s initial phase immediately after a disaster. Assessment Accuracy is not included on the Week 1 Scorecard, because the Week 1 budget is what will serve on the future scorecards as the “baseline” budget for the operation.

Figure 1 – South Asia Earthquake Week 1 Scorecard

<table>
<thead>
<tr>
<th>South Asia Earthquake</th>
<th>Operation Total</th>
<th>Priority 1</th>
<th>Priority 2</th>
<th>Total Op</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appeal Date: October 9, 2005</td>
<td>(Weighted)</td>
<td>Housing</td>
<td>Kits &amp; Sets</td>
<td>Target</td>
</tr>
<tr>
<td>Percent of Appeal Coverage (in quantity of items)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After 1 week</td>
<td>63%</td>
<td>61%</td>
<td>77%</td>
<td></td>
</tr>
<tr>
<td>Percent of Items Delivered (in quantity of items)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After 1 week</td>
<td>6%</td>
<td>1%</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Donation-to-Delivery Time</td>
<td>Mean (# days)</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Median (# days)</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Similar scorecards would be created after Week 2, Month 1, Month 2, etc., which consecutively track the operation’s progress over time. Figure 2 shows the Month 1 Scorecard, which includes all four indicators. At this point in time, the logistics department would start analyzing the financial efficiency of the operation, since the initial delivery phase has passed.
When the operation has been completed, the information can be compiled in a Final Scorecard, shown in Figure 3, which presents a **cumulative snapshot of the logistic performance throughout the entire operation**.

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5 Note that the second financial efficiency metric in Figure 2 is expressed in Swiss Francs (CHF), which is the currency used by the IFRC. For other organizations using other currencies, any currency may be used in this system.
Implementing the Framework

The “Total Op Target” column has been left blank in Figures 1-3; an organization actually using this system must first define these values in order to compare targets to actual results. Defining quantitative goals is a critical success factor to the implementation of a performance measurement system.

A key feature to highlight from the scorecard is the systematic use of designating “priority items” in each operation. If an organization determines at the beginning of an operation what the most important items are to deliver to beneficiaries, this will facilitate communication between donors who need to know what to donate, field personnel who need to know what they are receiving, and the logistics department which links these two parties together. The prioritized items are prominently displayed on the scorecard so that the organization can easily see how quickly and efficiently these goods are being delivered to the field.

In order to apply this framework for use in other non-profit humanitarian organizations, the IFRC’s framework should be modified, since it was designed in keeping with their specific business processes and strategic goals. For example, the IFRC accepts both cash and in-kind donations (donations of goods), while many other relief organizations only accept cash donations. When only cash is accepted, there is an additional step in the supply chain: step of fundraising, a metric should be added which captures how quickly the organization raises funds from donors out of the total amount of money that has been requested for the operation.

Source: Davidson, 2006
Appendix G: Major activities within disaster response operation

Within a given disaster response operation, knowledge and decisions from each area of activity drive and constrain logistics efforts, as follows:

1. **Assessment**: At the time that a disaster strikes, humanitarian organizations work to quickly and accurately ascertain the supplies required to meet the relief needs of an affected population. Typically, an assessment team with individual expertise in areas such as water/sanitation, health care, and nutrition, is dispatched to the disaster area, usually within the first 24 hours of a crisis. Logisticians estimate needs based on early rough projections of numbers of beneficiaries that may swing wildly in either direction as new information emerges.

2. **Appeals Management**: A preliminary appeal for donations of cash and relief supplies is launched often within 36 hours of the onset of the disaster. This appeal is the basis for large-scale mobilization of supplies.

   If donors do not respond and the appeal is under-funded, relief cannot proceed. The type and quantity of relief supplies needed are published to a mobilization table (a spreadsheet) that is used to track donations against demand. Since donations may be either in cash or in-kind, logisticians must work with donors to insure that in-kind donations are appropriate and useful to the relief need. Simultaneously, any pre-positioned supplies available to the organization are assessed, and procurement activities are begun as necessary.

3. **Operations Planning**: Coordination of the distribution of relief supplies with other relief activities, such as infrastructure repair and construction of field hospitals, is critical to making it effective. Constraints such as the political situation and weather or safety issues are likely to impact planning.

4. **Mobilization**: International transport capacity is mobilized and supplies are sent directly to the affected country, where relief aid must clear customs and then be transported by local transport to warehouses nearest the disaster site. Note that the success of these supply chain execution functions hinges as much on timely information as it does on assets. The activities of each
function must be closely tied with the function downstream to avoid delays at handoff points in the logistics network.

. **In-country Operations:** Once supplies arrive at the local port of entry, an organization.s in-country staff becomes the primary mechanism for the distribution of goods to beneficiaries. However, in-country/local distribution, where order accuracy must again be verified, goods received notices generated, and beneficiaries provided for, is not the end of a given disaster response. As with all functions in the disaster response process, performance must be measured and lessons learned in the field must be codified for use in improving organizational efficiency in future programs.

. **Coordination with Other HROs:** For major disasters hundreds of organizations work at the disaster site, all seeking to set up facilities and infrastructure, and to move supplies and people in and out. Congestion may limit availability of relief supplies, as happened during the Gujarat earthquake when one main airport with few officials, trucks, and warehouses served as the entry point for 50 organizations flying in goods over a period of 10 days. Competition for locally available commodities and services, such as for lodging and vehicle purchase/lease, has been known to drive prices up by a factor of 10 compared to normal conditions.

. **Reporting:** Reports serve as a coordinating mechanism as operations unfold, and as a means to monitor effectiveness of relief during and at the close of an operation. Early reporting to the media can also demonstrate effective action, and thereby increase pledge contributions. Reporting also meets donors. needs to inform their own constituencies about their activities. Timely reporting is critical, yet difficult to achieve, given the lack of information systems and communications infrastructure at disaster sites. Reporting is also hampered by a lack of training of field employees.

One need look no further than the relatively recent disaster in Gujarat, India to get a sense of the difficulty faced by humanitarian organizations in administering relief in disaster situations and of the positive impact humanitarian organizations can have on beneficiaries. On January 26th, 2001, a 7.9 Richter earthquake struck Gujarat, where 41 million people were preparing to celebrate India.s 50 years of independence. Thousands of people were killed, the local airport was destroyed, the infrastructure severely damaged, and very little information was available in the early stages of the disaster. Nonetheless, within the first 30 days of the earthquake, along with the assistance of 35 partner organizations, the International Federation of the Red Cross.s Logistics Emergency Unit arranged the delivery of 255,000 blankets, 34,000 tents, 120,000 plastic sheets, and large quantities of other items such as kitchen sets. More than 300 other global, regional, national and local NGOs and UN agencies similarly mobilized their staffs and resources.

Faced with unpredictable and uncontrollable conditions such as these, logisticians must continue to operate, relying on innovativeness and ingenuity, all the while knowing that the survival of vulnerable people depends on the timely arrival and distribution of relief supplies. Bernard Chomilier, the head of logistics for the IFRC described this difficult job in the following manner: .You do not know what you need, you do not know where you need it, but you have to get it there in a short amount of time under chaotic conditions or people will die.. In other words, logisticians must get the right goods, to the right place, at the right time, within the boundaries of a budget that has yet to fully materialize.  

*Source: Thomas, 2005*
## APPENDIX H: Disaster Management process overview

(Hale and Moberg, 2005)

<table>
<thead>
<tr>
<th>Stages</th>
<th>Planning</th>
<th>Mitigation</th>
<th>Detection</th>
<th>Response</th>
<th>Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major steps</td>
<td>1. Establish a planning team</td>
<td>1. Define mitigation opportunities</td>
<td>1. Develop detection plan</td>
<td>1. Implement response plan</td>
<td>1. Review and implement recovery plans</td>
</tr>
<tr>
<td></td>
<td>2. Analyze capabilities and hazards</td>
<td>2. Develop mitigation plan</td>
<td>2. Acknowledge warnings</td>
<td>2. Evaluate direction and control</td>
<td>2. Ensure continuity of management</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Continuous improvement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Adapted from Helferich and Cook (2002, p. 53)
APPENDIX I: Hybrid Supply chain

The humanitarian supply chain at the level of the international donor in developed countries should be:

**Lean for upstream activities** such as:
- needs assessment (remote demand forecasting)
- mobilisation of sufficient financing
- people, skills and goods
- procurement, transportation sourcing, disaster preparation and planning
- and related upstream supply chain activities.

**Upstream are usually lauded for their “agility”:** for example, credit is given to the speed with which a particular appeal can be instituted, and how generously and quickly donors can respond to a one-off event.

*Source: From Oloruntoba and Gray, 2006*
APPENDIX J: SCMS: Strengthening Supply Chains in the Global Response to HIV/AIDS

Scaling Up to Meet the Need

According to UNAIDS, 39.5 million people are currently living with HIV, with 4.3 million new infections in 2006. At the end of 2005, approximately 1.3 million people in low and middle-income countries were receiving life-extending antiretroviral treatment – roughly one in five of those in clinical need. While the global imperative to address HIV/AIDS is helping to slow the rate of new infections, treatment projections for the coming years call for an unprecedented scale-up of health care services, supplies, and delivery infrastructure. In logistics terms, this rate of expansion could require an increase in pharmaceutical shipments from 90,000 pallets in 2005 to between 360,000 and 540,000 pallets per year.

The surge in demand for HIV/AIDS-related commodities has stretched global supply chains to their limits, putting millions of people’s lives at risk. Ensuring that medicines are continuously available when people need them is crucial. Once people living with HIV start antiretroviral (ARV) therapy, they must stay on treatment to maintain their health and to avoid developing drug resistance, potentially creating resistant strains of the virus.

Supply chains – the integrated network of activities that move products and transfer information from manufacturer to recipient – are a vital component of HIV/AIDS care and treatment scaleup. Global and national supply chains that are safe, secure, reliable, and cost-efficient will facilitate effective manufacturing, procurement, and distribution processes. This in turn will enable clinicians to provide improved patient treatment and care.

Addressing Typical Supply Chain Challenges

Programs and governments may face many supply chain challenges as service delivery scales up. For example:

- **Lack of coordination** among partners leads to duplication of efforts while gaps continue to exist.
- Inadequate quantification can lead to commodity shortages.
- **Fragmented procurement processes** can create inefficiencies and complicate coordination efforts.
- **Non-uniform and non-transparent** contractual conditions lead to increased procurement transaction costs and unreliable supply.
- **Large, infrequent orders** place burdens on local infrastructure that result in product expiration or stockouts.
- **Overstretched in-country storage and delivery** routes increase the risk of theft, counterfeiting, and spoilage, resulting in program loss and health risks.
Partnering To Improve Supply Chain Performance

Ensuring that quality health services and medicines are continuously available when they are needed requires partnership across a diverse set of international and national partners.

A number of organizations have partnered to establish effective HIV/AIDS supply chains in resource-constrained areas of the world. As treatment goals increase, however, all existing supply chains need to be further strengthened to accommodate vastly increased delivery volumes without overburdening fragile local infrastructure. Proven best practices as well as innovative solutions need to be shared between countries. Capacity building will need to be accomplished cost-effectively to avoid diverting funds from procurement of medicines and supplies. And these improvements must be made in ways that are sustainable over the long term.

Established in September 2005, the Supply Chain Management System (SCMS) helps ensure that essential HIV/AIDS medicines and supplies are available to meet this unprecedented need. By providing technical assistance to local partners, SCMS develops national capacity and strengthens (rather than replacing) existing systems. SCMS procures and delivers antiretrovirals, HIV test kits, lab supplies, and other HIV/AIDS–related commodities to countries throughout the developing world. Additionally, SCMS works with in-country and international partners to coordinate efforts and share supply chain information to avoid duplication and improve decision making.

Funded by the President’s Emergency Plan for AIDS Relief (PEPFAR) through the U.S. Agency for International Development, SCMS is managed by the Partnership for Supply Chain Management, a non-profit partnership formed by JSI Research & Training Institute, Inc., and Management Sciences for Health. The SCMS project is comprised of 17 private sector, nongovernmental and faith-based organizations. Currently, SCMS is working in 16 countries and has 14 field offices – primarily in PEPFAR focus countries.

Supporting Partners through Technical Assistance

To ensure supply chain sustainability, SCMS facilitates local ownership by providing technical assistance to partners in procurement, quantification, warehouse management, distribution, and other supply chain–related disciplines. For example, in Guyana, SCMS is supporting the Ministry of Health with technical expertise and resources to strengthen warehousing and inventory management systems. In July, SCMS partnered with the Ministry to open a new warehouse that is secure and temperature-controlled, using best-practice operating procedures for storing and distributing HIV/AIDS-related commodities.

Expanding Global Supply Chain Capacity

The SCMS supply chain model follows a continuum from quantification through procurement, freight forwarding and inventory management, and delivery. Scaling up to meet HIV/AIDS
treatment needs requires *creative expansion of approaches to sourcing and distribution of essential drugs and supplies*. Managing vastly increased volumes of products without crushing already overburdened national supply chains requires *a global paradigm shift, from large, infrequent spot purchases and deliveries to frequently adjusted quantifications, long-term supplier contracts, and continuous replenishment of regional and local inventories*. Such industry best practices are essential to the development of the manufacturing and materials management capacity needed at scale.

Establishing *long-term relations with vendors* is an important part of the SCMS supply chain solution. *Long-term contracts enable manufacturers to better plan their production* and raw materials requirements, expand production capacity, and perhaps reduce prices. These contracts additionally enable rapid order fulfillment, leading to continuous product availability. The benefits of the contracts accrue to all who use SCMS products, even the smallest health care provider.

At the heart of the SCMS supply chain approach to freight forwarding and inventory management is the regional distribution center (RDC). Currently, SCMS has three RDCs operating in Ghana (serving Côte d’Ivoire and Nigeria), Kenya (serving Ethiopia, Rwanda, Tanzania, Uganda), and South Africa (serving Botswana, Mozambique, Namibia, Zambia and Zimbabwe). RDCs allow manufacturers to *optimize production schedules* while allowing clients to receive products as they are needed. RDCs can *cost-effectively send frequent, small shipments to clients* rather than large annual or semiannual shipments. Thus the throughput of national supply chains can be increased without adding physical infrastructure. Shipments can be planned and consolidated for delivery to reduce international freight costs, and donated goods can be consolidated with other commodities. A continuous flow of shipments from RDCs also enables more efficient customs clearance.

The RDCs operate to industry best–practice standards, thus ensuring safe storage and reduced waste due to expiration. RDCs are stocked with essential products such as ARVs, rapid test kits, and critical opportunistic infection and sexually transmitted infection drugs. These products are *procured in advance of country orders, based on expected need*, rather than being purchased to fulfill individual orders. Thus, RDCs *allow a rapid response to both unpredicted demand and emergency needs*. Average order response time for essential supplies is shortened from months to weeks, or even days.

**Addressing the Information Imperative**

One of the most significant challenges of rapid scaleup is *capturing and analyzing critical logistics data*. Well-developed information systems are required to track orders, monitor product shortages or losses, report defects, and manage inventory; *without an adequate logistics management information system, all other supply chain functions fail*.

SCMS is developing a robust logistics management information system for the commodities we procure and deliver. The system will provide the information necessary to *operate, control, and*
improve our supply chain. Clients will be able to track their orders throughout the delivery process, and access the Web-based product list (the “ecatalog”). The information system will facilitate enhanced global and national planning and the management of supply chain performance.

Each day, 8,500 people die from AIDS. However, applying industry best–practices in supply chain management can enable HIV/AIDS programs to meet the surging demand for treatment by ensuring an uninterrupted supply of life-saving commodities to those who need them.

For more information

Email questions or comments to scmsinfo@pfscm.org or visit the Web site at www.scms.pfscm.org.

Source: Fuessel et al, 2006

<table>
<thead>
<tr>
<th>SCMS Team Member Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affordable Medicines for Africa; AMFA Foundation; Booz Allen Hamilton; Crown Agents Consultancy, Inc.; The Fuel Logistics Group (Pty) Ltd.; IDA Solutions; JSI Research &amp; Training Institute, Inc.; Management Sciences for Health, Inc.; The Manoff Group, Inc.; MAP International; Net1 UEPS Technologies, Inc.; North-West University; Northrop Grumman; Program for Appropriate Technology in Health; UPS Supply Chain Solutions; Voxiva, Inc.; 3i Infotech, Inc.</td>
</tr>
</tbody>
</table>
## APPENDIX K: Glossary

| **Agility** | The agile supply chain is customer responsive, focusing on drivers of customer value in all processes. Manufacturer’s processes are connected with those of their supply chain partners to develop capabilities for responsiveness and flexibility and to align all operations. |
| **BTO** | Build-to-order |
| **Complexity** | High variety of parts or options (wide choice of colours, options, etc), can be internal or external. |
| **Complexity management** | Complexity management aims to handle the growing number of variants per part without limiting the offers. |
| **ECHO** | European Commission Humanitarian Office |
| **Effectiveness** | Ability to quickly respond to fluctuating demand (volume and variety). |
| **Efficiency** | Ability to produce as fast as possible without compromising quality. Efficient supply chains often become uncompetitive because they don't adapt to changes in the structures of markets |
| **IDPs** | Internally displaced populations |
| **JIT** | *Just-in-time* is an inventory control system that controls material flow into assembly and manufacturing plants by coordinating demand and supply to the point where desired materials arrive just in time for use. Developed by the automobile industry, it refers to shipping goods in smaller, more frequent lots. |
| **Flexibility** | “ability of a system to adapt to changing external and internal influences has been recognised as a source of competitive advantage” (Holweg, 2005, p.606) |
| **Lean** | Refers to the elimination of waste in all aspects of a business and value enrichment from the customer perspective. |
| **USAID** | United States Agency for International Development |

*Source: Christopher (2005); Harrison & van Hoek (2005); Grant et al. (2006); Walters (2006)*
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