How to Handle Demand Fulfillment in an Uncertain Environment

A Study of Humanitarian and Corporate Organizations and Their Cross-Learning Potentials

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Affidavit

I declare that I have authored this thesis independently, that I have not used other than the declared sources/resources, and that I have explicitly indicated all material which has been quoted either literally or by content from the sources used. The text document uploaded to TUGRAZonline is identical to the present doctoral thesis.

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Abstract

In today's ever more connected world the effects of supply chain disruptions are a huge problem which affect the corporate and the humanitarian world likewise. The short-term and long-term impacts of those disruptions can be devastating and even lead to a withdrawal from the market; therefore, the academic and practitioner community emphasized the need to design supply chains in a way that they are resilient to these disruptions.

As organizations exist whose specialty is to deal with disasters and disruptions on a daily base, the question arose why not to explore their methods and strategies on how to handle these difficult situations? Why not shed light on humanitarian organizations?

Commercial and humanitarian organizations might be considered to being very different, but those differences do not change the general setting of the supply chains and the problems they are faced with. Their major goal is to fulfill the customers´ (beneficiaries´) demand. Furthermore, they are both in a difficult non-ordinary situation and have only a limited time available for their endeavor until major consequences arise for their customers/beneficiaries.

Therefore, this thesis will take a look at supply chain resilience capabilities of humanitarian organizations. To learn about their approach an extended literature research and interviews with practitioner experts from five of the world's largest humanitarian organizations were conducted. Furthermore, a case study was done on the Austrian military, as part of the military relief forces, which get active following a large humanitarian disaster.

The findings of this study indicate that the big players in the humanitarian field function rather alike when considering supply chain resilience capabilities. The major differences are being able to track back mostly to the level of decentralization. After having identified the resilience capabilities of humanitarian organizations it was seen whether cross-learning potentials between the humanitarian and commercial world could be identified, which would create new insights for a better supply chain resilience approach. Humanitarian and commercial organizations were found out to rely on very similar supply chain resilience capabilities. Nevertheless, cross-learning potentials could be identified which would benefit the organizations, when implemented.

Contents

Abbreviations

AAF	Austrian Armed Forces
AEW	Analysis and Early Warning
AFDRU	Austrian Forces Disaster Relief Unit
APICS	American Production and Inventory Control Society
CCCM	Camp Coordination and Camp Management
CECIS	Common Emergency Communication and Information System
CoV	Coefficient of variation
CSCMP	Council of Supply Chain Management Professionals
CTD	Cyclododecatriene
DOE	Department of Operations and Emergencies
ERP	Enterprise Resource Planning
ERT	Emergency Response Team
ET	Emergency Team
EU	European Union
FACT	Field Assessment Coordination Teams
FAO	Food and Agriculture Organization
FDA	Food and Drug Administration
FPF	Forward Purchase Facility
FW	Framework
GDACS	Global Disaster Alert and Coordination System
GHS	Global Humanitarian Services
GM	General Motor
GO	Governmental Organization
HQ	Headquarter
HO	Humanitarian Organization
HRM	Human resource management
IASC	Inter-Agency Standing Committee
ICRC	International Committee of the Red Cross
IDP	Internally Displaced People
IFAD	International Fund for Agricultural Development
IFRC	International Federation of Red Cross and Red Crescent Societies
IGO	Intergovernmental Organization

INSARAG	International Search and Rescue Advisory Group
IOM	International Organization for Migration
IRA	Immediate Response Account
LC	Logistic Cluster
LEMA	Local Emergency Management Authority
LOGFAS	Logistics Functional Area Services
MDCA	Military and Civil Defense Assets
MENAR	Middle East and North Africa
MSF	Médecins Sans Frontières (Doctors without Borders)
MT	Mobilization Table
NATO	North Atlantic Treaty Organization
NBC	Nuclear, Biological, Chemical
NGO	Non-Governmental organization
NS	National Societies
NSPA	NATO Support and Procurement Agency
OC	Operational Center
OCHA	Office for the Coordination of Humanitarian Affairs
OLRT	Operational Liaison and Reconnaissance Team
ORM	Operational Readiness Management
OSOCC	On-Site Operations Coordination Centre
PICMME	Provisional Intergovernmental Committee for the Movement of Migrants from Europe
PRD	Preparedness and Response Division
RDC	Reception/Departure Center
RIT	Regional Intervention Teams
RITA	Relief Item Tracking Application
SC	Supply chain
SCM	Supply chain management
SCC	Supply Chain Council
SCOR	Supply Chain Operations Reference model
SCRAM	Supply Chain Resilience Assessment and Management
SCRES	Supply Chain Resilience
SCRM	Supply Chain Risk Management
SMS	Security Management System
TRD	Transition and Recovery Division

UN	United Nations
UNDAC	United Nations Disaster Assessment and Coordination
UNHAS	UN Humanitarian Air Service
UNHRD	UN Humanitarian Response Depots
UNHCR	United Nations High Commissioner for Refugees
UNISDR	United Nations Office for Disaster Risk Reduction
USAR	Urban Search and Rescue
VAM	Vulnerability Analysis & Mapping
VOSOCC	Virtual On-Site Operations Coordination Centre
WFP	World Food Programme
WHH	Welthungerhilfe

1 Introduction

In the last decades the business world has suffered major changes as the whole world has gotten more connected and the supply chains have grown longer and longer with the advancement of globalization. This interconnectedness contributes to increasing supply chain complexity and dependencies between the members of the supply chains (Blackhurst, Craighead, Elkins, & Handfield, 2005; Kamalahmadi & Parast, 2016). Through that connectivity – be it intentionally or unintentionally – local disruptions can cause effects which are felt thousands of kilometers apart. Let's take the well-known case of the fire at the Philips Albuquerque plant in 2000 as an example. Although the fire was small and quickly extinguished the effects on the manufactured chips were tremendous, thousands of chips that were in production were destroyed. The careless behavior of Ericsson, one of the main customers of those chips, in dealing with the interruption cost the company more than US$450 million at the end of the first quarter and eventually cumulated in the withdrawal from the mobile phone market (Waters, 2007). As depicted by this example even seemingly small disasters can seriously disturb a supply chain and lead to major unforeseen outcomes. Resources and production capacities can be damaged or destroyed which will endanger customer order fulfillment.

In the humanitarian world a disaster usually means the immediate need to respond as organizations are suddenly faced with a huge demand increase which should be fulfilled in the shortest possible lead-time. As in the business world if the disaster is not handled in an appropriate way the consequences can be devastating, as can be seen by the Ebola outbreak in West Africa in 2014 (Médecins Sans Frontières, 2015b).

Therefore, although commercial and humanitarian organizations might face different disruptions both organizations have the same goal, which is to fulfill the customer (beneficiaries) demand. Furthermore, they are both in a difficult non-ordinary situation and have only a limited time available for the endeavor until major consequences arise for their customers/beneficiaries. Thus, the question is, why not look for further approaches for achieving a resilient supply chain at organizations which are specialized in responding to disasters?

Therefore, this thesis will explore the until now not so much researched humanitarian world and strategies of the big players in the field and what can be learned by the industry from them and vice versa.

1.1   Motivation

The concept of supply chain management (SCM) was introduced to the business world in 1982 when the Financial Times published an article by Arnold Kransdorff on Booz Allen's new "supply chain management" concept (Heckmann, Shorten, & Engel, 2003). After this first mentioning 35 years ago it was quickly picked up by consultants, practitioners and academics, which amended and re-shaped it to reflect the insights gained through the experience of implementation. Thus, although being a young discipline in the economic science, SCM has changed the way we think about how markets may best be served and how significant competitive advantages can be gained or easily lost if neglected for too long (Christopher & Holweg, 2011).

Today's used models were created in a time where a relative stability was predominant and therefore is reflected in them. But this no longer holds true, as can be seen in Figure 1-1, which shows the overall turbulence of the business environment in the past decades, represented by the Supply Chain Volatility Index. [1]
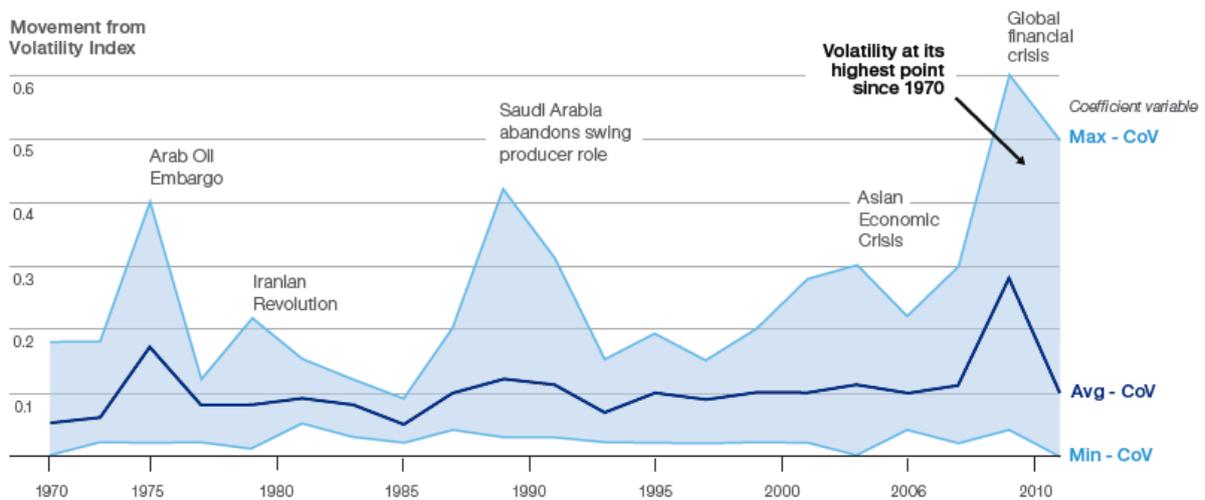
Figure 1-1: Supply Chain Volatility Index 1970-2011
Shows the overall turbulence in the business environment in the past decades, with a trend of an increasing volatility band size and a CoV peak in 2008 (World Economic Forum, 2013, p. 9).

In the past 45 years the world has seen many shocks, such as the Iranian Revolution or the Asian Economic Crisis but none of those measure up to what was experienced in 2008, when the coefficient of variation (CoV) reached levels which were last measured almost 30 years ago. And even at the peak of the Arab Oil Embargo the mean index value (0,166) was a third smaller than in 2008 (0,254). Furthermore, one can see that the volatility band size has increased significantly in the past 10 years. This all indicates that we are on the verge of a very turbulent era, in which supply chains have to adapt to the new and challenging boundary

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[1] The shown coefficient of variation (CoV) is based on selected parameters ranging from energy costs to raw materials costs and currency exchange rates; and therefore, represents several key business parameters simultaneously. The coefficient of variation (CoV) is used as a normalized and scale-free measurement of volatility, which allows to compare seemingly different business parameters. As a reference for the coefficient of variation (CoV) the EUR to GBP exchange rate; USD to GBP exchange rate; UK clearing bans base rate – middle rate; crude Oil-Brent FOB U$/troy ounce; LME-Copper, grade A three month £/MT; VIX – Chicago Board Options Exchange Market Volatility Index and the Baltic Dry Index were taken (Christopher & Holweg, 2011).

conditions. Therefore, Christopher & Holweg (2011) argue that the established models of SCM might need to undergo radical changes to keep up with the major changes of the global business environment.

But not only the business world faces difficult times, also in the humanitarian world a significant rise of disasters can be perceived. The number of disasters reported as well as the number of people affected by disasters in the past 70 years are on the rise (Centre of Research on the Epidemiology of Disasters, 2017; Swiss Re, 2013), as can be seen in Figure 1-2. Thomas and Kopczak (2005) even predict that over the next 40 years both man-made and natural disasters will increase fivefold. When once disasters used to be extraordinary they are increasingly coming to be a daily occurrence and therefore making the life of humanitarian organizations harder, as they suddenly need to respond more frequently and to more people.
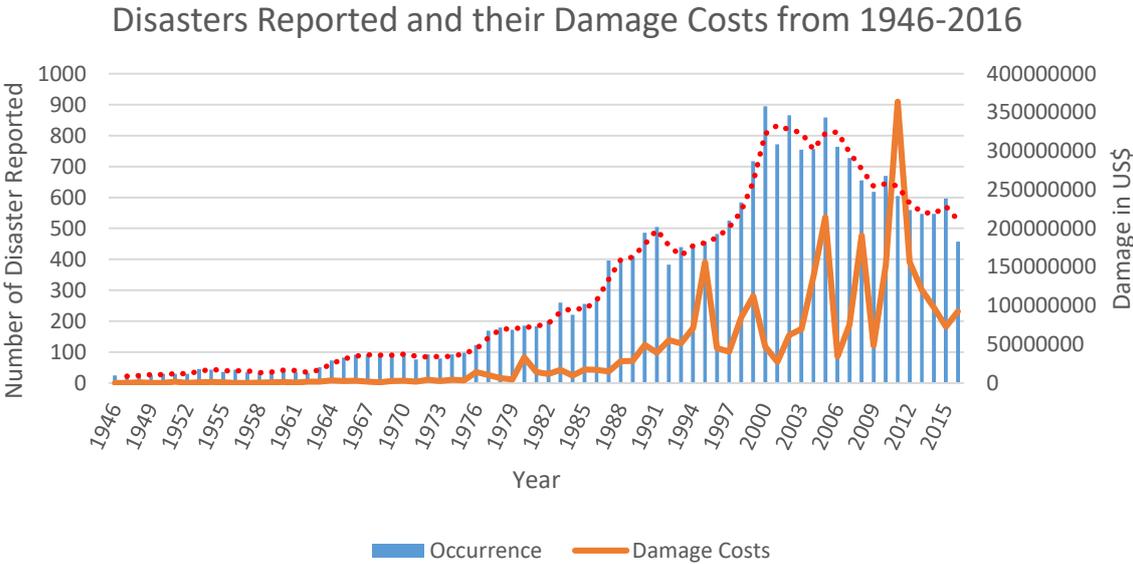
Figure 1-2: Reported Disasters and Damage Costs from 1946 – 2016
An upward trend of reported disasters and their damage cost[2] can be perceived (Centre of Research on the Epidemiology of Disasters, 2017).

This is also reflected in Figure 1-3 where the budget of the international humanitarian assistance is shown. One sees that it has been rising throughout the past 5 years.

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[2] The amount of damage to property, crops, and livestock. The value of estimated damage is given in US$ ('000). For each disaster, the registered figure corresponds to the damage value at the moment of the event, i.e. the figures are shown true to the year of the event (Centre of Research on the Epidemiology of Disasters, 2017).

Budget of International Humanitarian Assistance, 2012–2016
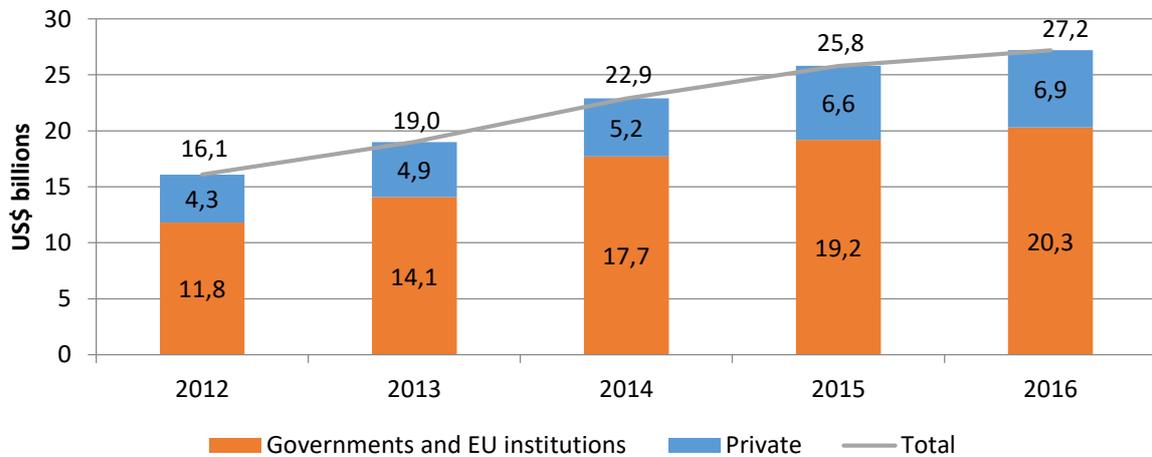
Figure 1-3: International Humanitarian Assistance, 2012-2016
The budget for international humanitarian assistance is rising (Development Initiatives Ltd, 2017 p. 28).

When looking at these data one sees that the world no longer is a stable and predictable place, volatility and fast changes have taken over. Investing in systems which can withstand those changes and uncertainties is inevitable for an organization to survive in the long run. Thus, being resilient does not seem to be something of choice for 'modern and fancy' organizations but a necessity for all who operate in this globalized world.

2 Research Methodology

The following chapter focuses on the research gap, the thereof derived research questions and the research methodology, which will be followed to answer the posed questions.

2.1 Introduction

Once having decided on a research topic and research questions are identified (section 2.2 & 2.3), it is important to specify which data and how the data needed should be gathered to answer the questions posed (Cameron & Price, 2009). This is done through a well-designed research methodology and design.

Research is defined as *"a process that people undertake in a systematic way in order to find out things, thereby increasing their knowledge"* (Saunders, Lewis, & Thornhill, 2016, p. 5). Brown (2006, p. 12) defines methodology as "the philosophical framework within which the research is conducted or the foundation upon which the research is based". Therefore, research methodology is the backbone of the whole research; shaping it through philosophical and theoretical assumptions and implications on the method(s) adopted, to generate a systematical and logical solution to a research question (Saunders et al., 2016).

The research design basically acts as a "blueprint" on how to actually answer the research questions (Yin, 2009). For this according to Philliber, Schwab, & Sloss (1980) at least four questions have to be answered by it: the question what to study, what data are relevant, what data to collect, and how to analyze the results. The first of those questions will be answered in section 2.3. The others shall be answered by the end of this chapter.

In order to be able to answer the four questions of the research design, a lot of underlying questions have to be resolved first. In the first step the assumptions that have been made by the researcher about human knowledge (epistemological assumptions), about encountered realities in the research (ontological assumptions) and the influence the researchers own values have on the research process (axiological assumptions) have to be identified and understood. Those assumptions inevitably shape the interpretation and understanding of the research questions, the methods being used and how the findings are interpreted and therefore carry a crucial importance (Crotty, 1998). The methodology, the strategy and the time horizon of the research will be defined in the next step, as these rely heavily on the assumptions and beliefs about the development of knowledge of the researcher (Saunders et al., 2016). In the last subchapter the data collection and analysis methods will be described in detail. Therefore, Saunders et al.'s (2016) approach of the research onion (Figure 2-1) will be followed, which should be understood as a layered concept, where the research methodology is created by considering one after another layer, starting with the outmost.
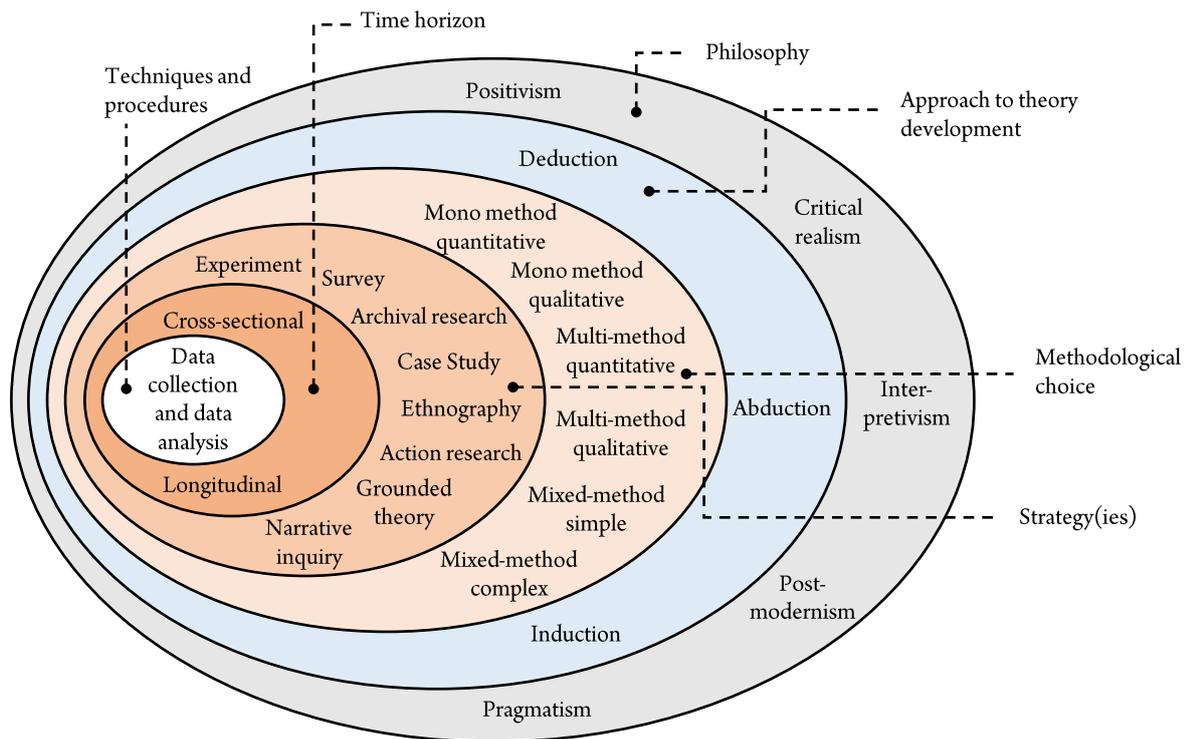
Figure 2-1: The research onion
A layered concept for finding the appropriate research methodology (Saunders et al., 2016, p.124).

Before further elaboration on research methodology is done, the research gap and questions will be stated.

2.2   Research Gap

Today's supply chains are prone to many disruption risks, both coming from external (e.g. natural disasters) and internal factors (e.g. globalized supply chains and lack of visibility) (Christopher & Peck, 2004; Hamel & Välikangas, 2003; World Economic Forum, 2013). These disruptions may entail short- and long-term impacts which can be devastating for the affected organizations (Hendricks & Singhal, 2003, 2005a, 2005b; Waters, 2007). Thus, research on business continuity and supply chain resilience has gained increasing attention in the last couple of years (Christopher & Holweg, 2011; Hohenstein, Feisel, Hartmann, & Giunipero, 2015; Kamalahmadi & Parast, 2016). Also many different supply chain resilience frameworks and approaches have been proposed to tackle those disruption and uncertainty problems (e.g. Ali, Mahfouz, & Arisha, 2017; Christopher & Peck, 2004; Hohenstein et al., 2015; Kamalahmadi & Parast, 2016; T. J. Pettit, Fiksel, & Croxton, 2010), which coincide more or less with each other (for further explanations see chapter 6). One thing that they have in common is the absence of looking further than commercial supply chains. But there is a world out there, which constantly deals with uncertainties and disruptions – the humanitarian aid world, specifically the emergency response branch. In the humanitarian world a disaster usually means an immediate need to respond, as the organization is suddenly faced with a huge demand increase, which has to be fulfilled in the shortest possible lead-time (IFRC, 2017d; Kovács & Spens, 2011b; Tatham & Pettit, 2010). If the disaster is not handled in an appropriate way, the consequences might be devastating, as for instance the Ebola outbreak in West Africa in 2014 showed (Médecins Sans Frontières, 2015b).

Many researchers think that lessons can be learned from the humanitarian sector by business sector supply chain managers (Carroll & Neu, 2009; Charles, Lauras, & Van Wassenhove, 2010; Dash, Mishra, & Mishra, 2013; Oloruntoba & Gray, 2006; Ramsden, 2014; Tatham & Christopher, 2014; Van Wassenhove, 2006) and vice versa (D'Haene, Verlinde, & Macharis, 2015; Dash et al., 2013; Pedraza Martinez, Hasija, & Van Wassenhove, 2010; S. J. Pettit & Beresford, 2009; Tabaklar, Halldórsson, Kovács, & Spens, 2015; Van Wassenhove, 2006).

Humanitarian supply chain and logistic literature has been getting more in the focus of research over the past decades, but is generally speaking still in its early stages (Carroll & Neu, 2009; Fawcett & Waller, 2013; Kovács & Spens, 2011a, 2007; Kunz & Reiner, 2012; Leiras, de Brito Jr, Queiroz Peres, Rejane Bertazzo, & Tsugunobu Yoshida Yoshizaki, 2014; Ramsden, 2014; Tatham, Spens, & Taylor, 2009; A. Thomas & Kopczak, 2005; Tomasini & Van Wassenhove, 2009). In the following paragraphs a look at the existing literature tackling the topics of supply chain resilience, cross-learning potentials and best practices is taken.

Heaslip (2013, 2015) puts the focus in his research on service operations in humanitarian logistics, mainly investigating how humanitarian organizations (HOs) are collaborating with each other or how it is done in-between themselves and how it should evolve in the years to come. In his research he mentions organizations like IFRC and UNICEF, who provide logistics services for other humanitarian organizations (Heaslip, 2013, p. 42). Also WFP is mentioned, the organization acted as a consignee for other HO during the Haiti earthquake in 2010, which had not been registered prior to the disaster (Heaslip, 2015, p. 6). Abidi et al. (2015) and Diego & Vega (2015) also look at service operations in humanitarian logistics, but they put their focus on the connection with the commercial world, how the cooperation is perceived and what best practices are. Morales & Sandlin (2015) also tackle the same topic, but put their emphasis on coordination structures like the cluster approach or other leadership modules (e.g. Humanitarian Coordinator) installed by UN OCHA. The role of the military and how cooperation with humanitarian organizations can affect the response was also investigated by some (Barber, 2012; Heaslip, 2012; Heaslip & Barber, 2014; Mari Ainikki Anttila, 2014; Morales & Sandlin, 2015; S. J. Pettit & Beresford, 2005).

Other research focuses on special topics such as performance management and metrics (Beamon & Balcik, 2008; Davidson, 2006; Haavisto & Goentzel, 2015), sustainability and reverse logistics (Kaur & Prakash, 2016; Peretti, Tatham, Wu, & Sgarbossa, 2015) or games or simulation exercises (Harteveld & Suarez, 2015; Luke, Stamm, Muggy, & Stamm, 2014).

Most of the scientific literature on humanitarian response management, is based on literature research or simulation and modeling studies and ends with a conceptual frameworks (e.g. Charles et al., 2010; Cozzolino, Rossi, & Conforti, 2012; Ertem & Buyurgan, 2011; Krejci, 2015; L'Hermitte et al., 2015; Nisha de Silva, 2001a; Oloruntoba & Kovács, 2015; Scholten, Scott, & Fynes, 2010). Actually, that can be seen to be true for almost all of the current academic humanitarian logistics and supply chain management literature (Kovács & Spens, 2011b; Kunz & Reiner, 2012; Natarajarathinam, Capar, & Narayanan, 2009). Only a small number of in-depth case studies can be found (Schulz, 2008). Probably the most well-known ones were developed by Luk van Wassenhove and his team at INSEAD on the practices of IFRC (Chomilier, Samii, & Van Wassenhove, 2003; Gatignon, Van Wassenhove, & Charles, 2010; Samii, Van Wassenhove, Kumar, & Becerra-Fernandez, 2002a, 2002b; Tomasini & Van Wassenhove, 2009). These studies followed a major restructuring process at the IFRC starting in October 1999 when Didier Cherpitel as new Secretary General was endorsed by IFRC. On his request McKinsey conducted a pro bono study of the role, activities and structure of IFRC back then,

that led to significant organizational changes and introduction of new concepts (such as the FACT teams) (Samii et al., 2002a).

All in all, most humanitarian logistics articles are not from academia but field reports or evaluations, which cover one or more disaster responses, highlighting the general challenges and issues and frequently finish with lessons learned recommendations (Beamon, 2004; Kovács & Spens, 2007; Long & Wood, 1995).

Concluding the literature review it can be stated, that it did not reveal any survey on humanitarian supply chain resilience capabilities. There exist some in-depth case studies which focus on established practices of humanitarian organizations, which one might use as a reference point for deducing resilience capabilities. But this has not been done so far. Therefore, a research gap is perceived concerning general knowledge of how humanitarian organizations actually handle disaster responses. And although some research has been done on finding cross-learning potentials none of those tackled the challenge of supply chain resilience, but only suggest possible future paths for identifying such potentials or highlight theoretical potentials, which should be explored further (Martinez & Van Wassenhove, 2010; Oloruntoba & Kovács, 2015; Tabaklar et al., 2015; Van Wassenhove & Pedraza Martinez, 2012).

Having shown the identified gaps in literature, in the next section the corresponding research questions are stated.

2.3 Research Question

As was shown in the previous section research gaps concerning humanitarian supply chain resilience strategies and potential cross-learning potentials between humanitarian and commercial organizations supply chain resilience capabilities exist. To be able to answer those two research questions, it first has to be established, whether humanitarian and corporate supply chains are comparable at all. Then knowledge has to be gained of commercial approaches to supply chain resilience. Following these steps, humanitarian organizations are tackled and in the final step cross-learning potentials might be identified. Therefore, the research questions for this thesis are:

1. What are the similarities and differences of humanitarian and corporate supply chains?

2. What strategies are implemented by commercial organizations to deal with supply chain uncertainties?

3. What strategies are implemented by humanitarian organizations to deal with supply chain uncertainties?

4. What are cross-learning opportunities between commercial (based on the SCRAM framework) and humanitarian organizations in terms of those strategies?

2.4   Research Philosophy

To be able to decide on one of the five main research philosophies, as depicted in Figure 2-1, first one needs to be able to distinguish between them. This is done by focusing on the three aforementioned research assumptions: ontology, epistemology and axiology.

Ontology can be defined as the study or science of being (Blaikie, 2010) and is focused on the assumptions that are made about the nature of reality and what is considered as a fact (Saunders et al., 2016). In business research these considerations mainly focus on how social entities can and should be seen. The question is, if the researcher considers them as objective entities that have a reality external to social actors or as social constructions built up from the perceptions and actions of social actors (Bryman & Bell, 2007). Put in simpler terms ontology answers the question whether social entities are seen as subjective or objective.

Epistemology refers to the assumptions about which knowledge should be regarded as valid and acceptable and how it can be communicated to others (Burrell & Morgan, 1979). Through the multidisciplinary context of business and management research a great variety of different epistemologies, reaching from numerical data to interpretations or narratives, are allowed (Bryman & Bell, 2007; Saunders et al., 2016).

Axiology is concerned with which roles values and ethics have in the research process. This includes the way the researcher deals with her own values or the values of the research participants (Saunders et al., 2016). It also tries to explain what the aim of the researcher is, being it explanation, understanding or prediction of things. (N. Lee & Lings, 2008)

When considering those three assumptions one can come to different conclusions and therefore choose different research philosophies. The assumptions made for this research project will be explained in the following paragraphs.

The focus of this thesis lies on resilience capabilities of humanitarian and commercial supply chains. Behind those supply chains different organizations with their own background, management, targets, tasks and values stand and through these the employed strategies are shaped. To illustrate that, let's take a look at the strategies of the companies Boston Scientific and Toyota.

Boston Scientific is a manufacturer of high-tech medical devices such as drug-coated stents that open clogged arteries of heart patients and help keep them blockage-free. To produce those items a highly sophisticated manufacturing process is required which needs to meet extensive FDA regulations. In case of a disruption in one of the main manufacturing centers, the company estimated that the time needed to repair and getting their facility recertified could mean a great loss on revenue and profit, and could provide their competitors with the chance to take over Boston Scientific's market share. As the company has assessed this risk as to great to take, they built redundant FDA certified production lines for some of their most important products. Although this method is not inexpensive, the company decided that in

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comparison to endangering the company's entire survival, it was a measure they were willing to take (Sheffi, 2005b).

Toyota as the world's leading car manufacturer follows a completely different strategy and relies heavily on lean management and six sigma approaches. Therefore, they see redundancy as something that would hinder them in their goal to reach a high enterprise efficiency. Among other things they rely on agility, multiple suppliers and cooperation with other companies to guarantee a smoothly running production (Sheffi, 2005b).

Through these examples and in line with Melnyk et al (2014; 2010) and Christopher & Peck (2004) one can see, that there is not only one true answer for gaining supply chain resilience, but the organizations' approaches vary largely. Nevertheless, the SCRAM framework (described in detail in chapter 6.5.5) has shown that there exists a certain range of resilience strategies and methods which are recurrently found when looking at different organizations.

Through those characteristics positivism and postmodernism can be clearly ruled out as philosophies, as both their main assumptions are refuted through this. Positivism assumes that there exists only on true reality which can be observed by the researcher and can be put down into law-like generalizations (Crotty, 1998). Postmodernism on the contrary relies on the assumption that there exists no order in the social world beyond what has been given through language and whatever is deemed right or wrong is done so through a collective decision. This research usually tries to shine light to suppressed opinions and thus change the established way of thinking (Saunders et al., 2016). As mentioned before both assumptions do not suit the research purpose.

Interpretivism focuses on human beings their differences and how through those dissimilarities they experience situations differently. The main aim of the interpretivist researcher is to understand the world from the point of view of the research participant (Saunders et al., 2016). Although different values and backgrounds play a big role when looking at the chosen resilience strategies, the emphasis is not on the mere individual itself but on the whole organization. Furthermore, the main goal of this study lies on the exploration of the resilience methods being used by certain organizations and not on the understanding why a specific organization chose the methods it relies on. Therefore, the subjectivist approach is also not the right one for this research. As interpretivism and postmodernism, the main subjectivist philosophies, do not apply to the research project, pragmatism can be ruled out too, as it includes a subjective world view in addition to an objective one (Saunders et al., 2016).

The critical realism assumes that there are two steps needed for understanding the world, the first being the experience of the event itself and the second being the backward reasoning which then tries to grasp the underlying reality that might have caused the experience in the first place (Reed, 2005). Critical realism largely corresponds to the aforementioned characteristics of supply chain resilience strategies. They are objectively observable but also result from the values, goals, cultural background, etc. of an organization.

Therefore, the chosen philosophy for this research project shall be critical realism.

2.5 Approaches to Theory Development

When developing a theory there exist three different basic tactics (see Figure 2-1): deduction, induction and abduction. Deduction refers to an approach which first generates a theory and

then through rigorous testing is trying to proof or falsify it. Induction is the opposite of deduction, here first data are collected and then based on the analysis of it a theory is developed. Abduction is used when exploring an observed phenomenon. Therefore, themes and patterns are identified, to create a theory of the origin of the phenomenon which is then tested (Saunders et al., 2016).

This study is explorative and will generate data about resilience strategies humanitarian organizations use. Therefore, data will be generated first and in the second step theories will be formulated based on the research results. Thus, an inductive approach is chosen.

2.6   Methodological Choice

When thinking about the methodological choice one has to take into account the chosen philosophy and the approach to theory development, as this will greatly influence the chosen method. By selecting critical realism with an inductive approach a pure quantitative method was ruled out, as this is usually used when gathering data to test a theory (Saunders et al., 2016). As it is not yet known what capabilities the humanitarian organizations' supply chains have, a qualitative approach was chosen to explore those. But to even further the understanding of humanitarian supply chains a small quantitative study was added. The qualitative part will focus on discovering the different resilience methods used and the quantitative part will emphasize on ascertaining the basic supply chain features to be able to get an overview of the supply chains. This combination, where one method supports the other, is called embedded design and is used when the researcher feels, that more data is needed to understand the phenomenon of interest (Bryman & Bell, 2015). Critical realism allows both methods and in fact the mixed methods approach is quite a common one with this philosophy (Saunders et al., 2016). Therefore, the chosen methodology is the mixed-method simple, as it best fits the research questions.

2.7   Research Strategy

A research strategy is basically a plan of action on how to achieve a certain goal. In this case the goal is answering the research question. Through the strategy the research philosophy will be linked with the approach of theory development and the methodological choice (Denzin & Lincoln, 2011). Of the eight research strategies which are mentioned by Saunders et al. (2016) in his research onion (Figure 2-1) only two are used with a quantitative approach, the experiment and the survey. As in this research project the focus does not lie on different variables which might influence each other, but on a holistic view of resilience strategies, the experiment cannot be the method of choice. The survey on the other hand which has two main purposes, either describing certain aspects or characteristics of the researched entity or testing hypotheses about the nature of relationships between entities, is perfectly adequate for the quantitative research part of this study (Jackson, 2011).

From the remaining research strategies most of them can be easily ruled out as inappropriate for this research endeavor. Archival research, which focuses on textual documents, such as diaries, letters or blog postings; ethnography, which is used to study the culture or the social world of a group, and narrative inquiry, which highlights personal accounts of events as essential; belongs to that group. Action research which is applied when developing solutions to actual organizational problems through a participative and collaborative approach of the parties involved, and grounded theory, which was introduced as a way to analyze, interpret

and explain the meanings that social entities create in order to make sense of their everyday experiences (Charmaz 2006 as cited by Saunders et al. (2016)) also do not suit the research methodology so far.

This leaves case study as the qualitative research strategy, which fits the purpose perfectly. According to Yin (2009, p. 18) case study is defined as follows:

"A case study is an empirical inquiry that

- *investigates a contemporary phenomenon in depth and within its real-life context, especially when*
- *the boundaries between phenomenon and context are not clearly evident."*

Bryman and Bell (2007) recommend using case study research when new insights are sought or in a field in which little or no formal theory exists. These two definitions illuminate exactly what the goal of this research is, to understand resilience in the context of humanitarian supply chains, which until now is not known. Also this contributes to closing the research gap which states, that more case-study research should be done in the humanitarian logistics and supply chain management field (Kovács & Spens, 2011b; Kunz & Reiner, 2012; Natarajarathinam et al., 2009).

The case for a case study can be a human being (e.g. a manager), an organization (e.g. a business), an event (e.g. an earthquake) as well as many other types of case subjects (Flyvbjerg, 2011). The cases in this research project will be different humanitarian organizations.
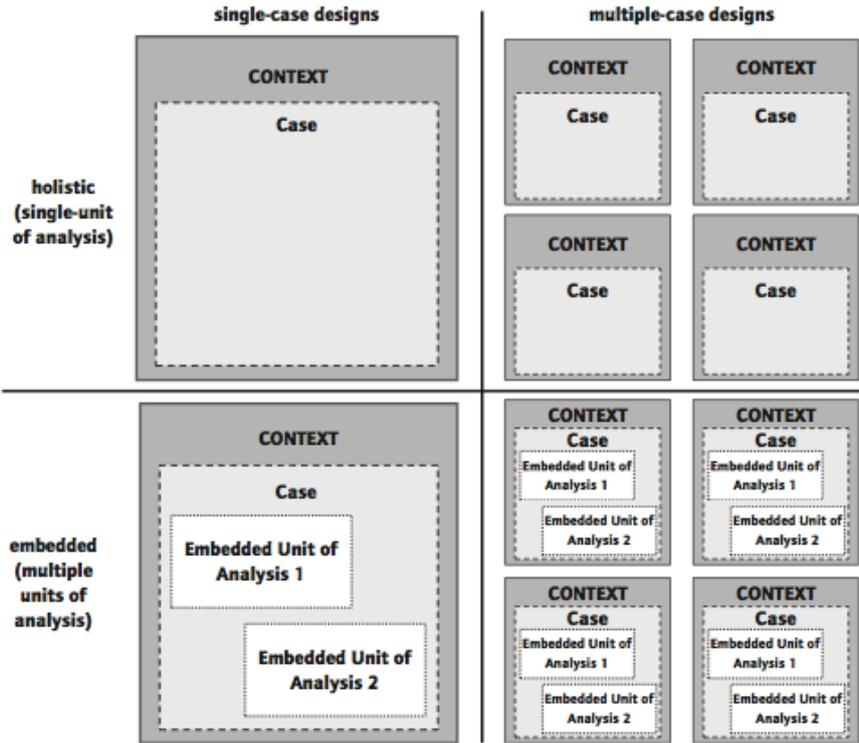

Figure 2-2: Case Study Types
Basic Types of Design for Case Studies (COSMOS Corporation as cited in Yin (2009, p. 46)). Yin (2009) differentiates

between four possible designs of a case study, based upon a 2x2 matrix as shown in Figure 2-2. The one axis differentiates between single and multiple-case designs and the second between holistic and embedded ones. A single-case design can be used when the case in question either represents a critical, an extreme or unique, a representative or typical, a revelatory or a longitudinal case (Saunders et al., 2016; Yin, 2009). As this does not apply to the research questions in focus, a multiple-case design is chosen. A multiple-case design also answers the question whether findings of a case study can be replicated, and therefore offers a triangulation.

When considering whether conducting holistic or embedded cases, the choice falls upon holistic cases, as the concern in this research project belongs to the supply chain of an organization as a whole and not specific subdivisions of it (Saunders et al., 2016).

All in all, the chosen research strategy relies on holistic, multiple case studies, enhanced by a quantitative survey.

2.8 Time Horizon

Considering the time horizon of the research project and whether this research shall be a "snapshot" taken of a particular situation at a particular time or whether it should be a series of snapshots, therefore representing events over a given time period, the answer is found quite easily (Saunders et al., 2016). The interest of the research lies with the current situation and the current supply chain resilience methods and strategies organizations have enforced and it is not of interest how those strategies and methods have changed over time. Therefore, a cross-sectional time horizon is chosen.

2.9 Data Collection and Data Analysis

The last layer of the research onions concerns itself with data collection and data analysis. In the following two subchapters 2.9.1 and 2.9.2 the chosen mixed method approach of multiple case studies and a survey will be described further.

2.9.1 Case Study

After having chosen the case study strategy one has to decide upon how to perform it. Yin (2009) gives a list of the six most commonly used techniques on how to perform a case study. He cites: documentation, archival records, interviews, direct observations, participant-observation, and physical artifacts. The goal of a direct observation is to observe some relevant behavior or environmental conditions which influence the researched phenomenon. In this study the interest does not lie on personal behavior but on the main management controls an organization has developed to deal with supply chain disruptions, therefore this technique will not be able to answer the research questions. The same applies to participant-observations, where the researcher may actively join the events being studied. The study of physical artifacts largely belongs to anthropological research and is not of interest in this research project either (Yin, 2009).

That leaves documentation, archival records and interviews as further possible techniques. When looking closer at the research questions and therefore the desired in-depth look on the organizations one comes to the conclusion that a mixture of those three techniques would

suit best to answer them. Through the inspection of documents (e.g. project reports) and archival records (e.g. budget or annual reports) the background of the organizations can be established and they can be used as a source for triangulation.

As the main research aim of this thesis is based on the exploratory part and a research gap has been identified for that, data will mainly be generated from interviews, as those can shed light unto till now untouched topics. There exist three different types of interviews: the structured, the semi-structured and the unstructured one. The structured interview is used when conducting quantitative research and is based on a standardized questionnaire. It is usually used when doing descriptive studies. As in this case the study has an exploratory orientation a predetermined questionnaire cannot be used, as the interviewer does not know beforehand what methods or strategies the organization in question is using and which might therefore be interesting to elaborate on. Both the semi- and the unstructured interviews are used for exploratory research, although the unstructured is used more frequently. Unstructured or in-depth interviews do not have a predetermined list of questions and the interviewee is given the opportunity to talk freely about the research topic. The focus therefore lies heavily on the interviewee as a person and how he/she perceives the studied phenomenon. It is often used when doing ethnographic or action research. As in this case the attention is directed to the supply chain capabilities of a whole organization, the personal opinion of an interviewee is not the key focus. The semi-structured interview allows the researcher to have a list of themes and some key questions which shall be covered during the interview, but also to omit some questions or add others when the organizational context claims it (Saunders et al., 2016). In this research project the basic questionnaire framework shall rely on the in chapter 6.5.5 mentioned SCRAM framework.

After having decided on the technique and type of a semi-structured interview, the next challenge poses the actual execution of the case studies. For this the approach of Eisenhardt (1989) shall be explored. In Table 2-1 the process of building theory from case study research by Eisenhardt (1989) is depicted. Generally speaking, the process is divided into 8 steps.

The first one called "Getting Started" focuses on the generation of at least a broad definition of a research question, so as to not become overwhelmed by the sheer amount of data. Through the use of a priori specifications the research can be shaped further. But the important thing to keep in mind is, that one should come as close as possible to not having a theory already under consideration or a hypotheses to test (Eisenhardt, 1989).

In the second step the attention is directed to "Selecting Cases". The cases should be chosen in a way as to limit extraneous variation and to help detecting the boundary of the generalization of the findings in the end. Nevertheless, theory or hypotheses should not compromise the selection of cases in a way that hinders theoretical flexibility. As mentioned before in chapter 2.7, multiple cases within each selection category will allow for replication of the results. Therefore, cases shall either be chosen with that thought in mind or to offer an extension of theory by filling conceptual categories (Eisenhardt, 1989). The selection criteria for this research project will be explained in chapter 2.9.1.1.

Table 2-1: Case Study Research Methodology
Process of building theory from case study research (modified Eisenhardt, 1989, p. 533)

Step	Activity	Own research
Getting Started	Definition of research question Possibly a priori construct	Research questions are defined and SCRAM Framework as base selected
Selecting Cases	Neither theory nor hypotheses Specified population Theoretical, not random, sampling	Humanitarian organizations were selected based on geographical and different aid-item criteria
Crafting Instruments and Protocols	Multiple data collection methods Qualitative and quantitative data combined Multiple investigators	Semi-structured interviews and quantitative survey was chosen
Entering the Field	Overlap data collection and analysis, including field notes Flexible and opportunistic data collection methods	Interviews were conducted with the chosen humanitarian organizations
Analyzing Data	Within- case analysis Cross-case pattern search using divergent techniques	Within-case and cross-case (via the SCRAM FW) analysis were conducted
Shaping Hypotheses	Iterative tabulation of evidence for each construct Replication, no sampling, logic across cases Search evidence for "why" behind relationships	Hypotheses about humanitarian world were generated based on the case studies
Enfolding Literature	Comparison with conflicting literature Comparison with similar literature	Extensive literature study was done
Reaching Closure	Theoretical saturation when possible	Through the selection of 6 organizations theoretical saturation could be reached

When "Crafting Instruments and Protocols" Eisenhardt (1989) suggests to use multiple data collection methods and especially combine qualitative and quantitative data. Those recommendations are made on the assumptions that the triangulation through the different

data will enhance the confidence in the findings of the study and the creative potential of the study will be enhanced. As described in section 2.6 for this study a mixed-method approach was chosen which is coherent with the aforementioned statement.

The next step, "Entering the Field", is mainly concerned with the task of data collection. When overlapping that process already with the following "Analyzing data", one gets the advantage of flexible data collection. Which allows the researcher to make adjustments during the data collection process. This is permitted because in theory building the investigator is focusing on each case individually and in as much depth as necessary. The mere creating of a summary statistics about the set of observations is not the objective (Eisenhardt, 1989).

For the already mentioned following step of "Analyzing Data" three key features are to be kept in mind. In the within-case analysis the goal is to familiarize oneself with each case separately and to look for emerging patterns within each case. Combined with a cross-case search for patterns the likelihood of creating a reliable and accurate theory increases. The suggested techniques for cross-case analysis are (Eisenhardt, 1989):

- Selecting categories or dimensions, and then to look for within-group similarities
- Selecting pairs of cases and then to list the similarities and differences between each pair
- Dividing the data by data source

As already some categories have been defined through the SCRAM Framework the first technique will be chosen to perform the cross-case search.

When "Shaping Hypotheses" one of the most important steps is the constant comparison of theory and data; iterating the theory until it closely fits the data. In the next step the relationship between theory and data has to be verified. This is very similar to the verification process in traditional hypothesis testing, with the difference of having to examine each hypothesis for each case, not for the aggregated cases (Eisenhardt, 1989). This results from the underlying assumption of treating the series of cases like a series of experiments, where each case either confirms or refutes the hypotheses (Yin, 2009).

By "Enfolding Literature" the researcher examines her own theory with the existing literature, with the goal of finding similarities and contradictions. Through that step the internal validity and generalizability shall be improved (Eisenhardt, 1989).

"Reaching Closure" is achieved when a theoretical saturation is reached. This refers to the point where the learning from each new case is only very limited, because the researcher already knows the phenomena well enough (Glaser & Strauss, 1967). Although there is no ideal number of cases Eisenhardt (1989) suggests a number between 4-10 cases. In this case study six organizations were chosen, therefore fitting that suggestion perfectly.

2.9.1.1 Selected Cases

As pointed out in the previous section it is very important to choose cases so that extraneous variations are excluded (Eisenhardt, 1989), the focus in this research project was put on large humanitarian organization. Large was defined by an annual budget of over € 1 billion per year. This was done as more than 90% of the humanitarian aid is delivered through only about a dozen "big player" (Ferris, 2007; Tatham & Pettit, 2010).

The selection of the cases within the €1 billion budget group is based on two main categories. The first criterion is concerned with the general structure of the aid organization and whether

it has permanent local offices in risk-prone countries, which are acting as a mostly independent part of the overarching network. According to Kovács & Spens (2009) this distinguishes different humanitarian organizations and their respective supply chain largely.

The second criterion focuses on the leading function in the cluster (see chapter 4.7). As the leader of a cluster section needs to be able to be the provider of last resort, only organizations which have the general capabilities to do so can be chosen. Therefore, it was thought as interesting if a difference in the approaches between cluster leading organizations and others exists.

In Table 2-2 the selected humanitarian organization and their compliance with the aforementioned criteria is shown.

Table 2-2: Selected Humanitarian Organizations

	Permanent local offices	Local project offices	Cluster Lead
MSF		x	
Caritas	x		
IFRC	x		x
WFP		x	x
IOM	x[3]		x
AAF		x	

Médecins Sans Frontières (MSF): MSF is a worldwide acting non-profit organization, with a yearly donation income of € 1.44 billion in 2015. The organization is specialized in providing medical aid and therefore medical items. Although the organization is made up of different independent national associations, the on-site aid is not managed through those but via external Operational Centers (OCs) which organize the response central and launch projects to provide help in different regions (Médecins Sans Frontières, 2015a).

Caritas: Caritas Internationalis is a catholic relief network which consists of over 160 members who operate in almost every country in the world. They are specialized in providing food and non-food items. Their annual budget ranges far above 1 billion euros. [e.g. Catholic Relief Service (CRS) € 782 Mio (2016) (CRS, 2017b), Caritas Germany €94.4 Million (2016) (Caritas Deutschland, 2017), Caritas International (Belgium) €36 Mio. (2016) (Caritas International, 2017), Caritas Austria €52.3 Mio (2013) (Kurier, 2017), Caritas Switzerland €97 Mio , Development and Peace (Caritas Canada) €37 Mio (Development and Peace, 2016), Fondation Caritas France €27 Mio (2016) (Fondation Caritas France, 2017),…]

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[3] IOM has a very small headquarter and the country offices almost act like independent organizations of a global network.

International Federation of Red Cross and Red Crescent Societies (IFRC): Their annual budget in 2014 was € 28.8 billion. Through their decentralized structure they have a large permanent local representation in over 189 countries worldwide. They mainly provide medical and non-food items aid (International Federation of Red Cross and Red Crescent Societies, 2014).

World Food Programme (WFP): With an annual budget of over €4 billion the World Food Programme is one of the largest humanitarian organizations from the UN. They are specialized on food distributions and as all UN organizations work do not have local permanent offices (World Food Programme, 2016a).

International Organization for Migration (IOM): As the leader of the shelter cluster, IOM is specialized in non-food items. As well as the WFP they are a UN organization and therefore organized centrally. Their budget in 2015 was over €1.2 billion (International Organization for Migration, 2016).

Austrian Armed Forces (AAF): The Austrian Armed Forces are funded by the Austrian Government and received in total € 2.3 billion in 2017 (DiePresse.com, 2017) which is distributed over the whole organization. As a main actor in the Austrian emergency relief it was considered as a relevant part of this study. Their main task is the provision of non-food items.

Additional to the aforementioned organizations, interviews with UN OCHA, Welthungerhilfe (WHH) and ACAPS. UN OCHA was interviewed to get a better overview of the UN approach and role in disaster response. The interview with Welthungerhilfe gave further insides on collaboration in the field between HOs, as they had a strong collaboration with WFP during the Ebola crisis. ACAPS is an independent information provider, which conducts needs assessments and situational analysis of a crisis region.

The semi-structured interview guide can be found in Appendix A.

2.9.1.2   Coding of Data

The coding was done according to a thematic analysis, which looks for pattern or themes that occur throughout a data set (Saunders et al., 2016). The codes themselves function as labels or tags for a unit of data, summarizing the content of it and therefore, making them accessible for further analysis (Miles, Huberman, & Saldaña, 2014; Saunders et al., 2016).

For the coding of the interviews the SCRAM framework and the mentioned 16 main and 85 sub-capabilities were used (chapter 6.5.5). In Figure 2-3 the hierarchical structure is shown for one of the main capabilities and its sub-divisions. The full list of etic codes (those brought to the research from the outside) can be found in Appendix B.
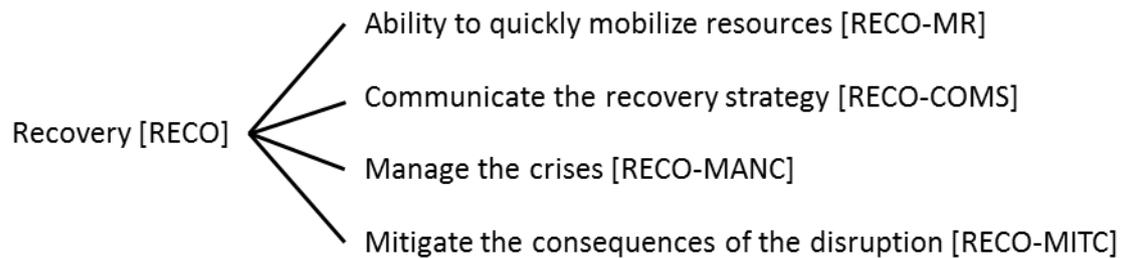
Figure 2-3: Hierarchical Coding Structure

The coding of the data was done with MAXQDA 12.

2.9.2 Survey

The quantitative survey was done to gather additional knowledge about the organizations' supply chains. It was send out prior to the interviews to the designated interview partners to get an a priori insight into the supply chain skills and to introduce the interviewee to the topic. The questionnaire is largely based on the McKinsey Supply Chain Quick Diagnostics questionnaire (McKinsey, 2002).

The questions are grouped into six categories: order processing and demand planning, response management, procurement management, distribution management, service level management, general topics and statistics. The last section statistics does not look on the supply chain per se but provides additional questions concerning the interviewed organization as a whole. The rating of the questions is done by a five-point Likert-rating scale, which ranges from agreeing "to a very great extend" to "not at all" to the question posed.

Appendix C contains the full questionnaire.

2.10 Final Research Approach

As a summary of chapter 2, in Figure 2-4 the chosen research approach for this thesis is shown and in the Table 2-3 explanations for each choice are given.
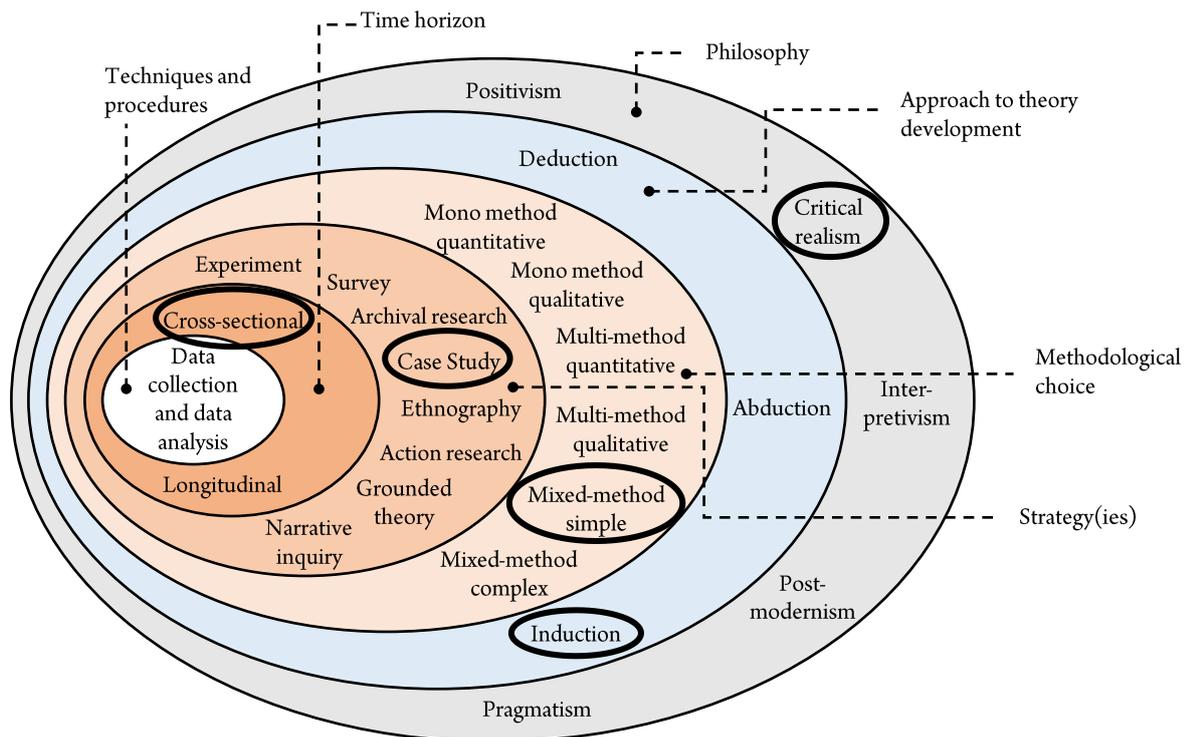
Figure 2-4: Final Methodological Approach
The chosen methodology for this thesis is shown here (modified Saunders et al., 2016, p. 124).

Table 2-3: Summary of the Final Methodological Approach

	Final Approach	Reasoning
Philosophy	Critical realism	Supply chain resilience strategies are objectively observable and are a result of the values, goals, cultural background, etc. of an organization.
Approach to theory development	Induction	As the study is explorative, first data will be generated and then later on a theory will be deduced from that.
Methodological choice	Mixed method simple	This thesis is concerned with supply chain resilience strategies of humanitarian organizations which are not known till now, therefore the study is explorative and primarily a qualitative approach is chosen. To gather additional data about the supply chain, a quantitative survey will be done as well.
Strategy	Case Study	As the research endeavor is explorative a case study approach seems logical. Furthermore, a triangulation will be provided through multiple cases.
Time horizon	Cross-sectional	Current situation of supply chain resilience is of interest.

The final research design is shown in Figure 2-5.

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┌─────────────────────────────────────────────────────────────┐
│                        Research idea                         │
└─────────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────────┐
│   Literature research on comparability of humanitarian and   │
│                   corporate supply chains                    │
└─────────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────────┐
│  Literature research of management strategies to build       │
│           supply chain resilience capabilities               │
└─────────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────────┐
│   Create semi structured interview guide and quantitative    │
│       survey based on findings of literature research        │
└─────────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────────┐
│        Select humanitarian organizations for case study      │
└─────────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────────┐
│                     Conduct case studies                     │
└─────────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────────┐
│      Derive humanitarian supply chain resilience capabilities│
└─────────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────────┐
│            Compare to SCRAM Framework capabilities           │
└─────────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────────┐
│               Identify cross-learning potentials             │
└─────────────────────────────────────────────────────────────┘
                              │
                              ▼
┌─────────────────────────────────────────────────────────────┐
│                  Discussion and conclusion                   │
└─────────────────────────────────────────────────────────────┘
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Figure 2-5: Final Research Design

3 Supply Chain Management and Logistics

This chapter deals with the basic definitions and gives an overview of the historical development of supply chain management and logistics.

3.1 History

Supply chain management and logistics are not new ideas. They have been around for ages, maybe not always framed by such a fancy set of vocabulary, but from the building of the pyramids to the relief of hunger in Africa, the principles underpinning the effective flow of materials and information to meet the requirements of customers have altered little. (Christopher, 2005)

Nevertheless, the requirements and constraints have changed. Today's business environment includes challenges such as severe competition, heightened customer expectation, globalization, technological impact and geopolitical factors, just to mention a few (Lu, 2011). Circumstances like these made manufacturers realize that total vertical integration (i.e. that the whole supply chain is owned by one company) does not lead to the expected business success anymore. Thus, companies started to change their business models and instead of owning the whole supply chain, to focus on their own core competencies; buying ready-made parts and services from suppliers whose core competency was, presumably, the part or service bought. This also provided the suppliers with the opportunity to concentrate on making specific parts, enjoying economies of scale by serving several customers, and focusing their expertise. Through the globalization and the worldwide deregulation of commercial activities, which began in the 1980s and 1990s, this trend accelerated further and led to the nowadays well-known practice of outsourcing. It also led to the birth of modern supply chain management and with that to the understanding that one's own business is only part of a large supply chain, and thus that the survival of a company highly depends on the ability to cooperate within supply chains and ultimately on the well-being of it (Sheffi, 2005b). Therefore, nowadays the arena of competition is moving from 'organization against organization' to 'supply chain against supply chain' (Lu, 2011).

3.2 Terminology

In the following sections the most important terms concerning supply chain management will be explained to establish a common ground of understanding.

Supply Chain

When reviewing literature for a definition of supply chain, one not only finds one but a whole plethora of definitions, it actually seems like everyone who is writing about it is also introducing an own definition of it.

Chopra & Meindl (2007) define it as "*consisting of all parties involved, directly or indirectly, in fulfilling a customer request*" (p. 3). Therefore, not only the manufacturers and suppliers belong to it, but also warehouses, transporters, retailers, and also customers themselves. The Council of Supply Chain Management Professionals (the former Council of Logistics Management) see it as "*starting with unprocessed raw materials and ending with the final customer using the finished goods […] the material and informational interchanges in the*

logistical process stretching from acquisition of raw materials to delivery of finished products to the end user. All vendors, service providers and customers are links in the supply chain" (Vitasek, 2013, p. 186)*. "A group of inter-connected participating companies that add value to a stream of transformed inputs from their source of origin to the end products or services that are demanded by the designated end-customers"* (Lu, 2011, p. 9) represents supply chains for Lu. The last definition that will be mentioned is by Mentzer et al. (2001), who define supply chain as *"a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances and /or information from a source to a customer"* (p. 4).

When looking through these definitions a few common concepts can be identified:

1. A supply chain consists of more than one participating party.
2. Materials (tangible or intangible), information or finances are moved through that system.
3. They are connected by their commitment to add value to the stream of those materials.

In Figure 3-1 such a basic supply chain model is shown with the three types of supply chain flows: the material flow, the information flow and the money flow. They are flowing in both upstream (from the end-customer to the supplier) and downstream (from the supplier to the end-customer) directions, thus representing the delivery and returning of material and its respective money and information flow.
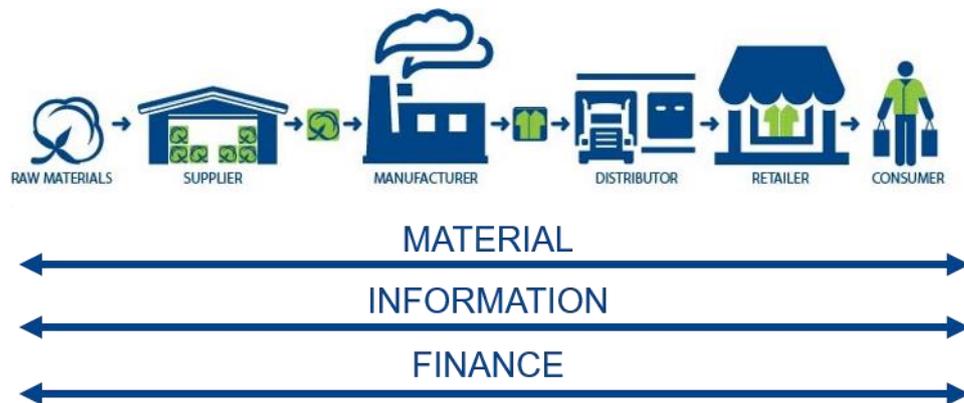

Figure 3-1: Supply Chain
Supply chain flows and the basic structure is shown (adapted: Southwest Wisconsin Technical College, 2017).

As nowadays multiple suppliers and indeed suppliers to suppliers as well as multiple customers and customers' customers are included in the total supply system, it could be argued that the term supply network would fit today's prevailing non-linear systems better than the term supply chain (Christopher, 2005). Therefore, following the supply network line of thought a supply chain definition by Aitken (1998) will be cited. He defines it as *"a network of connected and interdependent organisations mutually and co-operatively working together to control, manage and improve the flow of materials and information from suppliers to end users"* (Aitken, 1998, p. 93)*.

Figure 3-2 depicts a supply network (chain), showing more inter-linkages and giving a first idea of the real complexity of such a network.
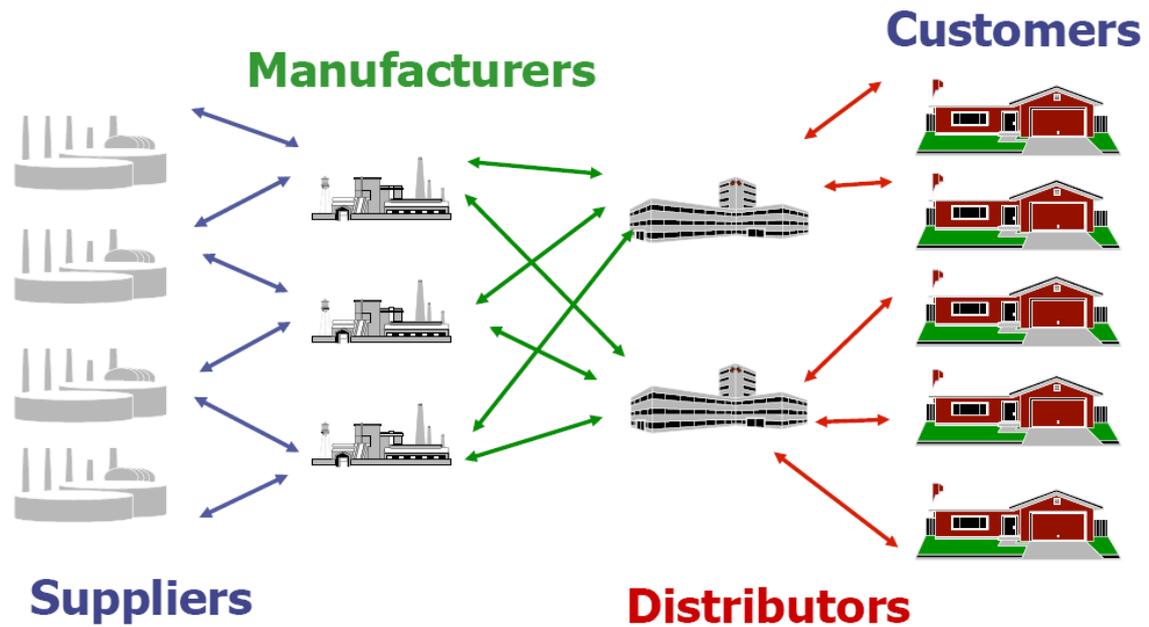
Figure 3-2: Supply Network
Example of a more complex and therefore more realistic supply network, with not only linear interlinkage (MIT Center for Transportation and Logistics, 2017, p. 14).

Supply Chain Management

When comparing different definitions of supply chain management, one comes to the conclusion that there is not one common and ubiquitous understanding of this term. Especially when it comes to the distinction between SCM and logistics the perceptions differ a lot (Larson & Halldórsson, 2004; Lummus, Krumwiede, & Vokurka, 2001; Mentzer et al., 2001).

In their survey Larson and Halldórsson (2004) found 4 prevailing views (traditionalist, re-labelling, unionist and intersectionist) on how logistics and supply chain management are connected (see Figure 3-3).
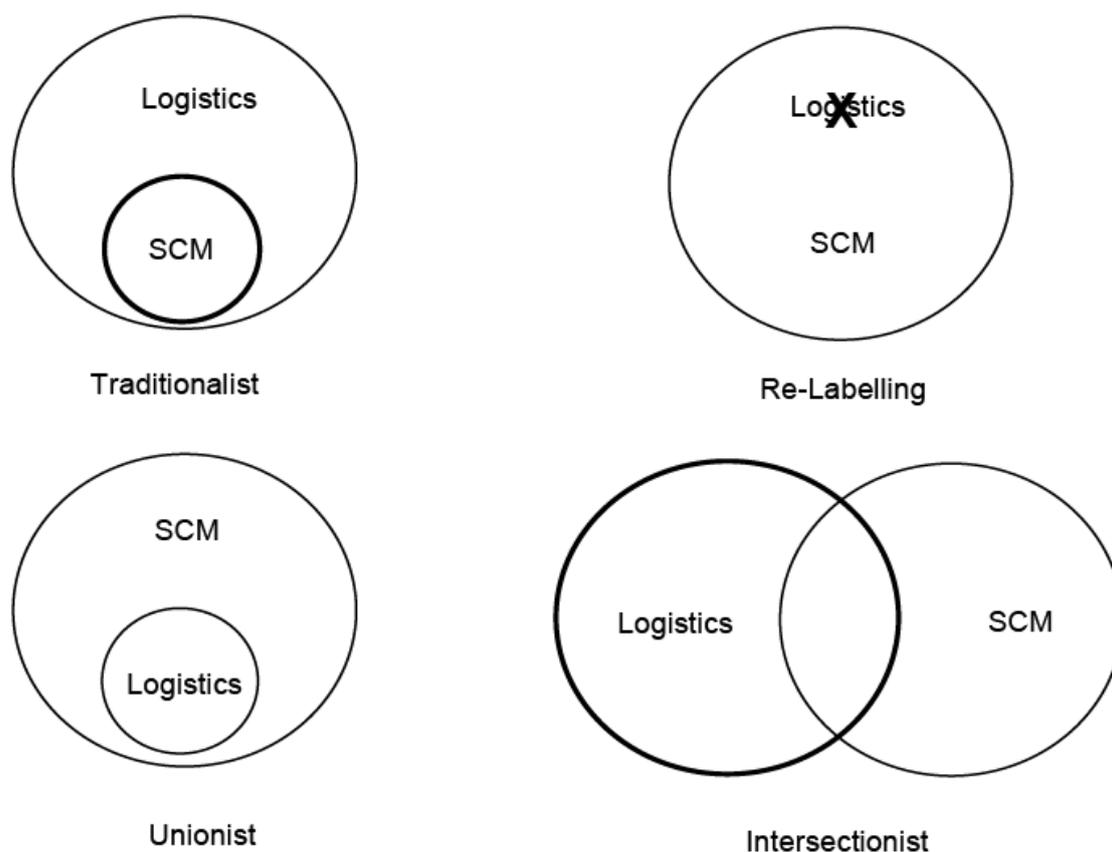
Figure 3-3: Perspectives on Logistics versus Supply Chain Management
Different relationships between logistics and supply chain management are shown. The view chosen for this thesis is the "unionist" (Larson & Halldórsson, 2004, p. 19).

The traditionalist sees SCM as a part of logistics. The re-labelling view does not make a difference between those two terms and sees SCM just as a new word for logistics. The unionist has the opposite view of the traditionalist, as in his perception logistics is part of SCM. Finally, for the intersectionist SCM is concerned with duties on the strategic level and logistics with those of the tactical level, e.g. the supply chain manager would be involved in negotiations of a long-term arrangement, but not the purchase or transmission. That would be the job of the logistics manager (Larson & Halldórsson, 2004).

In this thesis the unionist view suggested by Cooper, Lambert and Pagh (1997) will be adopted.

Figure 3-4 shows - according to the adopted view - the relations of the different business functions and their intra- and inter-firm connections are shown, giving logistics the status of a business function of SCM.
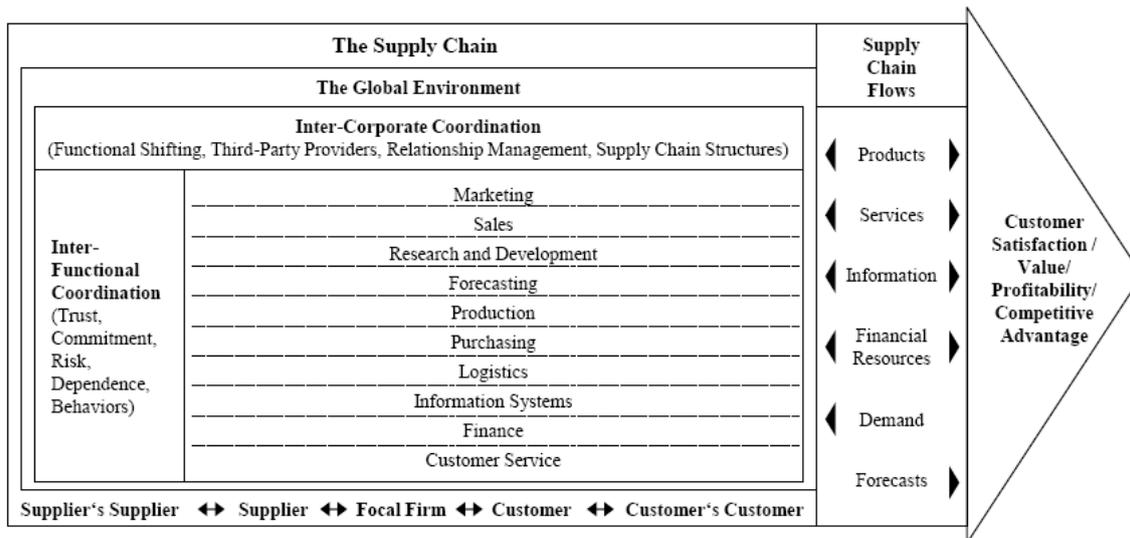
Figure 3-4: SCM Model
Shows the range of supply chain management in a company (according to the unionist view). Logistics is viewed as a business function (Mentzer et al., 2001, p. 19).

The Council of Supply Chain Management Professionals (CSCMP) defines supply chain management as the following.

"Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies" (Council of Supply Chain Management Professionals, 2017)

A very similar definition is provided by Professor Lee from the Stanford Supply Chain Forum, for them supply chain management "*deals with the management of materials, information, and financial flows in a network consisting of suppliers, manufacturers, distributors, and customers*" (1999, as cited in: MIT Center for Transportation and Logistics, 2017). "*The management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole,*" (p. 5) is the definition provided by Christopher (2005).

What is evident in all of these definitions, is that the focus of supply chain management lies on the management of relationships and the three flows to achieve the desired outcome of the supply chain (Christopher, 2005).

Logistic Management

The word "logistics" has been around for a couple of thousand years and was not coined by the business world, but originated from the military services in Greece, where "logistikos" was the used term for military officers who were experts in calculating the military needs for expeditions in war (Farahani, Rezapour, Kardar, & Daneshzand, 2011). Over time the application of logistics has moved into the business arena. The Encyclopedia Britannica (2017) defines it in this context "*as the organized movement of materials and, sometimes, people.*"

Another definition is provided by the CSCMP.

"Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements" (Council of Supply Chain Management Professionals, 2017).

As mentioned before, logistics will be considered as a part of supply chain management which is occupied with the product flow (being it goods, services or information) up- and downstream the supply chain (Lummus et al., 2001). SCM is the "*wider, intercompany, boundary-spanning concept*" (Mangan, Lalwani, & Butcher, 2008, p. 12) than logistics.

3.3 Characteristics

After having defined the key concepts of SCM, in the following chapter the main characteristics, business activities and entities of supply chains will be described.

3.3.1 Objective

The main objective of every supply chain is the overall value generated. This value is the difference between the costs the supply chain incurs in filling the customer's request and the price the customer pays when purchasing the final product. So the goal of any supply chain is to be cost-effective and efficient and therefore, generate the most value possible, while achieving customer satisfaction (Chopra & Meindl, 2007; Simchi-Levi, Kaminsky, & Simchi-Levi, 2008; Waters, 2007). Or to put it in other words:

"*getting, in the right way, the right product, in the right quantity and right quality, in the right place at the right time, for the right customer at the right cost*" (Mangan et al., 2008, p. 9).

3.3.2 Structure & Actors

In section 3.2 images of the theoretical structure of a supply chain were already shown.

As already mentioned, the basic thought in a supply chain is that organizations do not work in isolation. Each actor can act as a customer when it purchases materials from a supplier, and then also as a supplier when it sells materials to its customer. Therefore, the simplest view of the structure of a supply chain is that a single product moves through a series of organizations, where each one adds value to the product. Whatever happens before a certain organization is for that organization upstream, companies which act after that organization are called downstream. When now looking again at one organization in a supply chain and then extending the view to its direct suppliers (therefore, those suppliers which send materials directly to that organization), they are viewed as first-tier suppliers. Second-tier suppliers supply first-tier suppliers of an organization and so forth. The same applies to customers from that certain organization. All of those up- or downstream organizations are actors of the supply chain, of course also including the focal organization and its employees. When now thinking that a company usually does not only sell one product and that those products each have their own suppliers and those theirs again, one can imagine that supply chains get complex very fast (Chopra & Meindl, 2007; Waters, 2007).

3.3.3 Process Models

There exist different process models which try to describe the processes of a supply chain. In the following section one of the most well-known model will be shown.

Supply-Chain-Operations-Reference-Model (SCOR):

The Supply-Chain-Operations-Reference-Model (SCOR) was developed to describe the business activities associated with all phases of satisfying a customer's demand in any supply chain. Therefore, it works as a SC framework applicable to all different sorts of supply chains independent from the industry sector. Furthermore, the framework contains a set of performance metrics, supporting documentation and processes. Before the SCOR metrics were introduced, usage of different metrics on different supply chain levels and the related misalignment was a huge problem. For example, market researchers and corporate strategists used totally different measurements to describe the marketplace and the supply chain activities. Through the SCOR metrics different SCM areas achieve a better alignment and it facilitates design and reconfiguration of a supply chain to achieve desired performance (American Production and Inventory Control Society, 2017; Huan, Sheoran, & Wang, 2004; Simchi-Levi et al., 2008).

The SCOR framework was first released in 1997 by the Supply Chain Council (SCC). In 2014 the SCC merged with the American Production and Inventory Control Society (APICS) and henceforth they were called APICS SCC. Over the years many revisions were released, the last update was introduced in 2012 when the 11th version of SCOR was introduced (American Production and Inventory Control Society, 2017).

The Model itself contains several sections and is organized around the six primary management processes (shown in Figure 3-5) of Plan, Source, Make, Deliver, Return and Enable, which will be described briefly (Huan et al., 2004; Supply Chain Council, 2012; Zhou, Benton, Schilling, & Milligan, 2011):
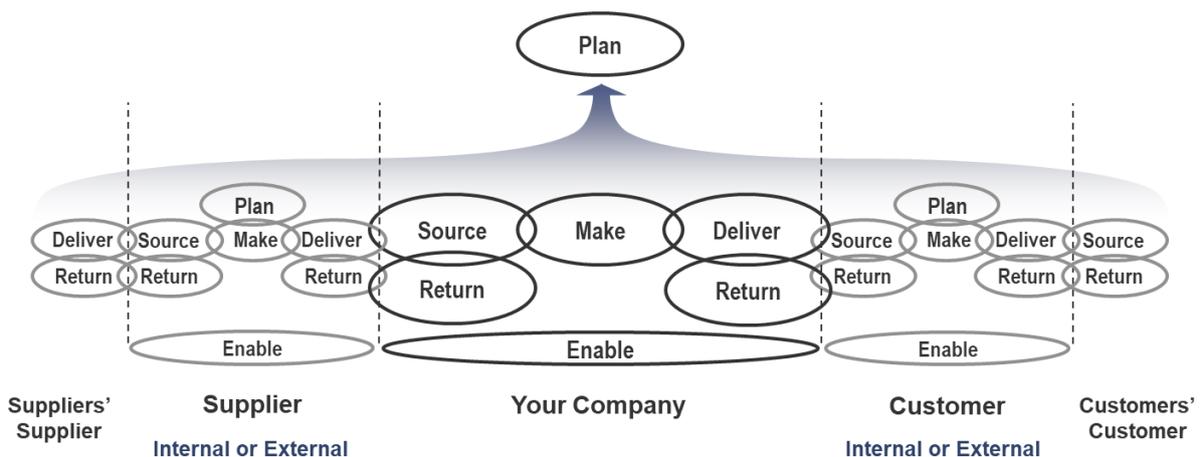

Figure 3-5: SCOR Model
Shows the SCOR model of a SC with its 6 primary management processes (adapted from: Supply Chain Council, 2012, p. i.2).

Plan: These processes focus on activities associated with developing plans to operate the supply chain.

Source: The Source processes describe the ordering (or scheduling of deliveries) and receipt of goods and services.

Make: The conversion of materials or creation of content for services is included in the make processes.

Deliver: The creation, maintenance and fulfillment of customer orders is of concern to the deliver processes.

Return: The reverse flow of goods is the focus of the return process.

Enable: Supply chain management processes, such as monitoring information or establishing and maintaining relationships, are described by the enable processes.

To make the SCOR framework applicable for all sorts of SCs, reaching from simple to very complex ones, the model only focuses on the top three process levels, which are industry neutral (Figure 3-6). Starting at level 4 the industry-, organization and/or location-specific processes, systems and practices are addressed (Supply Chain Council, 2012).

Level			Examples	Comments
#		Description		
1		Process Types (Scope)	Plan, Source, Make, Deliver, Return and Enable	Level-1 defines scope and content of a supply chain. At level-1 the basis-of-competition performance targets for a supply chain are set.
2		Process Categories (Configuration)	Make-to-Stock, Make-to-Order, Engineer-to-Order Defective Products, MRO Products, Excess Products	Level-2 defines the operations strategy. At level-2 the process capabilities for a supply chain are set. (Make-to-Stock, Make-to-Order)
3		Process Elements (Steps)	• Schedule Deliveries • Receive Product • Verify Product • Transfer Product • Authorize Payment	Level-3 defines the configuration of individual processes. At level-3 the ability to execute is set. At level-3 the focus is on the right: • Processes • Inputs and Outputs • Process performance • Practices • Technology capabilities • Skills of staff
4		Activities (Implementation)	Industry-, company-, location- and/or technology specific steps	Level-4 describes the activities performed within the supply chain. Companies implement industry-, company-, and/or location-specific processes and practices to achieve required performance
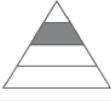
Figure 3-6: Hierarchical structure of SCOR
The scope of the SCOR model and its respective hierarchical levels are shown (Supply Chain Council, 2012, p. i.3).

The processes mentioned in the SCOR framework can be seen as activities most companies perform to effectively manage their supply chain. The six macro-level processes define the scope and the content of a supply chain. At level 2 the process capabilities of the level-1 processes are defined. Key level-2 processes include Make-to-Stock, Make-to-Order or Engineer-to-Order. On the third level individual process steps are defined.

As already mentioned, the SCOR framework is one of the most important basics for successfully managing and understanding a supply chain.

3.3.4 Key Challenges – why is it so hard?

Let's look at some of the major challenges for Supply Chain Management and Logistics. In other words, what makes it so hard? There are many different reasons for that and in this chapter we are going to take a look at four major ones. A further elaboration on supply chain challenges and how to deal with them can be found in chapter 6.

- **Uncertainty - Who knows what is going to happen?**

Uncertainty nowadays seems to be inseparably linked to supply chains. Starting with demand itself, which gets harder and harder to predict, as product life cycles shorten and customers get more discerning. A few decades ago it was totally normal to have only one phone in the house, which lasted for about 25 years. These days the average cellphone is coming out on 12 to 18 months' cycles, being replaced almost like a fashion item and therefore, running on ever shorter life cycles. This makes the business of forecasting more challenging and calls for shorter lead times. Additionally, uncertainties attributed to external sources such as natural disasters or geopolitical conflicts may result in supply chain disruptions. As can be seen, variability and uncertainty are present in almost every aspect of a supply chain (Christopher, 2005; MIT Center for Transportation and Logistics, 2017; Waters, 2007). Section 6.1 gives a deeper insight on supply chain vulnerabilities.

- **Global operations – Which language do we speak?**

In the past, companies used to rely on vertical supply chains, where the focal company owned all of its supply base. Let's take Henry Ford as an example. In 1929 he owned the world's largest industrial complex where the 'Model A' was produced. From the generation of power, to making glass and rubber and their own ore mines and steel miles – everything belonged to the River Rouge Plant (Sheffi, 2005b). Nowadays supply chains look quite different. Focusing on the core competencies and outsourcing are the new normal. In the globalized world companies buy parts and sell products worldwide. Production is often moved off-shore, as the hunt for lower labor costs is ongoing. Therefore, supply chains involve greater distances and huge numbers of partner companies on different continents, distributed over many time zones. The results are longer lead times, a need to forecast further in advance of sales, greater communication challenges and a huge reliance upon suppliers, who might be located literally on the other side of the globe (Christopher, 2005; MIT Center for Transportation and Logistics, 2017; Sheffi, 2005b).

- **Increased complexity – Why is it getting harder?**

The aforementioned rising globalization and therefore, the rise in supply chain partner numbers and the distribution of those partners all over the world contributes to increased complexity. But there are many other reasons for this development. The number of Stock Keeping Units (SKUs) is on a rise, as customers are becoming more demanding and their wants are becoming more diverse. But not only the discerning demand of the customer is a challenge, also the wish on how to be served varies and calls for an "omni-channel" approach, meaning a totally flexible way of demand fulfillment. Thus, one customer can place an order over the cell phone, gets it delivered to him/her and pays for it online. Another customer

might want to order it online, picks it up and pays for it in a store. This variability requires the supply chain to be more aligned and interconnected and makes it therefore harder to manage it successfully (H. L. Lee, 2002; MIT Center for Transportation and Logistics, 2017; Sheffi, 2005b).

- **Visibility – Who can see what and how quickly?**

Strongly relating to the problem of increased complexity is the challenge of visibility throughout the supply chain. As many different companies make up a supply chain, the data of each of the supply chain partners is usually stored separately at the distinct companies. But without a general supply chain database, there is no possibility of seeing all data at once. Even if that would be possible, other questions relating to useful metrics would arise, as data without structure and without a certain quality is not useful. End-to-end visibility is a big challenge and gets more difficult the more branched a supply network gets. It is often the case, that many companies do not even know their own low-tier suppliers at all. Different time zones, cultures, geographic boundaries of stores, companies and countries do not alleviate the problem (MIT Center for Transportation and Logistics, 2017; T. J. Pettit, 2008).

3.4 Important Concepts of Supply Chain Management

In the following paragraphs important supply chain management concepts will be explained.

Flexibility

Flexibility is a rather well-studied concept (Bernardes & Hanna, 2009). It was originally introduced in the manufacturing literature, where it was seen as "t*he ability of the manufacturing system to respond quickly, in terms of range and time, to external or internal changes*" (Crandall & Crandall, 2015, p. 303). Later on, the concept was expanded to organizations and supply chains. Corresponding definitions would be *"the capabilities of promptness and the degree to which a firm can adjust its speed, destinations and volumes"* (Prater, Biehl, & Smith, 2001, p. 824)*, or "the ability of a system to change status within an existing configuration (of pre-established parameters)"* (Bernardes & Hanna, 2009, p. 41). Rice and Caniato (2003) also stress the point that "f*lexibility entails redeploying previously committed capacity"* (p. 26).

To sum it up, the major ingredients of flexibility are:
1) The promptness with; and
2) the degree to which it can change its status.
3) This degree of possible changes may vary within a predefined spectrum.

Agility

There are many different definitions of agility. Wieland and Wallenburg (2012) define it as the "*ability of a supply chain to rapidly respond to change by adapting its initial stable configuration*" (p. 890). Bakshi and Kleindorfer (2009) (as cited in Kamalahmadi and Parast (2016, p. 125)) see it as a "r*apid system reconfiguration in the face of unforeseeable changes*".

"The ability to respond to external influences, the ability to respond to marketplace changes to gain or maintain competitive advantage," is the definition of the Supply Chain Council (2012, p. i.4).

As the definition of agility is very similar to the one of flexibility, the question arises what the differences between those two concepts actually are.

Some see flexibility as an antecedent of agility, so agile supply chains include flexibility, but flexible supply chains do not have to be agile (Braunscheidel & Suresh, 2009; Christopher, 2000; Swafford, Ghosh, & Murthy, 2006). Following that line of thought agility is made up by two main concepts (Conboy & Fitzgerald, 2004; Prater et al., 2001):

1. Speed and
2. Flexibility.

Prater et al. (2001) define speed as a "*measure of the time it takes to ship or receive a good*" (p.824), this coincides with the definition that Christopher and Peck (2004) suggest for velocity, "*distance over time*" (p. 10). In this thesis these two words will be used interchangeably, although strictly speaking velocity is a vector quantity and speed is scalar.

Bernardes and Hannah (2009) see the distinction between agility and flexibility in the character of the situation requiring change. A system responding to known situations is called flexible, therefore, flexibility enables a company to "*change status within the current configuration (a pre-established and limited scope and achievability)*" (p. 41); responding to unpredictable changes in market or in customer demand requires agility. Thereby, they define agility as the "*ability to fundamentally change states to accommodate unforeseen circumstances in a timely manner. It is a property that allows the system to change its fundamental configuration vis-à-vis unanticipated issues*" (p. 42).

This is the definition of agility that will be adopted, as it is viewed that agility is more than just flexibility and speed; but provides the possibility of fundamentally changing its configuration sometimes well without already predefined limits.

Resilience

The definition used in this thesis for resilience is the one proposed by Fiksel (2006, p. 16) *"the capacity of complex industrial systems to survive, adapt and grow in the face of turbulent change."* Further elaborations on the definition and concepts of supply chain resilience can be found in chapter 6.

To differentiate the concept of resilience form agility one may view resilience as existing in two dimensions – the proactive dimension, which concerns itself with robustness and the reactive dimension which deals with agility (Wieland & Wallenburg, 2013). The focus of a reactive strategy is that change is met with corresponding actions from the organization. Proactive strategies are based on prevention and forecasting (Lengnick-Hall & Beck, 2005).

Robustness

Robustness is *"the ability of a supply chain to resist change without adapting its initial stable configuration"* (Wieland & Wallenburg, 2012, p. 890). Therefore, a robust supply chain should be able to operate, even though it might have experienced some damage (Meepetchdee &

Shah, 2007). It endures rather than responds (Husdal, 2010) and thus, can be seen as proactive. Figure 3-7 shows the concept of robustness.
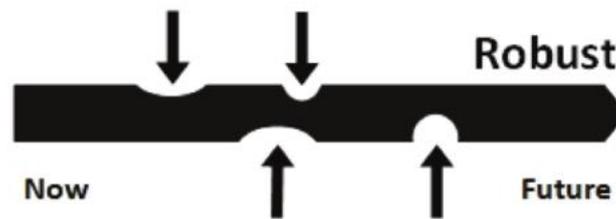

Figure 3-7: Concept of Robustness
Robustness can be seen as something that endures, although it might be damaged (Husdal, 2010).

Responsiveness

Is the "*propensity for purposeful and timely behavior change in the presence of modulating stimuli*" (Bernardes & Hanna, 2009, p. 41). In the literature review conducted by Bernardes & Hanna (2009) they found that responsiveness is seen as an outcome or use of the capability to address stimuli (e.g. flexibility). This is in line with the definition provided by the Supply Chain Council (2012) "t*he speed at which tasks are performed. The speed at which a supply chain provides products to the customer*" (p. i.4). For something to be called responsive, it has to anticipate or react to stimuli with timely and appropriate changes (Bernardes & Hanna, 2009).

Adaptability

In his famous "The Triple-A Supply Chain" paper Lee (2004) mentions agility, adaptability and alignment as central to achieving sustainable competitive advantage. He defines adaptability as the ability to "*adjust supply chain design to accommodate market changes*" (H. L. Lee, 2004, p. 4). As supply chains not only face sudden and unexpected changes but also near-permanent changes in market, they have to keep adapting their supply chains to maintain their competitive advantages. To be able to perceive new trends, organizations have to implement information systems and then reshape their supply chains if necessary (Ketchen & Hult, 2007; H. L. Lee, 2004).

Alignment

Alignment refers to the establishment of "*incentives for supply chain partners to improve performance of the entire chain*" (H. L. Lee, 2004, p. 1). This is important, as most supply chain partners would always choose something that benefits their own company over something that would benefit the whole supply chain. Therefore, if the interests of the supply chain differ from its member organizations, the actions of the individuals will not maximize the whole SC's performance and hence weaken it in the long run (Ketchen & Hult, 2007; H. L. Lee, 2004). Another very important factor of alignment in a supply chain, is the alignment of information (e.g. material flow, forecasts) to perform well (Christopher & Peck, 2004; T. J. Pettit et al., 2010).

Leanness

"A philosophy of production that emphasizes the minimization of the amount of all the resources (including time) used in the various activities of the enterprise. It involves identifying and eliminating non-value-adding activities in design, production, supply chain management, and dealing with the customers" (Bozarth & Handfield, 2008, p. 527).

Therefore, the main goal of a lean management philosophy is to eliminate waste including time in a supply chain and hence to optimize performance and to improve the competitive position (Mason-Jones, Naylor, & Towill, 2000).

Leagility

As a pure approach of leanness makes a company very susceptible to disruptions, it is argued that the next step from leanness is achieving agility. Therefore, the concept of leagility was coined.

"Leagile is the combination of the lean and agile paradigms within a total supply chain strategy by positioning the decoupling point[4] so as to best suit the need for responding to a volatile demand downstream yet providing level scheduling upstream from the marketplace" (Ben Naylor, Naim, & Berry, 1999 (as cited in: Mason-Jones et al. (2000), p. 4065)).

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[4] The decoupling point is the point in the material flow streams to which the customer's order penetrates. It is here where order-driven and the forecast-driven activities meet (Mason-Jones et al., 2000, p. 4065).

4   Humanitarian Supply Chains

4.1   Introduction

In 2016, over 377 million people were affected by natural disasters and humanitarian crises all around the globe; these disasters and crises then resulted in more than 66 million displaced people (Development Initiatives Ltd, 2017). Humanitarian organizations, who are the relief arm of the global community, are the front line of assistance for people affected by all kinds of disasters (A. Thomas, 2005) and through them, $27.3 bn was spent on response efforts (Development Initiatives Ltd, 2017). As disaster relief is approximately 80% logistics, logistics and supply chain management are of critical importance (Trunick, 2005; Van Wassenhove, 2006). One would think that the significance of those two aspects of humanitarian response has been evident to most humanitarian organizations for a long time, but that is not the case. In fact, it was not until 2004 that their role was widely acknowledged (Kovács & Spens, 2011a; A. Thomas & Kopczak, 2005).

In 2004, a major tsunami struck South Asia and claimed approximately 230,000 lives and left 1.7 million people displaced as a result. The relief effort which followed was unprecedented and involved donations of more than $13 billion from all over the world (Cozzolino, 2009). Airports and warehouses were flooded with relief goods as aid agencies struggled to sort through the piles of supplies, trying to distribute the needed items and dispose of others. As warehouses filled up, relief agencies could hardly find other storage spaces for the incoming goods or transportation pipelines. In addition, the myriad of aid agencies and military representatives from different countries operating in the region created a coordination and logistical nightmare (A. Thomas & Kopczak, 2005). These problems were recognized by the press and addressed by agencies like MSF (Médecins Sans Frontières) who stopped accepting any more money for their relief operations, as what was needed in their view were *"supply managers without borders: people to sort goods, identify priorities, track deliveries and direct the traffic of a relief effort in full gear"* (A. Thomas & Kopczak, 2005, p. 1, citing the Economist.com Global Agenda on January 5 2005)*.

Outcries like that one showed the world that logistic speed and efficiency are essential to a successful emergency aid response (Christopher & Tatham, 2011), thereby highlighting the role of the often overlooked logistical aspects in relief operations (S. J. Pettit, Beresford, Whiting, Banomyong, & Sylvie, 2014).

As a result, interest in the field of humanitarian logistics from practitioners and researchers has increased significantly. It also led to the introduction of humanitarian supply chain tracks at conferences, the dedication of special issues to the topic and the introduction of a whole journal (Journal of Humanitarian Logistics and Supply Chain Management) in 2011. Since 2004, much has changed, and many humanitarian organizations now recognize the relevance of a well-functioning supply chain for the provision of fast and accurate relief aid (Kovács & Spens, 2011a; Tatham & Pettit, 2010). However, winning a competitive award for their supply chain performance, as have both the IFRC (International Federation of the Red Cross and Red Crescent Societies) and the WFP (World Food Programme) (IFRC, 2017d; WFP, 2017c), is still a non-ordinary occurrence for an HO. Often, the focus still lies too heavily on frontline activities, such as fundraising, and not on background activities that facilitate those (Murray, 2005; Taylor & Pettit, 2009; A. Thomas & Kopczak, 2005).

Van Wassenhove (2006) even argues in his famous Blackett Memorial Lecture that humanitarian organizations are about 15 years behind their private sector counterparts, who

recognized the importance of efficient supply chains and the advantages of 'going global' years before.

Therefore, great challenges still lie ahead for the humanitarian sector on its way to effective and efficient responses to ever more complex disasters (United Nations, 2013).

4.2   Terminology

So far, there has not been an official definition of humanitarian logistics or humanitarian supply chain management. The IFRC defines it as:

"The basic task of humanitarian logistics comprises acquiring and delivering requested supplies and services, at the places and times they are needed, whilst ensuring best value for money. In the immediate aftermath of any disaster, these supplies include items that are vital for survival, such as food, water, temporary shelter and medicine, among others" (IFRC, 2017c).

Another definition, the most accepted and cited one nowadays, was coined by Thomas and Kopczak in 2005:

"Humanitarian Logistics is defined as the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people. The function encompasses a range of activities, including preparedness, planning, procurement, transport, warehousing, tracking and tracing, and customs clearance" (A. Thomas & Kopczak, 2005, p. 2).

As was mentioned in the previous chapter, in this thesis the unionist approach for understanding SCM and logistics will be used, which considers logistics a part of SCM. In order to manage a successful relief operation, humanitarian organizations discovered that the supply chain management approach to coordinate all different players was inevitable (Tomasini & Van Wassenhove, 2009). Also, all other key processes, such as program implementation, donor management or budget control, must be coordinated with the logistics unit. Therefore, the definition of humanitarian SCM that is most fitting for this thesis is the following:

"Humanitarian Supply Chain Management is the integration of key business processes from end beneficiary through original suppliers that provide products, services and information for the purpose of meeting the end beneficiary's requirements" (based on (Lambert, Cooper, & Pagh, 1998, p. 1; A. Thomas & Mizushima, 2005, p. 1)*.*

Based on the cited definition of humanitarian supply chain management the humanitarian supply chain is defined as:

"the network created through the flow of supplies, services, finances and information between donors, beneficiaries, suppliers and different units of humanitarian organizations for the purpose of providing physical aid to beneficiaries" (Howden, 2009, p. 2; based on: Mentzer et al., 2001, p. 4).

In a humanitarian context, the word "beneficiary" is used instead of the word "customer" , since there is no real "customer" by the textbook definition of the word (*"one that purchases a commodity or service"* (Merriam-Webster, 2017a)). The people who receive humanitarian

aid are usually not the ones paying for the goods and services, therefore, the word "customer" does not fit and the word "beneficiary" is used.

4.3 Background

As was mentioned in chapter 4.1, humanitarian supply chains have often been overlooked by humanitarian organizations, who saw them only as a supporting function rather than an integral part of their relief work. This lack of understanding of supply chain management and logistics resulted in a lack of inclusion in the planning and budgetary processes, which then in turn led to a breach of logistic requirements. In a desperate fire-fighting approach, the HOs then tried to fix these problems. The logistics struggle was noticed by managers, who concluded that a review of logistics was not advantageous, which in turn supported the lack of understanding, completing the vicious circle (Figure 4-1) perfect (Van Wassenhove, 2006).
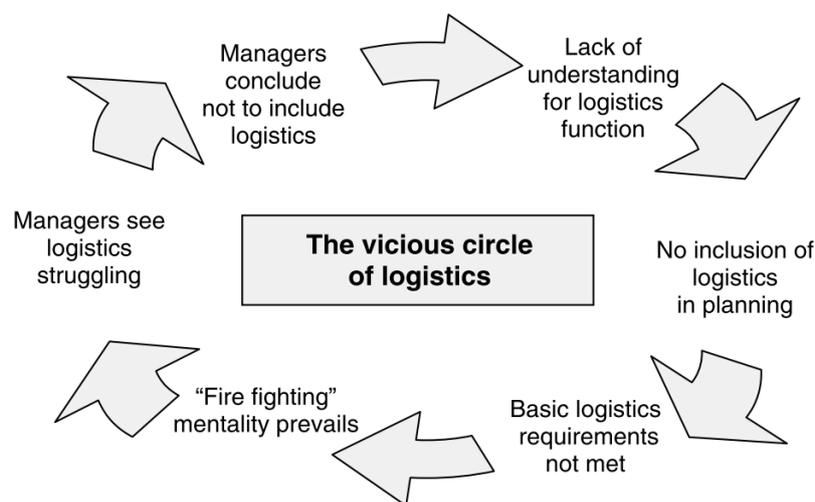

Figure 4-1: Vicious Circle of Logistics
This figure shows why logistics was for long trapped in a rather insignificant position in humanitarian operations and often overlooked by managers *(Van Wassenhove, 2006, p. 477).*

Nowadays, humanitarian organizations are more and more aware of the fact that supply chain management and logistics are central to their relief efforts. Thomas and Kopczak (2005) offer four reasons for the crucial role of SCM in humanitarian operations:

- Effectiveness and speed of response for major humanitarian programs are closely related to it.
- Since procurement and transportation are included in the function, SCM can be one of the most expensive parts of the whole relief effort.
- SCM is often the repository of data that can be analyzed to provide post-event learning, since tracking of goods is handled by the logistics department.
- All aspects of execution are reflected in logistics data, ranging from the effectiveness of suppliers and transportation providers and the cost and timeliness of response to the management of information and the appropriateness of donated goods. Therefore, it is crucial not only for current, but also for future response missions and programs.

Having defined humanitarian supply chain management and logistics and shown the overall importance of supply, the focus will now be put on costs.

When taking a closer look at the expenditures of humanitarian organizations, it is estimated that approximately 80% of costs are supply chain relevant costs (Trunick, 2005; Van Wassenhove, 2006). These can be further subdivided into two categories. 65% are spent on procurement costs and 15% on transport and warehousing. The remaining 20% of the total budget are spent on administration and personnel (Falasca & Zobel, 2011; Schulz, 2008).
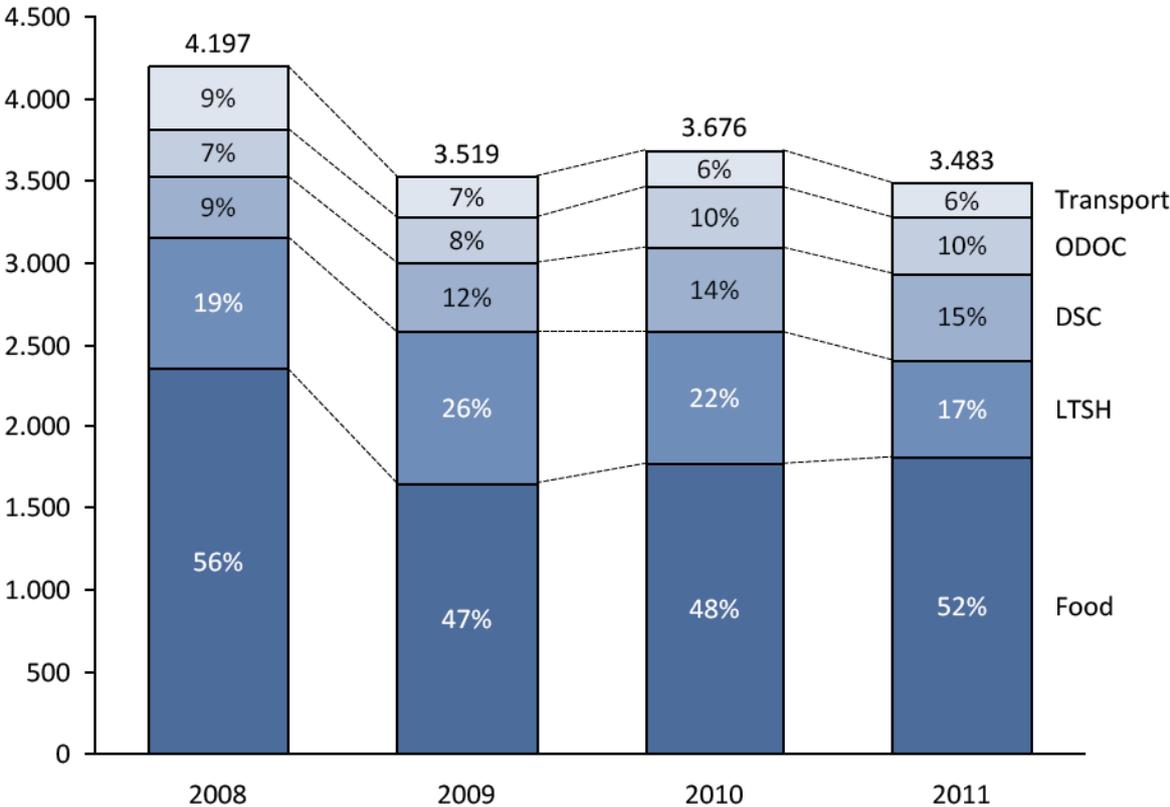
Figure 4-2: Direct Expenses of the World Food Program
This figure shows the direct expenditure by cost component (US$ million) of the WFP (World Food Programme, 2012, p. 72)[5].

Figure 4-2 shows the distribution of direct expenses by cost component of the World Food Programme for the years 2008 – 2011. As can be seen, it shows results similar to those of Schulz (2008) and Falasca & Zobel (2011).

When one now considers the annual budget for humanitarian assistance for the year 2016 (USD 27.2 bn (Development Initiatives Ltd, 2017)), the logistics expenditures amount to USD 21.76 bn. The magnitude of this enormous sum again highlights the great importance of supply chain management for humanitarian responses and the impact cost reductions and efficiency improvements would have.

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[5] Direct expenses do not include indirect support costs, program support and administrative budget costs.
LTSH – Landside Transport Storage and Handling (incurred primarily in-country)
DSC - Direct support costs (DSC) are the costs, generally at the country office level, that can be directly linked with the provision of support to an operation and which would not be incurred should the activity cease
ODOC – other direct operating costs (e.g. cargo insurance)

4.4 Characteristics

After shedding light on the terminology and the background of humanitarian supply chains as well as their financing, the following chapter will take a closer look at their characteristics.

4.4.1 Objective

The overall objectives of humanitarian organizations are to:

"*save lives, alleviate suffering and maintain human dignity during and after man-made crises and disasters caused by natural hazards, as well as to prevent and strengthen preparedness for when such situations occur*" (Development Initiatives, 2017)*.*

Generally speaking, for humanitarian organizations, social development, human lives and equity considerations are of higher importance than profitability aims (Ertem, Buyurgan, & Rossetti, 2010; Huang, Smilowitz, & Balcik, 2012; McLachlin & Larson, 2011; A. Thomas & Mizushima, 2005; Van Wassenhove, 2006). Apart from these overall goal differences to commercial supply chains, humanitarian organizations share the same supply chain objectives, which are therefore getting the product at the right place, at the right time, in the right quantity, of the right quality and at the right price (IFRC, 2017d; Luke et al., 2014; Tomasini & Van Wassenhove, 2009).

However, fulfilling these objectives is not an easy task, which becomes even more evident when looking at the general characteristics of humanitarian aid, especially during disaster operations (Balcik & Beamon, 2008, p. 102):

- *"Unpredictability of demand, in terms of timing, location, type, and size;*
- *Suddenness of the occurrence of demand in large amounts but with short lead times for a wide variety of supplies;*
- *High stakes associated with the timeliness of deliveries; and*
- *Lack of resources in terms of supply, people, technology, transportation capacity, and money"*

Arminas (2005, p. 14) put it quite precisely when he stated that *"purchasing and logistics for major disaster relief is like having the client from hell – you never know in advance what they want, when they want it, how much they want and even where they want it sent."*

4.4.2 Types

Humanitarian aid can be divided into two major branches: continuous aid work (development aid) and disaster relief (Kovács & Spens, 2007). The aim of continuous aid work is to assist in the development of a region, run a refugee camp or famine aid. Although famine aid could also be covered under disaster relief, the word "disaster relief" is usually reserved for sudden onset natural disasters (section 4.5) such as earthquakes or floods (Long, 1997). From a logistics point of view, development aid presents itself with normal lead times, which usually allow for evaluation and bidding procedures. Relief procurement is characterized by a major emphasis on speed and availability of goods to save lives (Falasca & Zobel, 2011).

Figure 4-3: Disaster Relief and Continuous Aid Work
left: Destroyed Homes in Bhaktapur, Nepal after the 2015 earthquake (Berehulak, 2015); right: Children at the community-based Children Centre in Taiza, Malawi (Matas, 2014)

Jahre and Heigh (2008) even further subdivide those two types of humanitarian aid into a permanent part, an emergency part and a project part. The permanent supply chain refers to all permanent or long-term facilities (like warehouses with pre-positioned stock), employees, systems and standardized processes which facilitate or generally enable a fast response process to emergencies or projects. The emergency supply chain is set up in the immediate aftermath of a disaster and is characterized by its unpredictability and instability. The project SC is usually set up in the recovery phase of a disaster or is designed in preparation to a possible future event. Like the permanent supply chain, it is predictable and stable.

4.4.3   Structure

A typical relief supply chain includes the building blocks shown in Figure 4-4. After a disaster has happened, assessments are conducted which then lead to first appeals and the mobilization of the people needed. Based on these appeals and assessments, procurement is launched and goods are transported to the affected region. There they are stored and further distribution points are set up for the last-mile delivery. Parallel to these processes, information is exchanged throughout the supply chain and cooperation is managed (A. Thomas, 2005; Van Wassenhove & Pedraza Martinez, 2012). Planning and sourcing for donations continue throughout the whole relief process.
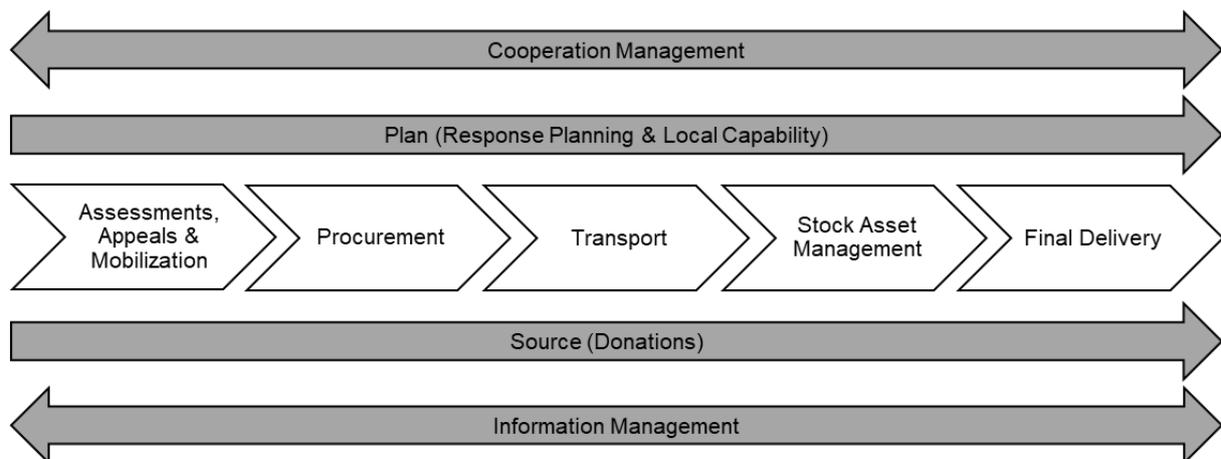

Figure 4-4: Relief Supply Chain
Shows the flows of a relief supply chain and the basic processes (based on: A. Thomas, 2005, p. 3; Van Wassenhove & Pedraza Martinez, 2012, p. 310).

In the following Figure 4-5, the SCOR model is transferred to the humanitarian world. Since humanitarian organizations usually are more of a service provider and not producers of goods, the make process is marked with a question mark. This example is based on a humanitarian food supply chain.
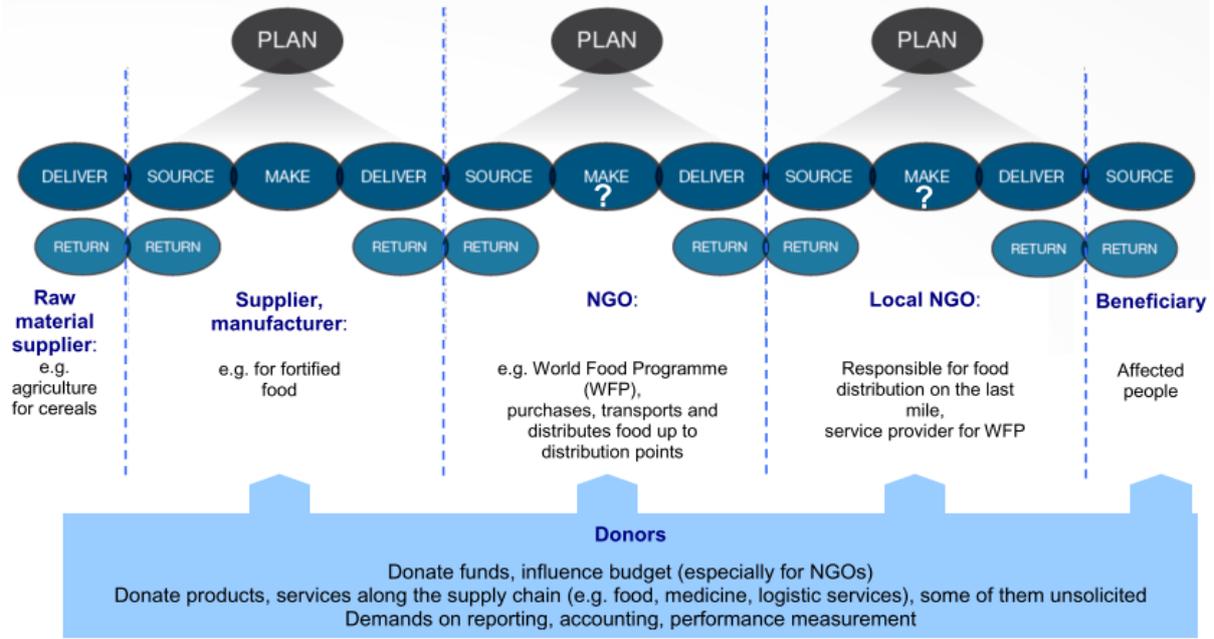

Figure 4-5: Example SCOR Model of a Humanitarian Supply Chain
The SCOR model applied to a humanitarian food SC. Since NGOs are usually not producing themselves, the make process is marked with a question mark (Bölsche, 2012, p. 15).

4.4.4 Actors

Concerning participating actors in humanitarian aid, one can see that they are quite numerous. Their motivation for participating is usually different than the motivation of those working in a commercial environment and goes beyond profitability (Ernst, 2003). Therefore, many actors who are not directly linked to the benefits of satisfying demand are part of humanitarian aid (Figure 4-6).

In contrast to commercial organizations, a "repeated purchase" (another demand) is nothing to be desired in the humanitarian world, but rather seen as something that should be avoided. Also, "true demand" (Gilliland, Sglavo, & Tashman, 2015, p. 64) is not created (Ernst, 2003), as the demand is assessed by aid agencies in the field (Long & Wood, 1995), which means that the customer (beneficiary) does not really have a purchase choice. Those aid agencies are usually also the primary actors through which governments and private donors channel their relief. They vary greatly in size and in their areas of operations, ranging from global to local action (A. Thomas & Kopczak, 2005). Aid is also frequently provided to fulfill certain political motives (Long & Wood, 1995; Tomasini & Van Wassenhove, 2004). However, political issues often aggravate the situation of relief operations and even hamper supply distribution, as one party of a conflict might not want relief aid to be delivered to certain other groups (Murray, 2005). Therefore, it is an important, though sometimes extremely difficult endeavor to depoliticize relief operations (Tomasini & Van Wassenhove, 2004).

Donors are of superior importance to relief missions because response activities are usually almost exclusively financed by them. This results in them often being referred to as the

"customer" of a relief process, as without their funds, no relief would be possible (Balcik, Beamon, Krejci, Muramatsu, & Ramirez, 2010; Gatignon et al., 2010; Heaslip, 2013). The majority of donations with an amount of more than $20 bn in 2016 was contributed by public donors, including governments and EU institutions. The remaining contributions ($6.9 bn) came from private donors (individuals, trusts, foundations and corporations) (Development Initiatives Ltd, 2017). Other actors in a humanitarian response include the military, the private sector, the diaspora and also the affected people themselves (O'Brien & UN OCHA, 2015).

As humanitarian organizations rely heavily on donations, trust and predictable (long-term) commitment are extremely important to them. Therefore, the maxim of transparency and being able to show donors that their pledged money and goods have actually reached the people in need is of paramount importance (Cozzolino, 2012).
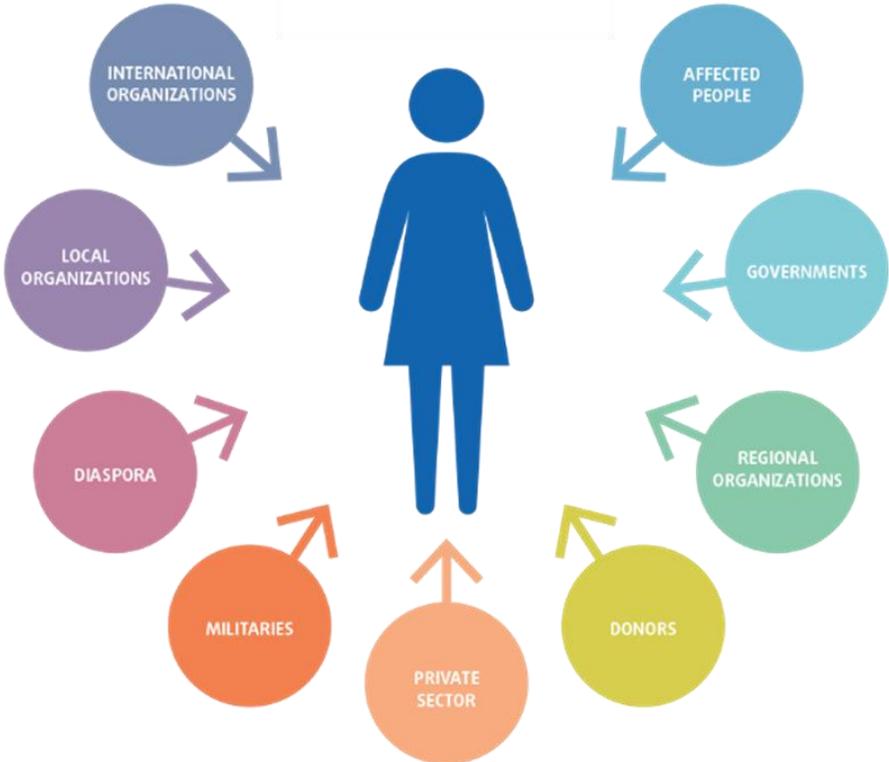
Figure 4-6: Actors in a Humanitarian Response
Many actors with different incentives are active in a humanitarian response (O'Brien & UN OCHA, 2015, p. 4).

With the military's ability to quickly mobilize troops and deliver relief in the first hours and days following a disaster, they are highly valuable for the disaster response, as this usually is the most critical time (Barber, 2012). Nevertheless, including the military often makes keeping the humanitarian principle of neutrality and independence (see section 4.6 for humanitarian organizations more difficult. This results in military aid being accepted after natural disasters rather than after a complex emergency (such as interventions during war time) (Balcik et al., 2010; Kovács & Tatham, 2009). Many times, the acceptance of military aid also depends on the country offering it; help from middle powers such as Canada, Holland, Ireland or the Scandinavian countries is accepted more often than help from large powers, like the UK or US army (Rutherford, Brem, & Matthew, 2003).

Traditionally military humanitarian actors have favored short-term lifesaving interventions with a clearly defined exit strategy (Rigby, 2001), which is why they will most likely be found

in the immediate response phase to a natural disaster (S. J. Pettit & Beresford, 2005). Of course, this is also strongly influenced by their capability to quickly mobilize military resources and to deal with a highly unpredictable demand and the associated required flexibility of their supply chain (Rietjens, Voordijk, & Boer, 2007). The military mandate in humanitarian response is described in more length in chapter 7.6.3.

Further characteristics of humanitarian supply chains are mentioned in chapter 5, where a comparison of humanitarian and commercial supply chains is made.

4.5 Disasters

Disasters have happened for thousands of years and are therefore no new concept in the human world. Max Frisch (1998) takes the rather philosophical notion that *"only human beings can recognize catastrophes, provided they survive them; Nature recognizes no catastrophes"* (p. 271). This line of thought can be found in many definitions of disasters.

The UNISDR (United Nations Office for Disaster Risk Reduction) (2009) defines a disaster as a:

„serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts which exceeds the ability of the affected community to cope using its own resources" (p.9).

Smith (cited by (Perry, 2007, p. 7) states that disasters are:

"Events that produce death and destruction and cause considerable social, political and economic disruption" (p. 301).

Fritz (1961) described disasters as:

"uncontrollable events that are coordinated in time or space, in which a society undergoes severe danger and incurs losses that the social structure is disrupted and the fulfillment of all of the essential functions is prevented" (p.655).

What all those definitions have in common is the presence of a social system which is seriously disrupted as a whole and as a result might not be able to fulfill its basic functions.

Having defined disasters, the following will provide a closer look at the occurrence rate of them. In Figure 4-7 the number of disasters from 1950 to 2016 is shown.

As can be seen, the annual amount of both natural and man-made (technological and complex) disasters has significantly risen over the past 65 years. However, this is far from over: according to Thomas and Kopczak (2005)), the number will continue to increase five-fold over the next 40 years. The economic impact of those disasters is gigantic: in the time period from 2005 to 2014 alone, the UNISDR (United Nations Office for Disaster Risk Reduction) estimated that the accumulated economical damage of disasters amounted to $1.4 trillion (UNISDR, 2017). Such impacts could be reduced by a better disaster handling and faster responses, thus alleviating the consequences of disasters and in some cases even preventing them from happening. Therefore, an efficient and effective supply chain management which is able to cope with those disruptions is of superior importance.

Number of Natural and Technological/Complex Disasters from 1950-2016
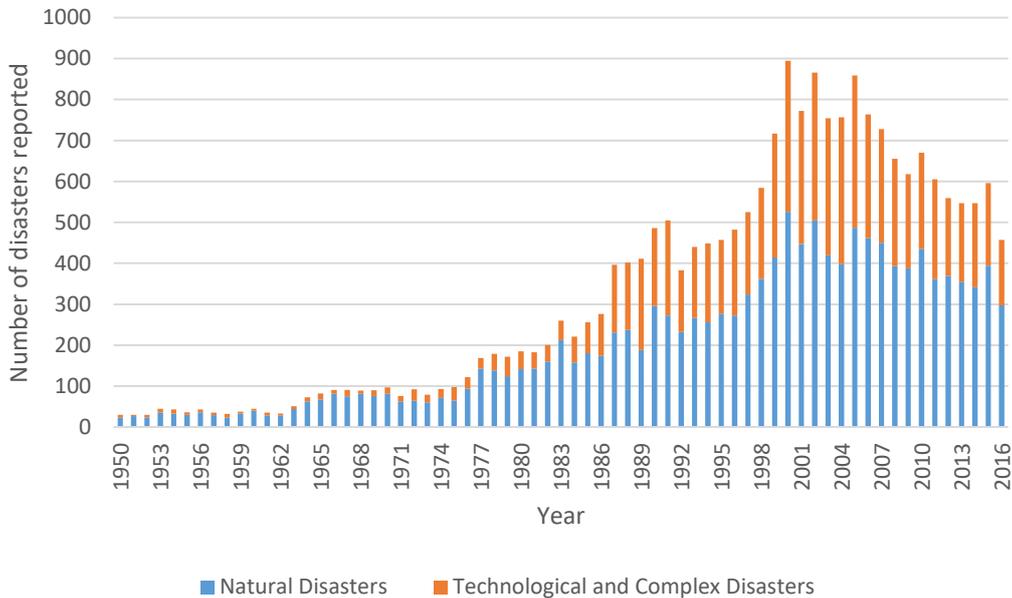
Figure 4-7: Number of Natural and Technological/Complex Disasters (1950-2016)
The number of natural and technological/complex disasters has significantly risen since 1950 (based on: Centre of Research on the Epidemiology of Disasters, 2017).

Disasters can be classified by their cause (Figure 4-8) – the aforementioned natural and man-made distinction – and by their predictability and speed of occurrence – sudden- and slow-onset (Van Wassenhove, 2006).

	Natural	**Man-made**
Sudden-onset	Earthquake Hurricane Tornadoes	Terrorist Attack Coup d'Etat Chemical leak
Slow-onset	Famine Drought Poverty	Political Crisis Refugee Crisis

Figure 4-8: Classification of Disasters
Disasters can be classified by their cause and by their speed of occurrence (Van Wassenhove, 2006, p. 476) .

When now also considering the logistical challenge these different disasters pose, one can say that sudden-onset disasters are more demanding at the beginning since they are hardly predictable and usually require a very fast response. Slow-onset disasters, such as famines or political crises, allow more time to plan (Cozzolino, 2009).

Those four seemingly independent disaster types are usually strongly interlinked, as for example an earthquake may easily cause a famine and/or an economic or political crisis. Therefore, it is often more appropriate to talk about disasters instead of a single disaster (Cozzolino, 2009).

4.5.1 Phases of Disaster Relief

When looking at the chronological sequence of disasters, literature differentiates between different phases. Usually, literature identifies various stages that correspond more or less to each other. There is no unanimity about the names of those phases (Cozzolino, 2009; Kovács & Spens, 2007; Long, 1997; Nisha de Silva, 2001b; S. J. Pettit & Beresford, 2005; Van Wassenhove, 2006).

Nevertheless, the most acknowledged model consists of the following phases (Cozzolino, 2009):

- Mitigation
- Preparation
- Response
- Reconstruction

These four stages form the disaster management cycle (Figure 4-9).

From a logistics or supply chain management perspective, the preparation, response and reconstruction phases are of most relevance. The mitigation phase is usually the responsibility of governments as it refers to laws or mechanisms that reduce social vulnerabilities and therefore do not actively influence humanitarian logistics (Cozzolino, 2009).
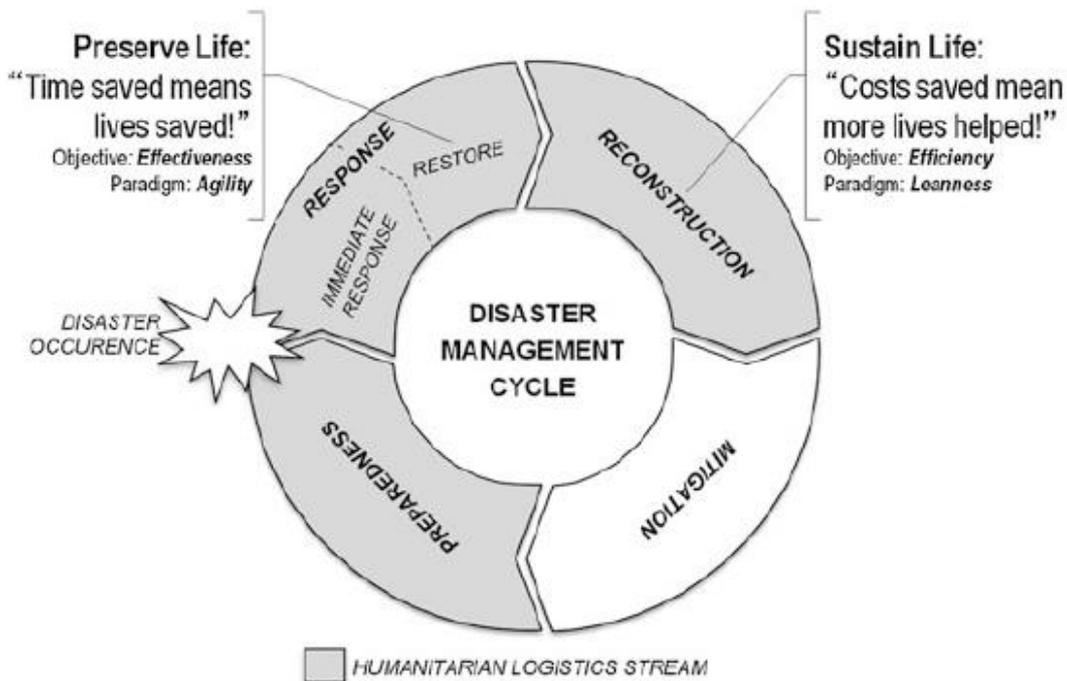
Figure 4-9: The Disaster Management Cycle and the Humanitarian Logistics Stream
The most demanding phases of a disaster are the response phase, where speed is of utmost importance, and the reconstruction phase, where efficiency is the main objective (Cozzolino, 2012, p. 10).

Preparedness: Although natural disasters are usually hard to predict, some regions are more prone to certain disasters than others. Especially when considering hurricanes or earthquakes, one can name regions (like South East Asia) or cities (e.g. San Francisco, Tokyo) which are affected by those disasters in an almost frequent, if not predictable way (Kovács & Spens, 2007). Thus, the aim of the preparedness stage is to prevent the gravest possible

consequences of such disasters by developing plans for an emergency response, training people, making building adaptations which limit the effects of a disaster, etc. Investing in preparedness pays off, as a study conducted by the Boston Consulting Group (2015) showed. Through preparedness activities, it is possible to speed up the response time to disasters by 2 to 50 days. Furthermore, the UNDP found that "*every dollar spent reducing people's vulnerability to disaster saves around seven dollars in economic losses*" (UNDP, 2012, p. 1). Nevertheless, as donors often insist that their money has to be used to directly help victims and not finance back-office operations, training or other preparedness activities, preparatory measures are frequently neglected (Guerrero-Garcia, Lamarche, Vince, Cahill, & Besiou, 2016; Murray, 2005).

Response: The response phase deals with operations instantly performed after a disaster. This phase has two main objectives which are carried out consecutively.

- The activation and set-up of temporary networks or supply chains (Jahre, Jensen, & Listou, 2009) and thereby responding immediately is the first objective.
- To restore the basic services and deliver much needed goods to the highest possible number of beneficiaries is the second goal.

The time in which aid can be delivered is of the utmost importance, as the first 72 hours are crucial for the survival rate of people (BMLVS, 2015; Van Wassenhove, 2006). Therefore, the coordination and collaboration of the actors involved in this phase and supply chain agility is needed (Cozzolino, 2009; Van Wassenhove, 2006).

Reconstruction: The reconstruction phase concerns itself with the aftermaths of a disaster. It has a long-term perspective and focuses on rehabilitation and restoring some form of normality to the victims' lives. Disasters often have long-term consequences and effects on the affected population that exceed the capabilities of emergency aid. In this phase, the focus lies on cost reduction, as speed is no longer essential to the survival and therefore, lean operations are desired (Cozzolino, 2009; Kovács & Spens, 2007; Tomasini & Van Wassenhove, 2009).

Howden (2009) provides an overview of the logistics efforts throughout the different stages of a disaster. Besides the aforementioned four phases, he also mentions a transition phase, since response and recovery efforts usually overlap and cannot be separated distinctly (Asian Development Bank, 2004; Howden, 2009).

As can be seen in Table 4-1 the response and the recovery phase are the most demanding phases from a logistics perspective.

Table 4-1: Humanitarian Logistics Throughout the Disaster Management Cycle
The most demanding phases of a disaster for humanitarian organizations are the response and recovery phase (Howden, 2009, p. 7).

Phase	Preparedness	Response	Transition	Recovery	Mitigation
Period	Long Term - Continuous	Days – Months	Months – Years		Long Term - Continuous
Logistics Volume	Low	High	Medium		Low
Supplies Required	Specific standard supplies pre-positioned for disaster response	Specific standard supplies: Food, medical supplies, water and sanitation equipment, shelter, household kits, etc.	Varied supplies depending on the context of the disaster: reconstruction material, livelihoods equipment		Varied supplies
Urgency	Low	High: Lead times for supplies can make the difference between life and death.	Medium: There may be government and donor pressure to complete recovery activities		Low
Procurement of Supplies	Local	International	Local-International		Local

4.6 Humanitarian Principles

Not everything that is labelled humanitarian assistance can truly be considered as such. There exists a set of four principles which form the foundation of humanitarian aid. Already set out in the 19th century by Henry Dunant and later on endorsed by the UN General Assembly Resolution 46/182 (19 December 1991), the principles of humanity, neutrality and impartiality must be kept. In another resolution from the year 2004 (58/114), the principle of independence was added (Tomasini & Van Wassenhove, 2009; UN OCHA, 2013). Table 4-2 explains the principles.

Table 4-2: Humanitarian Principles
Humanitarian organizations have to adhere to these principles (UN OCHA, 2013, p. A-2)

Humanity	Human suffering must be addressed wherever it is found, with particular attention to the most vulnerable in the population, such as children, women and the elderly. The dignity and rights of all victims must be respected and protected.
Neutrality	Humanitarian assistance must be provided without engaging in hostilities or taking sides in controversies of a political, religious or ideological nature.
Impartiality	Humanitarian assistance must be provided without discriminating as to ethnic origin, gender, nationality, political opinions, race or religion. Relief of the suffering must be guided solely by needs and priority must be given to the most urgent cases of distress.
Independence	Humanitarian action must be autonomous from the political, economic, military or other objectives that any actor may hold in relation to areas where humanitarian action is being implemented.

Keeping these principles is no easy task and humanitarian organizations are often faced with incomprehension and even anger for doing so. For example, the ICRC provided health services, such as first aid kits, training and other humanitarian aid in Afghanistan. To act in accordance with the principles, the ICRC offered these services to anyone in the conflict areas, including the Taliban and Afghan security forces. This was met with criticism by many, some even stating that the Taliban "*did not deserve to be treated like humans […] (as) they treat the people they capture worse than animals*" (The Guardian, 2010).

Concerning these humanitarian principles, responding to natural disasters is usually not as complicated as delivering aid in a man-made conflict (Balcik et al., 2010; Kovács & Spens, 2009; Van Wassenhove, 2006). Nevertheless, the mere decision about who is to receive aid when there is insufficient amount for everyone can prove to be extremely difficult. This can be illustrated by the fictional example of two villages which were struck by an earthquake. The larger village is closer to my warehouse, but not as damaged as the smaller one, and there is not have sufficient stock in the warehouse to provide for all people in need. If the inventory manager now decided to follow the principle of humanity, he would distribute the stock to the largest number of people – meaning the larger village. However, by doing so, he would ignore the principle of neutrality and impartiality. If he adhered to the principle of impartiality, he would send my stock to the smaller village, which has been affected worse. Finally, if he were to decide to stay neutral, he would have to split the aid between the two camps. Now to take all three principles into consideration, he would have to share the aid proportionately, keeping in mind the different travel distances and demands (Tomasini & Van Wassenhove, 2009).

This example illustrates how complicated delivering humanitarian aid can be and how often things which are of hardly any consideration to the business world can significantly impact the humanitarian supply chain.

4.7   Cluster Approach

Coordination is one of the most important factors when it comes to responding to an emergency. Good coordination equals fewer gaps and overlaps and facilitates a needs-based - rather than a capacity-driven - response (UN OCHA, 2017c).

To achieve that, in 2005 the IASC (Inter-Agency Standing Committee) endorsed the Cluster Approach to further enhance humanitarian coordination. Clusters are groups of humanitarian organizations, both UN and non-UN, which are active in a distinct field of a response (UNHCR, 2017). In the cluster, needs are prioritized and then the fulfillment of delivery is distributed among the participating organizations in order to minimize duplication of effort (IASC, 2006). The overall aim of the Cluster Approach is:

"[…] to strengthen system-wide preparedness and technical capacity to respond to humanitarian emergencies, and provide clear leadership and accountability in the main areas of humanitarian response. Similarly, at the country level, it aims to strengthen partnerships, and the predictability and accountability of international humanitarian action, by improving prioritization and clearly defining the roles and responsibilities of humanitarian organizations" (IASC, 2006, p. 2)*.*

Today, there exist 11 different clusters, ranging from emergency telecommunications to logistics. Every cluster is led by a Cluster Lead Agency which agrees to function as a "Provider of Last Resort" if necessary. This means that if necessary, and depending on security, access

and availability of funding, the cluster lead has to ensure the provision of service required to fulfil crucial gaps which were identified by the cluster (IASC, 2015).

The cluster is activated "*when clear humanitarian needs exist within a sector, when there are numerous actors within sectors and when national authorities need coordination support*" (UN OCHA, 2017a).

Figure 4-10 shows the Cluster System and the respective leader organizations of the clusters.
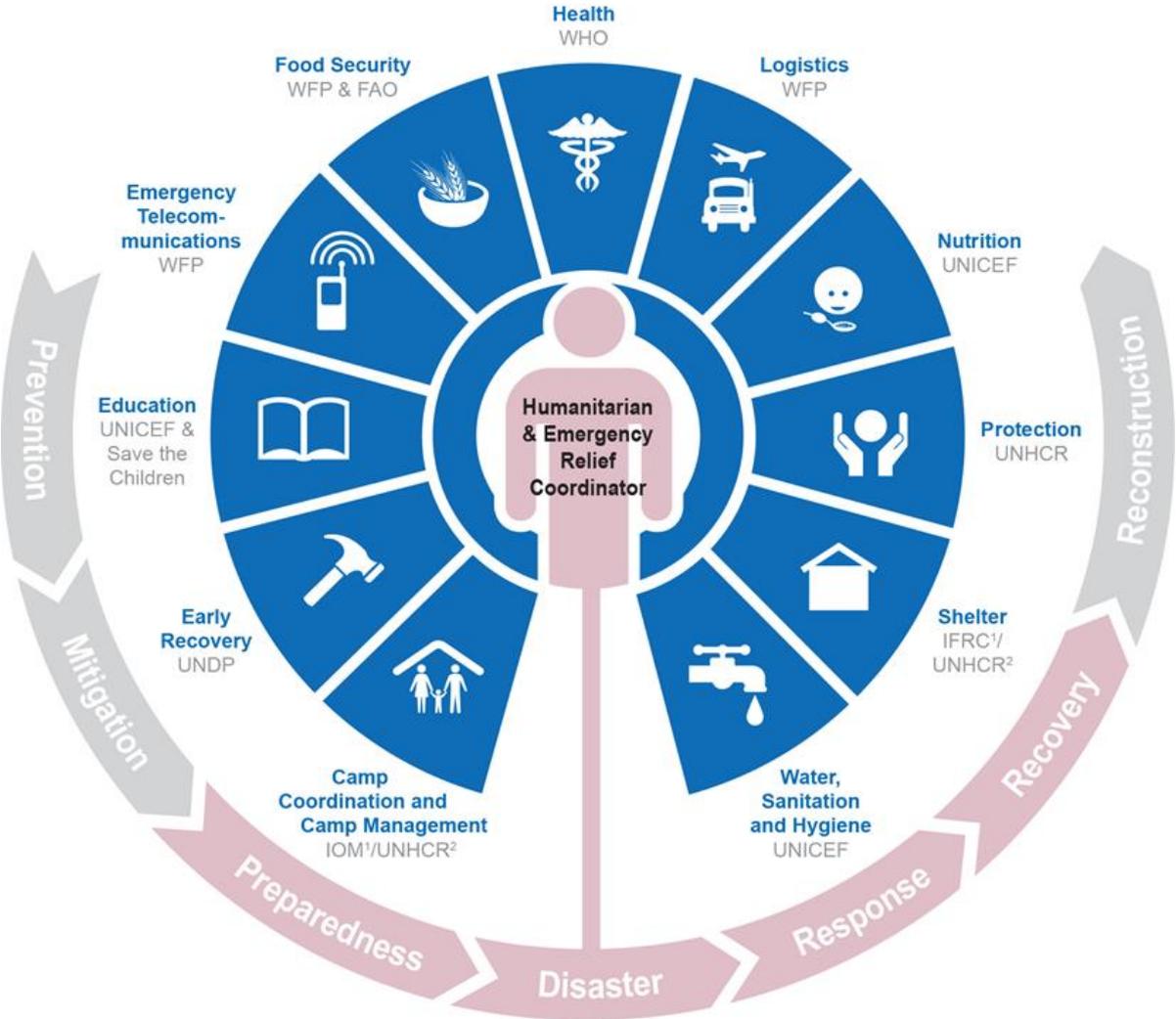

Figure 4-10: The Cluster System
There are 11 clusters that represent the basic tasks in a humanitarian relief mission and which can be joined by HO (UN OCHA, 2017b) *[1) conflict situations 2) natural disasters].*

5 Comparison Between Humanitarian Supply Chain and Business Supply Chain

Chapters 3 & 4 gave an overview over commercial and humanitarian supply chains. To be able to answer the research question and see whether supply chain resilience strategies from humanitarian supply chains can be transferred to commercial ones and vice versa, it is important to understand if those two types of supply chains are comparable in this sense. This chapter shall answer that research question and will therefore go into detail about supply chain characteristics of those two types of supply chains.

5.1 Methodology

To answer this research question an extensive literature review was done, according to Bryman and Bell (2015):

1. define the research question/aim of the study
2. identify articles
3. select and evaluate articles
4. analyze and synthesize; and
5. present results.

The research question itself is defined by the similarities and differences between humanitarian and commercial supply chains. Therefore, the three most important journals in the humanitarian field were rigorously searched for articles which included information about humanitarian supply chains characteristics and their relation to commercial supply chains. This was done until the year 2016. The journals were: *Humanitarian Logistics and Supply Chain Management, International Journal of Production Economics, International Journal of Physical Distribution and Logistics*. In addition to that, other important papers or books were analyzed as well.

The articles were analyzed using the critical analysis suggested by Saunders, Lewis & Thornhill (2016). In the following sections, the results will be presented and then summarized in Table 3.

5.2 Comparison

Emergencies are unique events, they are hard (and sometimes even impossible) to predict and may require an instant response (Cozzolino, 2009). Often, people are affected by these disasters and therefore (as already mentioned in chapter 4.4.1) the main goal of humanitarian organizations is to "*save lives, alleviate suffering and maintain human dignity*" (Development Initiatives, 2017). The goal of humanitarian supply chains is to deliver goods "*at the right place, at the right time, in the right quantity, of the right quality [and] at the right price*" (IFRC, 2017e). This goal coincides with the supply chain goal of commercial organizations. However, the main goal of commercial organizations is to maximize profit (Chopra & Meindl, 2007; Christopher, 2005; Van Wassenhove, 2006).). To fulfill their supply chain goals, both commercial and humanitarian organization are bound by prevailing laws and regulations. Additionally, humanitarian organizations also have to follow the humanitarian principles as set out by the UN General Assembly in 1991 (Tomasini & Van Wassenhove, 2009; UN OCHA, 2013).). This marks a huge difference, as staying in line with these principles affects the

management of the supply chain greatly (Winter, 2009) (see chapter 4.6). Another important aspect is the number of actors and their incentives. In the commercial world, those actors are usually known and have rather aligned incentives, while that is normally not the case in the humanitarian world. There exists a multiplicity of actors who are often not even known, and their incentives are often misaligned (political motives, altruistic motives, etc.) (Charles et al., 2010; D'Haene et al., 2015; O'Brien & UN OCHA, 2015; Van Wassenhove, 2006).

Demand and supply patterns in the humanitarian world are characterized by uncertainties, unpredictability and often the receiving of unexpected goods, at least when considering emergency supply chains (Charles et al., 2010; Ertem et al., 2010; Kovács & Spens, 2007; Logistics Cluster, 2017; Tatham, Loy, & Peretti, 2015; Van Wassenhove, 2006). In the business world, demand is usually forecastable or known, and also supply patterns are mostly predictable (Charles et al., 2010; Ertem et al., 2010; Tatham et al., 2015; Van Wassenhove, 2006). Of course, there exist exceptions to that, which will be discussed later when analyzing Lee's (2002) "Uncertainty Framework". Although the environment for humanitarian organizations is probably one of the most volatile ones, commercial organizations are faced with a more and more volatile world as well (Antai & Owusu, 2015; Besiou, Stapleton, & Van Wassenhove, 2011; Charles et al., 2010; D'Haene et al., 2015; Gatignon et al., 2010). In contrast to commercial supply chains, HSC are not necessarily built on the basis of frequent economic transactions. Relationships are built "just-in-case" as a preparedness measure and suppliers need to have a certain capacity at the time of need (Kovács & Spens, 2011b).

Van Wassenhove (2006) argues that humanitarian organizations are approximately 15 years behind their private sector counterparts in respect to the application of supply chain management tools. This might also be due to the fact that, logistics were only quite recently acknowledged as a core function of humanitarian operations (see chapter 4.1) (Kovács & Spens, 2011a; A. Thomas & Kopczak, 2005). The use of technology and information systems also reflects this. In the commercial world, the technology used is usually rather sophisticated technology with commercial software packages. Literature on the humanitarian world states that this is apparently not the case for the humanitarian world yet (Ertem et al., 2010; Van Wassenhove, 2006).

When now analyzing the value benefit network[6] of a commercial supply chain (Figure 5-1), further differences can be noted.[7] The figure includes the supplier, who offers materials that are purchased by the focal organization. Therefore, information and also material and money are exchanged between the two. The customer then buys the products or services offered by the focal organization, and information is exchanged as well (Charles et al., 2010; Chopra & Meindl, 2007; Christopher, 2005; Tomasini & Van Wassenhove, 2009). If the product is returned, the directions of the flows change.

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[6] In this notation the upper part of the circle mentions the name of the entity, the middle part its capabilities and the lower part its assets. The arrows show the exchange of different values (Vorraber, 2012).

[7] Only one exchange of supplier, focal organization and customer is shown; this could be extended to the whole supply network, following the shown basic scheme. As it is only intended to show the basic value transfer, this was not done.

Supplier

Supplier of
material

material

Own Organization

*Offering service or
product*

Product/service

Customer

*Ordering service or
product*

money

money   information   resources
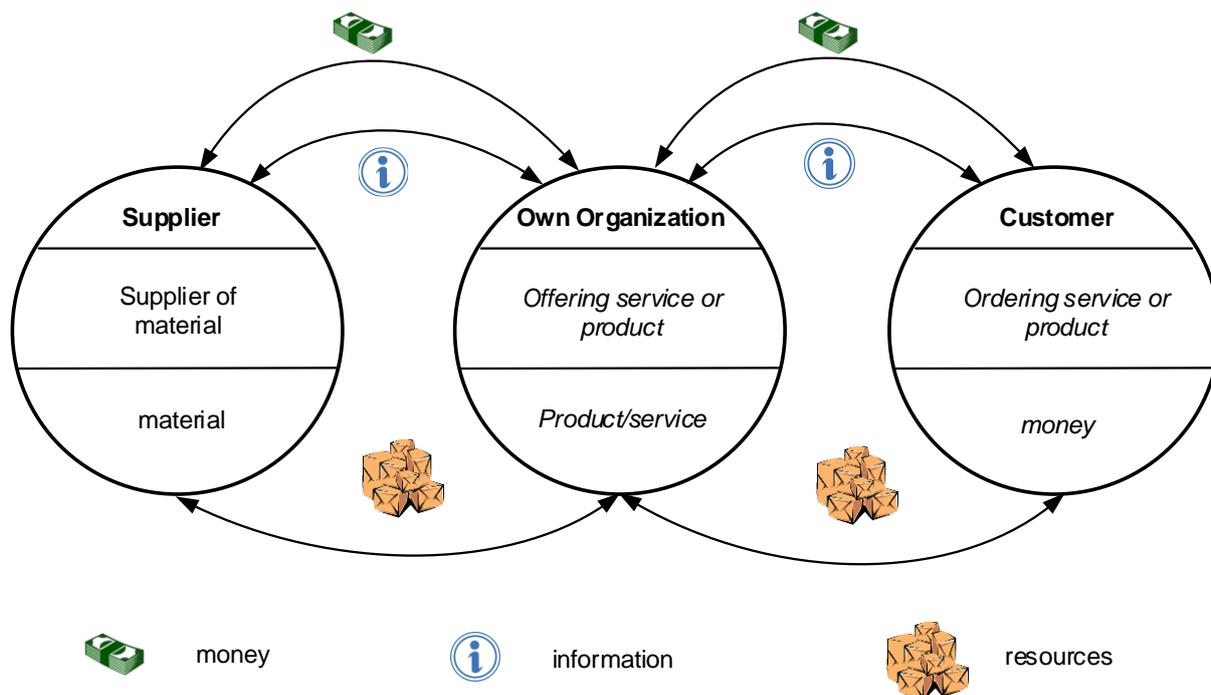
Figure 5-1: Commercial Supply Chain Flows
This figure shows the main participants and their exchanged flows in a commercial supply chain.

Figure 5-2 depicts some essential differences in comparison with Figure 5-1. Foremost a fourth and a fifth actor is introduced. The donor, which finances all of the processes and products of the HOs and the individual helper, which represents helping people, who are doing that without a HO (e.g. family members). The donor donates money, manpower or material to an executing agency (NGO, IGO or GO)[8] which then distributes all those donations to the beneficiary and coordinates the relief or uses the money to purchase relief aid from suppliers. The transaction between the supplier and the humanitarian organization resembles the commercial one, which was described above. The beneficiary primarily receives aid and also provides information, but does not pay for any help (Charles et al., 2010; S. J. Pettit & Beresford, 2009).

This illustrates one of the two major differences between humanitarian and commercial supply chains mentioned by Winter (2009), namely that *"the beneficiary (customer) lacks voice, as there is no direct market mechanism to punish (or reward) ineffective (effective) organizations"* (p. 98). Humanitarian organizations need to act in accordance with their principles, which is the second difference stated.

Furthermore, Figure 5-2 also shows the complex situation of the end user not being the buyer of the products and therefore the often predominant view that the donor is the actual customer who needs to be satisfied (Charles et al., 2010; Tatham, 2012; Tomasini & Van Wassenhove, 2009).

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[8] NGO – Non-Governmental Organization, IGO – Intergovernmental Organization, GO – Governmental Organization
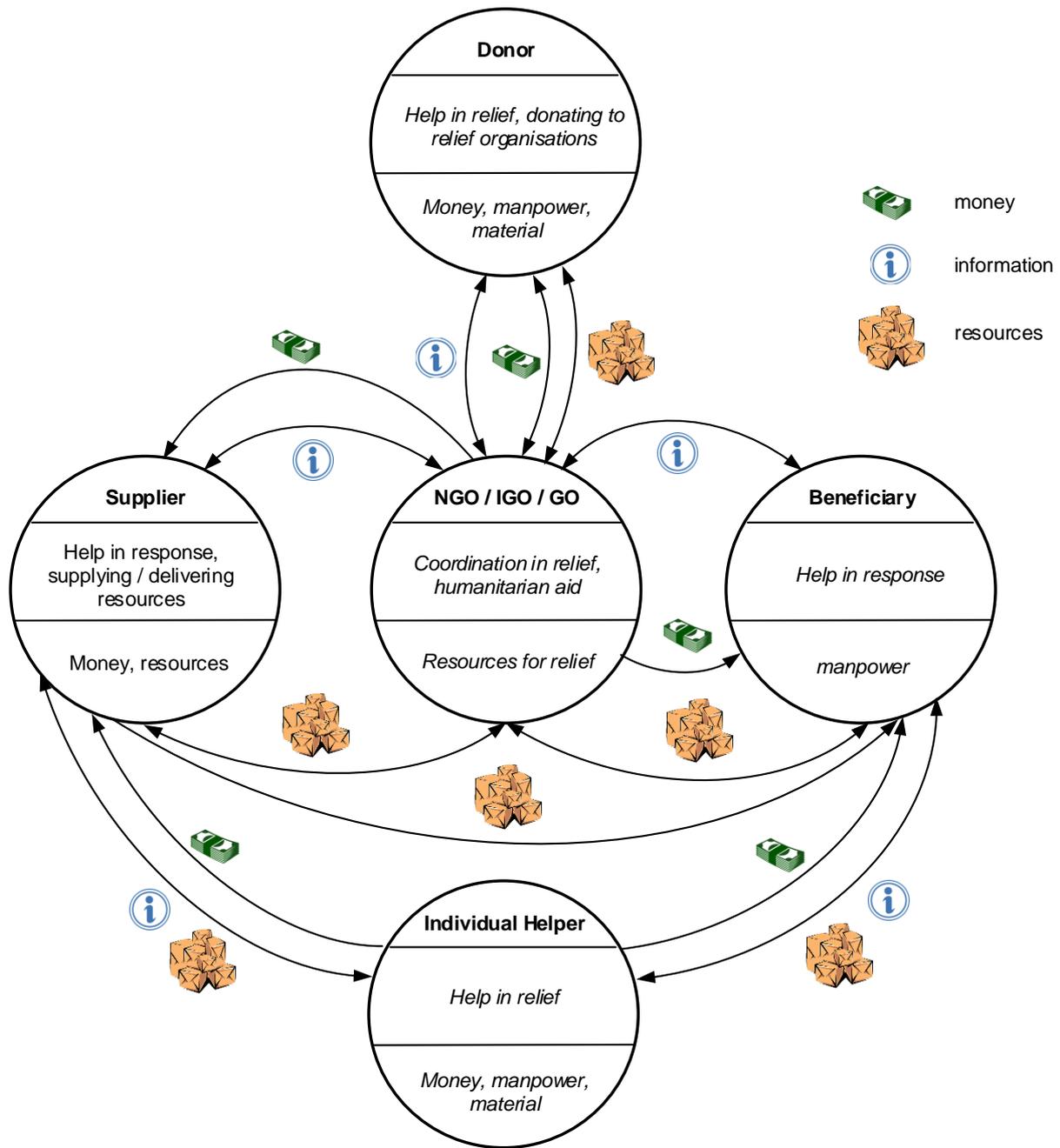
Figure 5-2: Humanitarian Supply Chain Flows
This figure shows the humanitarian supply chain flows. One can see that there exist 2 new entities, in comparison with the CS. The donor, which funds the whole operation and the individual helper, which represents all people not helping through humanitarian organizations (e.g. family members).

As mentioned before, there exist different types of commercial and humanitarian supply chains. The following paragraphs will shed light on them and their uncertainties resulting from the demand and supply side.

Considering the different uncertainty levels in a commercial supply chain, Lee (2002) provides a classification of those levels in his "Uncertainty Framework". Functional Products with a stable process are products which form the base of products that are usually bought by a household, such as staple food or oil and gas. Products with a high demand uncertainty but a rather stable supply include for instance computers or fashion apparel. As far as hydro-electric power or some food products are concerned, the demand for them is certain, but the supply

not. Meanwhile, supply and demand uncertainties are in the right lower corner, where products such as semiconductors or high-end computers are listed.

The three humanitarian supply chain types described by Jahre and Heigh (2008) (see chapter 4.4.2) can also be classified in the "Uncertainty Framework". The demand for the project supply chain and the permanent one is rather predictable, and supply uncertainties are usually not too big either (Jahre & Heigh, 2008). Therefore, the products of these two supply chains can be found in the upper left corner. The emergency supply chain on the other hand is not very predictable. Although framework agreements and warehouses alleviate some supply uncertainties, there usually still exists a huge supply uncertainty after a disaster has struck (Ertem et al., 2010; Jahre & Heigh, 2008; Van Wassenhove, 2006). Furthermore, the demand is not certain, as the situations often tend to be fairly complex and assessments take time (Charles et al., 2010; Jahre & Heigh, 2008; Kovács & Spens, 2007; Logistics Cluster, 2017; Tatham et al., 2015). This puts the emergency supply chain in the same corner as highly innovative products which are still in an evolving phase. When consideringt the attributes of those products, one finds many similarities with the humanitarian emergency supply chain. Lee (2002, p. 106) defines innovative products as products with high demand uncertainties, difficult to forecast, with variable demand, high product variety and high stock-out cost among others. Evolving products are described as vulnerable to breakdowns, limited supply sources, unreliable suppliers, more process changes, potential capacity constrained and variable lead time (H. L. Lee, 2002, p. 107). This reflects Balcik and Beamon's (2008) thoughts on the characteristics of humanitarian supply chains (see chapter 4.4.1).

Demand Uncertainty

	Low (Functional Products)	High (Innovative Products)
Low (Stable Process)	Grocery, basic apparel, food, oil and gas	Fashion apparel, computers, pop music
High (Evolving Process)	Hydro-electric power, some food produce	Telecom, high-end computers, semiconductor

(Supply Uncertainty — vertical axis label)

Figure 5-3: The Uncertainty Framework
In this figure, examples for products of the different uncertainty categories are given (H. L. Lee, 2002, p. 108).

When adopting Gattorna's view (2010), these highly uncertain supply chains call for a "fully flexible" supply chain management approach, one focusing on a "*creative solution to an unusual, and seemingly low probability event*" (Gattorna, 2010, p. 252). This has to be done very fast, as time is pressing.

In Table 3, the comparison of the two supply chains is summarized.

Table 3: Comparison of Commercial SC and Humanitarian Relief SC

	Commercial SC	Humanitarian SC
Main objective of organization	Maximize profit (Chopra & Meindl, 2007; Christopher, 2005; Van Wassenhove, 2006)	Save lives and help beneficiaries (Development Initiatives, 2017; Ertem et al., 2010; McLachlin & Larson, 2011; Natarajarathinam et al., 2009; Oloruntoba & Gray, 2006; Tomasini & Van Wassenhove, 2009; Van Wassenhove, 2006)
Objective of SC	Getting the product at the right place, at the right time, in the right quantity, of the right quality and at the right price. (Chopra & Meindl, 2007; Mangan et al., 2008; Waters, 2007)	Getting the product at the right place, at the right time, in the right quantity, of the right quality and at the right price. (IFRC, 2017e; Luke et al., 2014; Tomasini & Van Wassenhove, 2009)
Supply chain range	From suppliers' supplier to customers' customer (Charles et al., 2010; Chopra & Meindl, 2007; Tomasini & Van Wassenhove, 2009)	From donors and suppliers to beneficiaries (Charles et al., 2010; S. J. Pettit & Beresford, 2009)
Customer definition	End user = buyer (Charles et al., 2010; Christopher, 2005)	End user (beneficiary) ≠ buyer (donor) (Charles et al., 2010; Tatham, 2012; Tomasini & Van Wassenhove, 2009)
Information flow	Usually rather well-structured (Charles et al., 2010)	Means of communication often reduced (no internet access in the field, etc.) (Charles et al., 2010; Scholten et al., 2010)
Regulations	Official laws and regulations by governments etc. (Winter, 2009)	Official laws and regulations and also their own humanitarian principles (Tomasini & Van Wassenhove, 2009; UN OCHA, 2013; Winter, 2009).
Financial flows	Bilateral and known (Charles et al., 2010)	Unilateral (from donor to beneficiary) (Charles et al., 2010)
Supplier	Usually known in advance (Charles et al., 2010)	Often not known in advance (supplier or/and donor) (Charles et al., 2010)

Actors	Known, with rather aligned incentives (Charles et al., 2010)	Multiplicity in nature, but scarcity in numbers; incentives are rather misaligned (Charles et al., 2010)
Demand pattern	Usually forecasted/known (Charles et al., 2010; Ertem et al., 2010; Tatham et al., 2015; Van Wassenhove, 2006)	Uncertainties; demand is estimated in first hours of response (Charles et al., 2010; Kovács & Spens, 2007; Logistics Cluster, 2017; Tatham et al., 2015)
Supply pattern	Mostly predictable (Ertem et al., 2010; Van Wassenhove, 2006)	Sometimes hard to predict; can either be cash, in-kind donations or unsolicited goods (Ertem et al., 2010; Van Wassenhove, 2006)
Environment	More and more volatile (Charles et al., 2010)	Highly volatile and unstable (Antai & Owusu, 2015; Besiou et al., 2011; Charles et al., 2010; D'Haene et al., 2015; Gatignon et al., 2010)
Flow type	Commercial products (Ertem et al., 2010; Van Wassenhove, 2006)	Resources like evacuation vehicles, people, shelter, food, hygiene kits, etc. and services (Ertem et al., 2010; Tatham et al., 2015; Van Wassenhove, 2006)
Lead time	Mostly predetermined (Ertem et al., 2010; Van Wassenhove, 2006)	Approx. zero lead time, demand is immediate (emergency SC); mostly predetermined (permanent, project SC) (Ertem et al., 2010; Jahre & Heigh, 2008; Kovács & Tatham, 2009; Oloruntoba & Gray, 2006; Van Wassenhove, 2006)
Delivery network structure	Established techniques to find the number of warehouses, distribution centers (Ertem et al., 2010; Van Wassenhove, 2006)	Often ad hoc distribution facilities or demand nodes, dynamic network structure (Ertem et al., 2010; Van Wassenhove, 2006) In risk-prone regions infrastructure already exists (Jahre, 2017)

Inventory control	Safety stocks for certain service level can be found; inventory control easier when demand and supply pattern is given (Ertem et al., 2010; Van Wassenhove, 2006)	Rather unpredictable demand pattern, therefore difficult inventory control (Ertem et al., 2010; Van Wassenhove, 2006)
Technology and information systems	Often, highly developed technology is used with commercial software packages (Ertem et al., 2010; Van Wassenhove, 2006)	Less technology is used, few software packages that can record and track logistics data. (Ertem et al., 2010; Van Wassenhove, 2006)
Performance measurement method	Based on standard supply chain metrics (Ertem et al., 2010; Van Wassenhove, 2006)	Time to respond to the disaster, percentage of demand supplied, meeting donor expectations, etc. (Beamon & Balcik, 2008; Ertem et al., 2010; Van Wassenhove, 2006)
Equipment and vehicles	Ordinary trucks, vehicles and fork-lifts (Ertem et al., 2010; Van Wassenhove, 2006)	Robust equipment has to be mounted and demounted easily (Ertem et al., 2010; Van Wassenhove, 2006)
Human resources	Commercial SC is a respected career path	High employee-turnover, voluntary staff (A. Thomas & Kopczak, 2005; Van Wassenhove, 2006)
Stakeholders	Shareholders, customers and suppliers (Ertem et al., 2010; Van Wassenhove, 2006)	Donors, governments, military, NGOs, beneficiaries, United Nations, etc. (D'Haene et al., 2015; O'Brien & UN OCHA, 2015; Van Wassenhove, 2006)

5.3 Conclusion

As was shown in this chapter, humanitarian and commercial supply chains are alike in many aspects, but also differ in others. It is evident that their purposes for existing are different. However, this difference does not change the general setting of the supply chains and the problems with which they are faced (time pressure, demand forecasting difficulties, etc.).

Therefore, to keep in line with Schulz (2008, p. 45), Jahre & Heigh (2008, p. 47), Van Wassenhove & Pedraza Martinez (2012, p. 310) and Kovács & Spens (2012, p. xiii), the differences of these two supply chains are acknowledged, but they do not impede the comparability of the supply chains. The (emergency) humanitarian supply chain and the military supply chain are seen as "*extreme examples taken from the range comprised in the supply chain spectrum*" (Schulz, 2008, p. 45). The "project" and "permanent" supply chains are generally predictable and stable (Jahre & Heigh, 2008) and are therefore comparable to commercial supply chains with moderate uncertainties (H. L. Lee, 2002).

Through this comparability of the different types of humanitarian supply chains to commercial ones the "*techniques, and approaches used within business logistics can often be transferred or altered so they fit the purpose of their context*" (Kovács & Spens, 2012, p. xiii)*.

When considering the future challenges for supply chains, Tomasini and Van Wassenhove (2009) observe that due to the dynamic environment, commercial and humanitarian supply chains increasingly need the same capabilities to survive and flourish:

"*Companies increasingly need the same sort of skills as relief organizations, given the dynamic demands and disruption risks of operating global supply chains and the central role of logistics in increasing profits when it comes to short-term changes in demand or supply (agility), or in adjusting their design to market changes in the medium term (adaptability)*" (p.134).

6   Supply Chain Resilience

In the following chapter the concept of supply chain resilience will be explained thoroughly based on a literature review.

6.1   Introduction

In the last decades the business world has suffered major changes as the whole world has become more connected and supply chains have grown longer and longer as globalization advanced. This interconnectedness contributes to increasing supply chain complexity and dependencies between the members of the supply chains (Blackhurst et al., 2005; Christopher & Peck, 2004; Craighead, Blackhurst, Rungtusanatham, & Handfield, 2007; Fiksel, Polyviou, Croxton, & Pettit, 2015; Hamel & Välikangas, 2003), thus contributing to potential supply chain disruptions. In Table 6-1 further factors are listed.

Table 6-1: Supply Chain Disruption Risks
In this figure factors which potentially increase the risk of supply chain disruptions (based on: Cranfield University - School of Management, 2002, p. 3; Sheffi & Rice, 2005, p. 41)

- Globalized supply chains
- Specialized factories
- Centralized distribution
- Focus on efficiency rather than effectiveness
- Increased outsourcing
- Reduced supplier base
- Increased volatility of demand
- Lack of visibility and control procedures
- Increased customer expectation
- Greater product variety with shorter product life cycles

In Table 6-1 mostly internal risks for a supply chain disruption were listed but of course also exogenous factors exist. The 2011 "Supply Chain and Transport Risk" Survey by World Economic Forum focused on those. In multifaceted analysis of published studies, an online survey and various interview series with industry, academic and government experts, they assessed those. Figure 6-1 shows the outcome of their survey on which external disruptions are most likely to cause significant and systemic effects on supply chain or transport networks. It was also measured if the distinct disruption causes were controllable, influenceable or uncontrollable by the supply chain itself.

Environmental	Natural disasters	59%	
	Extreme weather	30%	
	Pandemic	11%	
Geopolitical	Conflict and political unrest	46%	
	Export/import restrictions	33%	
	Terrorism	32%	
	Corruption	17%	
	Illicit trade and organized crime	15%	
	Maritime piracy	9%	
	Nuclear/biological/chemical weapons	6%	
Economic	Sudden demand shocks	44%	
	Extreme volatility in commodity prices	30%	
	Border delays	26%	
	Currency fluctuations	26%	
	Global energy shortages	19%	
	Ownership/investment restrictions	17%	
	Shortage of labour	17%	
Technological	Information and communications disruptions	30%	
	Transport infrastructure failures	6%	

■ Uncontrollable
■ Influenceable
■ Controllable

Figure 6-1: Triggers of Global Supply Chain Disruptions
There are different triggers which might cause supply chain disruptions. Natural disasters, which are very likely to cause them, belong to a risk group which is uncontrollable by the supply chain itself. Other occurrences like conflict and political unrest or sudden demand shocks can be at least a bit influenced. Whereas information and communication disruptions or export/import restrictions are controllable if the SC is managed well (World Economic Forum, 2012, p. 8).

Pettit et al. (2010) tried to collate all those aforementioned internal and external factors contributing to a higher probability of disruption into their vulnerability factors with corresponding sub-factors. Table 6-2 shows their classification.

To illustrate these nowadays prevailing risks of experiencing a supply chain disruption, let's take a look at General Motors (GM), one of the largest car manufacturers in the world. It created a vulnerability map to help categorizing all the possible disruptions that could happen to their supply chain. All in all, GM documented more than 100 types of vulnerabilities. When going through that list and checking whether such an incident had actually happened in the past 12 months, every single of the even beforehand as rare categorized events (such as a plant getting struck by a tornado) had occurred (Sheffi, 2005b). As Sheffi (2005b, p. 26) put it, "*the likelihood for any one event that would have an impact on any one facility or supplier to happen might be very small, the collective chance that some part of the entire supply chain will face some type of disruption is high*". A study conducted by the Business Continuity Institute in 2016 with 526 respondents in 64 countries shows a similar outcome. There 70% of the surveyed companies stated that they experienced at least one supply chain disruption in

the past year. Over 41% of those disruptions even occurred at tier 1 (Business Continuity Institute, 2016).

Table 6-2: Vulnerability Factors
These are factors which make a supply chain susceptible to disruptions (T. J. Pettit et al., 2010, p. 11).

Vulnerability Factor	Definition	Sub-Factors
Turbulence	Environment characterized by frequent changes in external factors beyond your control	Natural disasters, Geopolitical disruptions, Unpredictability of demand, Fluctuations in currencies and prices, Technology failures, Pandemic
Deliberate threats	Intentional attacks aimed at disrupting operations or causing human or financial harm	Theft, Terrorism/sabotage, Labor disputes, Espionage, Special interest groups, Product liability
External pressures	Influences, not specifically targeting the firm, that create business constraints or barriers	Competitive innovation, Social/Cultural change, Political/Regulatory change, Price pressures, Corporate responsibility, Environmental change
Resource limits	Constraints on output based on availability of the factors of production	Supplier, Production and Distribution capacity, Raw material and Utilities availability, Human resources
Sensitivity	Importance of carefully controlled conditions for product and process integrity	Complexity, Product purity, Restricted materials, Fragility, Reliability of equipment, Safety hazards, Visibility to stakeholders, Symbolic profile of brand, Concentration of capacity
Connectivity	Degree of interdependence and reliance on outside entities	Scale of network, Reliance upon information, Degree of outsourcing, Import and Export channels, Reliance upon specialty sources
Supplier/Customer disruptions	Susceptibility of suppliers and customers to external forces or disruptions	Supplier reliability, Customer disruptions

The short-term and long-term impacts of those disruptions can be costly, devastating and even lead to a withdrawal of companies from the market (e.g. Ericsson withdrawal from the mobile phone market after the 2001 fire at a suppliers chip manufacturing plant) (Hendricks & Singhal, 2003, 2005a, 2005b; Waters, 2007). In 2003 Hendricks and Singhal published a study of 519 cases on stock market reactions when firms publicly announced that they were experiencing supply chain disruptions or glitches that caused shipping or production delays. It showed that the mere announcement decreased the shareholder value by 10.28% (Hendricks & Singhal, 2003). Therefore, the academic and practitioner community emphasized the need to design supply chains in a way that they are efficiently managing the daily business while being resilient to disruptions (Christopher & Holweg, 2011).

6.2 Definition & Terminology

The concept of resilience can be traced back to the fields of psychology, ecology and social sciences, before it was introduced into the world of supply chain management (Melnyk et al., 2014; T. J. Pettit, 2008; Ponomarov & Holcomb, 2009). The Canadian ecologist Holling (1973) was the first to postulate that systems have distinct properties: resilience and stability. Resilience was seen as the *"ability of the system to absorb changes"* (p. 17) and stability as *"the ability of a system to return to an equilibrium state after temporary disturbance"* (p. 17). The faster the system manages to get back to that equilibrium state the greater the stability (Holling, 1973; Ponomarov & Holcomb, 2009). The definition for resilience has changed considerably since then and a common one nowadays in ecology sees resilience as *"the capacity of a system to absorb disturbance and reorganize while undergoing change so as to retain essentially the same function, structure, identity, and feedbacks"* (Folke et al., 2004, p. 558). As already mentioned the concept was adapted to other fields. In engineering resilience is for example defined as *"the capability of a strained body to recover its size and shape after deformation caused especially by compressive stress"* (Merriam-Webster, 2017b) and in psychology as the *"the successful adaptation to life tasks in the face of social disadvantage or highly adverse conditions"* (Windle, 2002, p. 163). As for this thesis resilience in the context of supply chains is of concern, the focus will now turn to definitions coming from that research field. Although the concept of supply chain resilience (SCRES) has been known for quite some time and many researchers have defined it with their own words, there is still no commonly accepted definition. Table 6-3 shows a non-exhaustive list of common supply chain resilience definitions.

When looking at these definitions, one can see that they all consider supply chain resilience as an ability of a supply chain which enables it to respond to disturbances or disruptions. A disturbance is defined as *"a foreseeable or unforeseeable event, which directly affects the usual operation and stability of an organization or a supply chain"* (Barroso, Machado, & Cruz, 2011, p. 163). This is in line with the definitions proposed by Hendricks et al. (2009) and Svensson (2000). Revilla and Sáens (2014) define supply chain disruptions as *"unplanned and unanticipated events that disrupt the normal flow of goods and materials within a supply chain"* (p.1124), in line with Svensson (2000), Kleindorfer and Saad (2005) and Craighead et al. (2007).

In this thesis the supply chain resilience definition provided by Fiksel (2006) will be used. He describes it *"as the capacity of complex industrial systems to survive, adapt and grow in the face of turbulent change"* (p.16). Put in more practical terms, resilience basically aims at improving a global supply chains adaptability, improving collaboration with stakeholders and leveraging information technology to assure continuity, even when facing catastrophic disruptions. (Fiksel et al., 2015)

Table 6-3: Supply Chain Resilience Definitions

Source	Supply Chain Resilience Definition
Rice et al. (2003, p. 27)	The ability to react to unexpected disruptions and restore normal supply network operations.
Christopher and Peck (2004, p. 2)	The ability of a system to return to its original state or move to a new, more desirable state after being disturbed.
Sheffi (2005a, p. 13)	[Resilience] measures their ability to, and speed at which they can, return to their normal performance level – production, services and fill rate – after an HILP [high Impact / low probability] disruption.
Fiksel (2006, p. 16)	The capacity of complex industrial systems to survive, adapt and grow in the face of turbulent change.
Ponomarov and Holcomb (2009, p. 131)	The adaptive capability of the supply chain to prepare for unexpected events, respond to disruptions and recover from them by maintaining continuity of operations at the desired level of connectedness and control over structure and function.
Jüttner and Maklan (2011, p. 247)	Supply chain resilience addresses the supply chain's ability to cope with the consequences of unavoidable risk events in order to return to its original operations or move to a new, more desirable state after being disturbed.
Wieland and Wallenburg (2013, p. 301)	The ability of a supply chain to cope with change.
Golgeci and Ponomarov (2013, p. 604)	An adaptive capability to prepare for unexpected events, respond to disruptions, and recover from them by maintaining continuity of operations.
Melnyk et al. (2014, p. 36)	The ability of a supply chain to both resist disruptions and recover operational capability after disruptions occur.
Hohenstein et al. (2015, p. 108)	The supply chain's ability to be prepared for unexpected risk events, responding and recovering quickly to potential disruptions to return to its original situation or grow by moving to a new, more desirable state in order to increase customer service, market share and financial performance.
Kamalahmadi and Parast (2016, p. 121)	The adaptive capability of a supply chain to reduce the probability of facing sudden disturbances, resist the spread of disturbances by maintaining control over structures and functions, and recover and respond by immediate and effective reactive plans to transcend the disturbance and restore the supply chain to a robust state of operations.

6.3   Dealing with Supply Chain Uncertainties

To protect one's company from supply chain disruptions has been a long-nourished dream of companies. In the time of the industrial revolution piling up inventories seemed to be an effective way to ensure supply chain reliability. Later on, when customer service came more and more to the center of SCM and thereby, SC costs were increasing, managers started to balance costs for customer satisfaction against inventory holding, distribution and productivity costs (Kent & Flint, 1997). Therefore, concepts such as Just-in-Time (JIT), Vendor Managed Inventory (VMI), Continuous Replenishment or Six Sigma took over. But by reducing safety stock and inventory costs, the brittleness of supply chains was increased, making them more susceptible to disruptions (T. J. Pettit et al., 2010). To deal with this brittleness these concepts were soon accompanied by supply chain risk management (SCRM) processes (Dionne, 2013). SCRM focuses on identification and assessment of risks, which might affect the business continuity and the development of strategies on how to deal with these risks, ensure continuity and reduce vulnerabilities (Wieland & Wallenburg, 2012).

In a recent MIT Scale Network study it was shown that approximately 60% of managers were either not actively working on SCRM or do not believe in the effectiveness of their company's risk management practices (Sáenz & Revilla, 2014). Fiksel et al. (2015) attribute that ineffectiveness to the difficulty of anticipating and quantifying risks, as many risks are unknown and unpredictable or their impacts are just not understood beforehand. These so-called "black swan" events (Taleb, 2007) can only be comprehended afterwards. So the problem lies with unpredictable events and the related uncertainty[9], which cannot be accounted for by past experience (Melnyk et al., 2014).

The field of supply chain resilience offers an additional viewpoint to address these problems. Thereby, the focus is not as much on the events, rather on the disruption or damage to the network and how the entire system can rebound quickly (Leveson, 2011; Sheffi, 2005b).

Despite acknowledging that there exist an infinite number of causes for disruptions (Sheffi, 2005b), authors have tried to sort those into categories (Hendricks & Singhal, 2003; Kleindorfer & Saad, 2005; Manuj & Mentzer, 2008; T. J. Pettit, 2008; Rice & Caniato, 2003).

Following the line of thought of Pettit (2008, p. 110) those can be summed up into:

- **Supply-side disruptions:** *relating to the creation, delivery and availability of supplies when and where needed*
- **Production disruptions:** *the process of creation of products or services by the focal firm*
- **Demand-side disruptions:** *relating to distribution and sale of products to customers through to the end consumer, including additional manufacturing downstream of the focal firm*

The resilience of a certain supply chain now makes it more or less prone to experience such disruptions.

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[9]Uncertainty: likelihood to change, especially in a negative or unpleasant way (adapted from: Oxford University Press, 2017)

6.4   Stages of Disruption

When looking at the progress of a disruption Sheffi & Rice (2005) offer a model which distinguishes eight phases (Figure 6-2). Their proposed disruption profile is similar to the ones identified by Beamon (2004) and Thomas (2002).
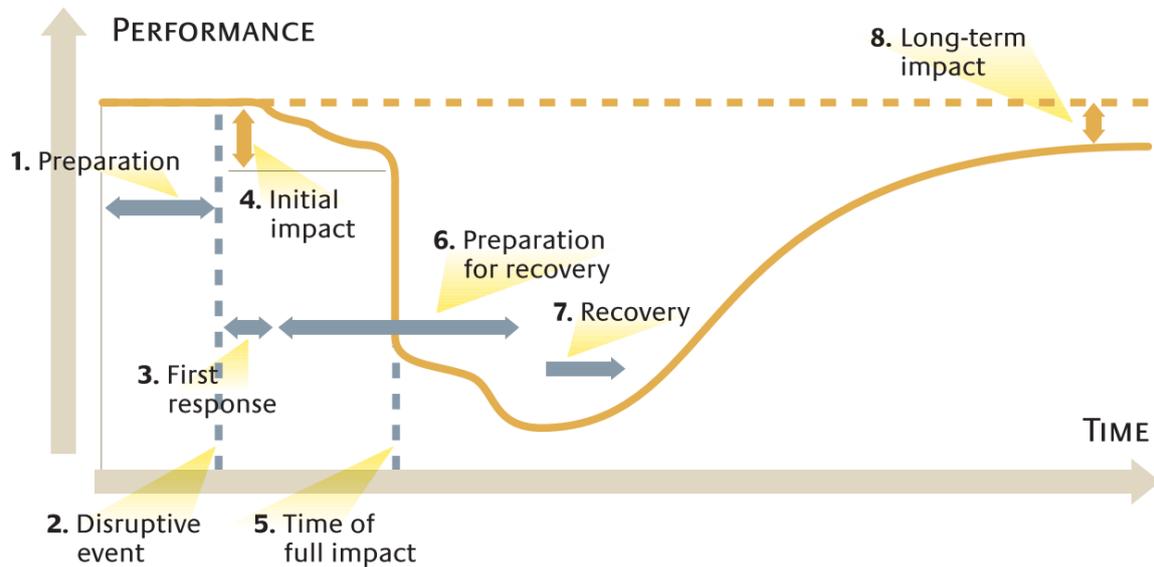

Figure 6-2: The Disruption Profile
This figure shows the impact of a disruption on the performance of an entity (such as an organization or state) that over time (Sheffi & Rice, 2005, p. 42).

In the following paragraphs the eight phases described by Sheffi & Rice (2005) will be explained further.

1. **Preparation:** Sometimes a possible disruptive event can be foreseen (e.g. hurricanes) and therefore mitigating measurements can be issued. The times in-between a warning and the actual event vary greatly and some events only have very little or no precedent warnings (like 9/11).
2. **The Disruptive Event:** The moment or time period when the disruptive event happens.
3. **First Response:** Are the immediate actions which are taken to control the situation, saving or protecting lives and systems, thereby trying to minimize further possible damage.
4. **Initial Impact:** Often the full impact of a crisis is only felt after some time, as it takes time to affect a company, e.g. some safety stock is still available at other locations after a warehouse burns down. If the full impact is not felt immediately, usually the performance starts to deteriorate nevertheless until the full impact is felt.
5. **Full Impact:** As mentioned, the full impact can either be felt immediately when a crisis hits or after some time. Once the full impact is obvious, the performance often drops quickly.
6. **Recovery Preparation:** Preparation for a recovery often starts as early as the first warning signals or when the first response is triggered.
7. **Recovery:** The goal of the recovery phase is to get back to normal operations levels. Often seen measures for that are overtime requirements from employees, usage of resources from suppliers or customers or running at maximum utilization (to make up for lost production).

8. **Long-Term Impact**: Even after a crisis has been dealt with and the immediate impact has been removed, often long-lasting problems, such as a reduced confidence from customers in the company, still exist. It is very difficult to convalesce from those effects.
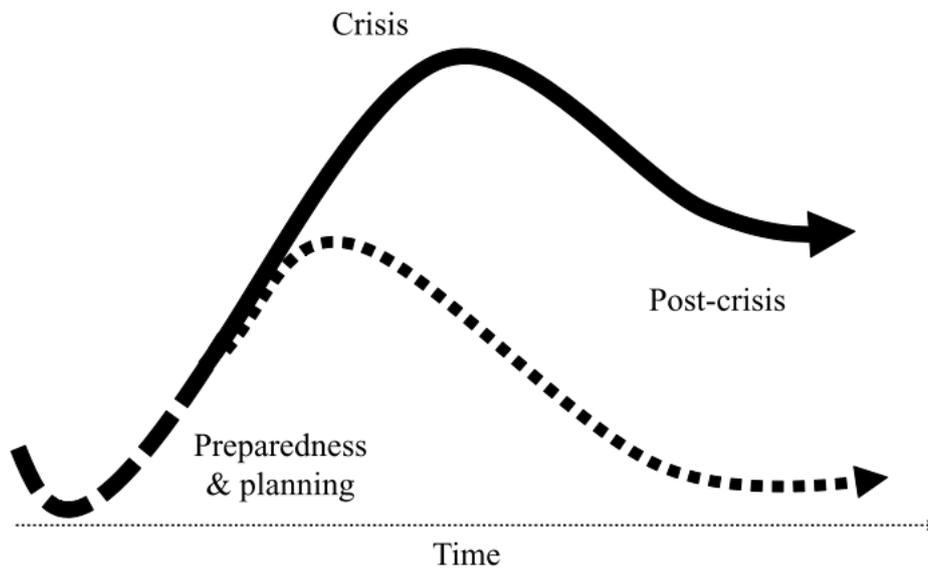

Figure 6-3: Effects of Crisis Management
One can see that the effects of a crisis can be significantly mitigated, if the right preparedness and planning measures have been taken (Natarajarathinam et al., 2009, p. 544).

Figure 6-3 shows the effects (or impact) of crisis management when a disaster strikes. (Natarajarathinam et al., 2009). Therefore, if a crisis cannot be prevented through preventive measurements, the goal of successful crisis management is to alleviate the effects (impact) of a crisis and fasten the response mechanisms so that a normal process can be established quicker. Jüttner & Maklan (2011), Fiksel (2006) and Christopher & Peck (2004) even go one step further and proposes that through a fitting resilience approach not only the pre-crisis status should be achieved but the organization should be able to move to a more desirable status.

6.5   Supply Chain Resilience Strategies (Approaches)

In this chapter the focus lies on strategies on how to achieve SCRES.

6.5.1   Supply Chain Resilience Framework by Christopher and Peck

One of the first and also most cited supply chain resilience framework was created by Christopher and Peck (2004). It is based on an empirical study of private and public-sector companies, taken from a wide range of industries (e.g. oil and petrochemicals, food retailing, electronics…). It builds on the four main principles of supply chain (re) engineering, supply chain collaboration, agility and creating a supply chain risk management culture (Figure 6-4).
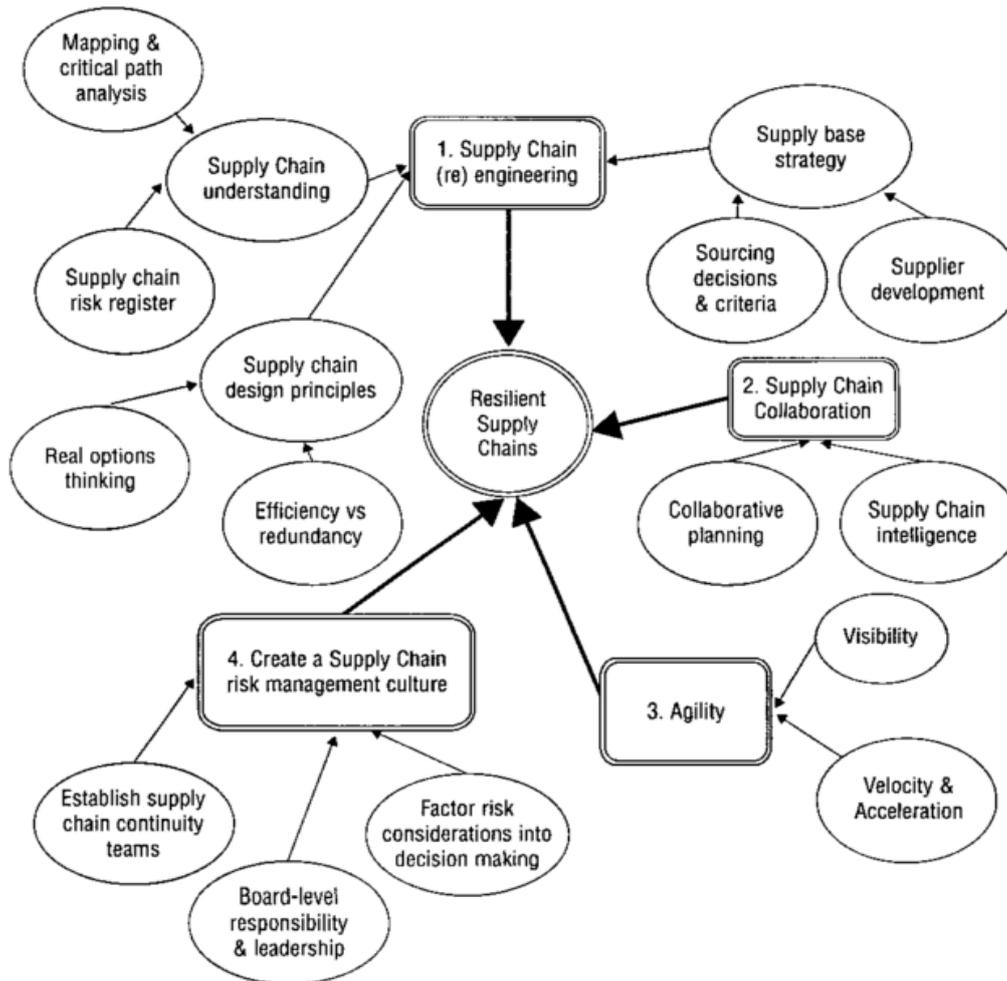
Figure 6-4: Supply Chain Resilience Framework
The supply chain resilience framework by Christopher & Peck (2004, p. 7) relies on four main elements: supply chain (re) engineering, supply chain collaboration, agility and a supply chain risk management culture.

Supply chain (re) engineering: They think that resilience should be designed into a supply chain as an objective function of it. To be able to do this, one needs an understanding, of the network that connects the own company to its suppliers and their suppliers and to its downstream customers. Having a supply base strategy which also takes resilience issues into account (such as 'is my supplier aware of possible risks in his supply chain') is important. The last building block of supply chain re (engineering) is the design of it. They argue that the trade-off between efficiency and redundancy should be considered thoroughly and that a resilient supply chain strategy should never be too restrictive, but allow for different options, in case one does not work out (Christopher & Peck, 2004).

Supply chain collaboration: If risks are to be identified and managed in a multi-organizational supply chain, it is evident that there needs to be a high level of collaboration. Collaboration is rooted in a collaborative planning approach and supply chain intelligence. Supply chain intelligence describes the process of actively using the information which was shared by supply chain partners (Christopher & Peck, 2004).

Agility: Being able to react fast to unpredictable changes in demand or supply is a major prerequisite of resilience. Agility for Christopher and Peck is rooted in supply chain visibility and supply chain velocity. Therefore, the "*ability to see from one end of the pipeline to the other*" (Christopher & Peck, 2004, p. 10) and the possibility to act quickly.

Creating a supply chain risk management culture: Risk management should not only be the concern of a few people but it should be incorporated into the organizations culture (Christopher & Peck, 2004).

6.5.2 Enhancement of Christopher & Peck's Framework by Kamalahmadi & Parast

Based on the framework created by Christopher and Peck (2004) (see previous section 6.5.1) Kamalahmadi & Parast (2016) developed their own supply chain resilience framework, which incorporates the supply chain resilience literature after 2000. The framework is shown in Figure 6-5.

Like the framework by Christopher and Peck (2004) the enhanced framework consists of the same four main building blocks: SC reengineering, collaboration, agility and SCRM culture.

They subdivide SC reengineering into flexibility and redundancy between which a reasonable trade-off has to be accomplished (Kamalahmadi & Parast, 2016), so that the chosen strategy fits the requirements and the possibly developable capabilities of the supply system (Kamalahmadi & Parast, 2016; Melnyk et al., 2014; T. J. Pettit, 2008; Sheffi, 2005b; Sheffi & Rice, 2005). Redundancy strategies may buy some extra time for a company faced with disruptions and might include among other things safety stock, having multiple suppliers and overcapacity. However, it is not cheap to hold extra inventory and as demonstrated by lean and six sigma processes, it might also lead to rather sloppy operations, which in turn lead to extra costs and reduced quality (Blackhurst, Dunn, & Craighead, 2011; Sheffi, 2005a). Flexibility on the other hand refers to being able to respond quickly to uncertainties (Sheffi & Rice, 2005). The notion that redundancy and flexibility are of superior importance is shared by many authors (among others: Christopher & Peck, 2004; Jüttner & Maklan, 2011; Melnyk et al., 2014; Ponomarov & Holcomb, 2009; Rice & Caniato, 2003; Sheffi, 2005a).

Collaboration is based on trust and information sharing (Kamalahmadi & Parast, 2016). Trust is associated with facilitating cooperation and collaboration within the organization and across partners in a supply chain (Faisal, Banwet, & Shankar, 2007; Ponomarov & Holcomb, 2009). Information sharing plays a huge role before and after a disruption and is a pre-requisite of collaboration (Lenort & Wicher, 2012; Melnyk et al., 2014; Sheffi, 2005b).

As well as in the framework by Christopher and Peck (2004) the building block of agility is made up by visibility and velocity. Visibility is viewed as a pre-requisite of a response, as it enables managers to know about changes (Wieland & Wallenburg, 2013). Velocity is inherent to agility (Barroso et al., 2011; Scholten, Scott, & Fynes, 2014; Wieland & Wallenburg, 2013), and as meant by Christopher and Peck (2004) it is very similar to the concept of supply chain flexibility (*"how rapidly the supply chain can react to changes in demand, upwards or downwards"* (p. 10)). The main difference between flexibility and velocity, as seen by Smith (2004), is that velocity puts a stronger emphasis on the efficiency rather than the effectiveness of the SC's response and recovery.
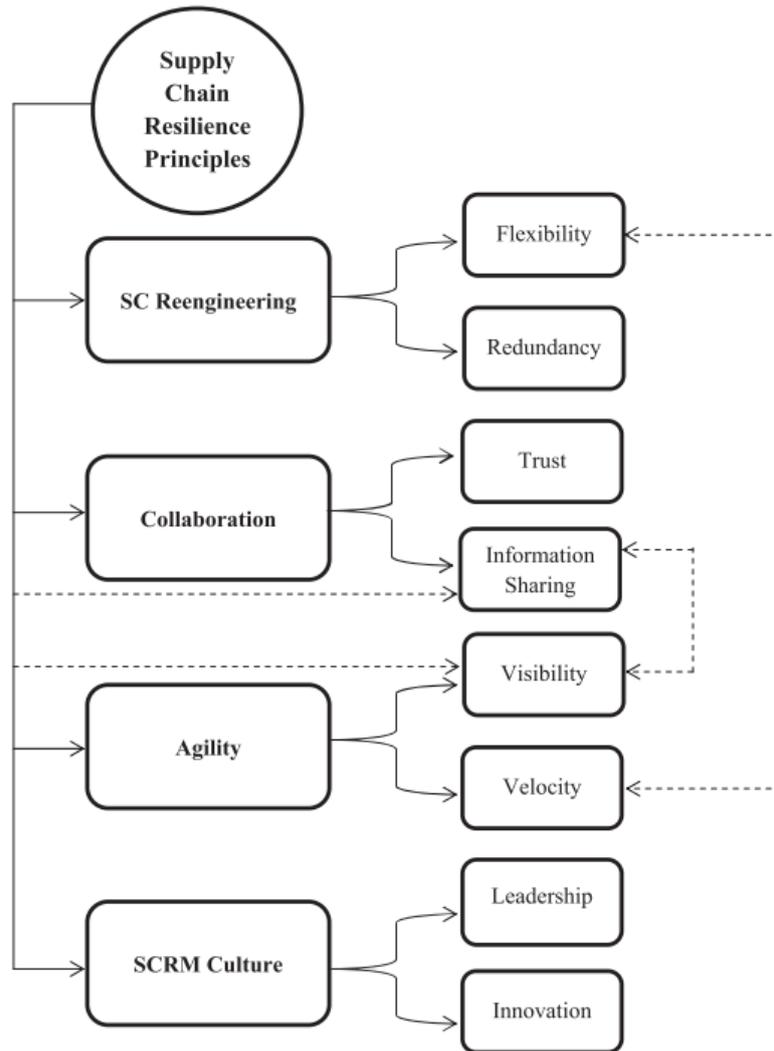
Figure 6-5: Supply Chain Resilience Principles Framework
This framework relies on 4 main building blocks, which are further subdivided into 8 elements (Kamalahmadi & Parast, 2016, p. 127)[10].

The last dimension of supply chain resilience focuses on a SCRM culture. Many authors confirm the importance of such an organizational culture. Sheffi (2005b) even calls it the "*real secret*" (p. 264) to a successful response to disruptions. *"It contributes to resilience by endowing employees with a set of principles regarding the proper response when the unexpected does occur, and when the formal organization's policy does not cover the situation at hand or is too slow to react"* (Sheffi, 2005b, p. 244). In line with Sheffi (2005b), Seville et al. (2006) found out in their 6 year research project that resilience issues can often be related to the softer, less tangible aspects of an organization, such as its leadership, culture, vision and other so-called soft managerial practices (e.g. effective communication and relationships within the organization and with key customers and stakeholders). As with most change processes it is of superior importance that the leadership level of an organization is committed to it and supports it lengthily (Christopher & Peck, 2004; Demmer, Vickery, & Calantone, 2011; Wilding, 2013). Through innovation an enterprise may ensure its long-term survival and

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[10] The arrows present the relationship among the key variables in the model, based on the review of the literature; these relationships were reported in several studies. The dotted arrows represent the relationship which were reported in a few studies and need more investigations (Kamalahmadi & Parast, 2016, p. 127).

growth, through that it has an important role on how firms adapt and respond to changes in the environment (Golgeci & Ponomarov, 2013; Santos-Vijande & Álvarez-González, 2007).

6.5.3 Supply Chain Resilience Elements by Hohenstein et al.

A different approach on how resilient can be achieved is proposed by Hohenstein et al. (2015). Based on an intense literature review of 67 peer-reviewed journal papers over a period of 11 years (2003-2013), they could identify certain strategies which foster supply chain resilience (Table 6-4).

Table 6-4: Ground SCRES Elements
Hohenstein et al. (2015, p. 105) sees two different main categories of strategies, pro- and reactive ones, which are either made up by readiness elements or by elements corresponding to response, recovery and growth.

Proactive strategy	Readiness elements	Subelements
	Collaboration	Coordination, cooperation, joint-decision making, knowledge sharing, supplier certification, supplier development
	Human resource management	Employee training and education, risk-sensitive culture and mindset, cross-functional teams, experienced employees for crisis management
	Inventory management	Use of inventory and safety stocks to buffer disruptions
	Predefined decision plans	Contingency plans, communication protocols
	Redundancy	Production slack, transportation capacities, multiple sourcing and production locations
	Visibility	Early warning communication, information sharing, real-time and financial monitoring
Reactive strategy	Response, recovery and growth elements	Subelements
	Agility	Communication, information sharing (= visibility), quick supply chain redesign, velocity
	Collaboration	Coordination, cooperation, joint-decision making, knowledge sharing, supplier certification, supplier development
	Flexibility	Backup suppliers, easy supplier switching, distribution channels, flexible production systems, volume flexibility, multi-skilled workforces
	Human resource management	Employee training and education, risk-sensitive culture and mindset, cross-functional teams, experienced employees for crisis management
	Redundancy	Production slack, transportation capacities, multiple sourcing and production locations

They segmented the resilience process into 4 phases. In the readiness phase the focus of the company lies on preparation and on 'avoiding threats' strategies (Golgeci & Ponomarov, 2013;

Ponomarov & Holcomb, 2009; Wieland, 2013). The following response stage refers to the efforts made immediately after a disruption (Blackhurst et al., 2011; Christopher & Peck, 2004; Fiksel, 2006; Sheffi & Rice, 2005; Wieland & Wallenburg, 2013). In the recovery phase the organization tries to get back to a normal flow of business (Christopher & Peck, 2004; Golgeci & Ponomarov, 2013; Jüttner & Maklan, 2011; Rice & Caniato, 2003; Sheffi & Rice, 2005). The final growth period enables the company to move to a new state, through which it improves its competitive position (Christopher & Peck, 2004; T. J. Pettit, 2008; Rice & Caniato, 2003; Wieland, 2013).

What is instantly apparent is that those four phases are very similar to the stages of the disaster management process (as introduced in section 4.5.1) (Ponomarov & Holcomb, 2009).

In the next step the identified SCRES elements were assigned to either a proactive or a reactive strategy. Proactive is referring to strategies which are implemented before a disruption takes places (readiness phase) and reactive strategies are used in a post-disruption phase (all other phases).

Based on their literature review flexibility and redundancy are the two most important strategies. Interestingly their research shows that the different phases require almost the same elements. Nevertheless, some seem to be more appropriate in the pre-disruption phase and others thereafter (Hohenstein et al., 2015). The allocation of elements to the two different stages can be seen in Table 6-4, the elements will be shortly described in the following paragraphs

Agility: Refers to subelements such as visibility (information sharing, communication), velocity and quick supply chain redesign to reduce the impact of a disruptions or to alleviate the recovery (Blackhurst et al., 2011; Christopher & Peck, 2004; Wieland & Wallenburg, 2013).

Collaboration: Sharing crucial information, valuable knowledge and to establish joint efforts are the main parts of collaboration (Jüttner & Maklan, 2011; T. J. Pettit, 2008).

Flexibility: It is achieved through measurements such as backup suppliers, flexible production systems or flexibility in disruption channels (T. J. Pettit, 2008; Sheffi & Rice, 2005).

Human resource management (HRM): Part of successful HRM is to train and educate employees in how to deal with disruptions, to install a risk-sensitive culture and create cross-functional teams (Blackhurst et al., 2011).

Inventory management: To reduce the probability of stock-outs and lost sales, safety stocks are used to buffer disruptions (Blackhurst et al., 2011; Kleindorfer & Saad, 2005).

Predefined decision plans: Those plans reduce the response time and mistakes during executions are also minimized (Blackhurst et al., 2011; Kleindorfer & Saad, 2005).

Redundancy: Multiple suppliers and slack resources in production or transport capacity can be used as "shock absorbers" for short term disruptions (Craighead et al., 2007; Sheffi, 2005a).

Visibility: In order to prevent turbulences, early warning indicators and real-time/financial monitoring are of use (Blackhurst et al., 2011; Christopher & Peck, 2004; Craighead et al., 2007).

6.5.4   Supply Chain Resilience Elements by Ali et al.

In a systematic literature review by Ali et al. (2017) they reviewed 103 papers published from 2000-2015. Based on their research they identified 27 elements, which are mentioned as

fostering resilience in the reviewed literature. In Figure 6-6 those elements are listed and sorted by the frequency they are mentioned in publications.
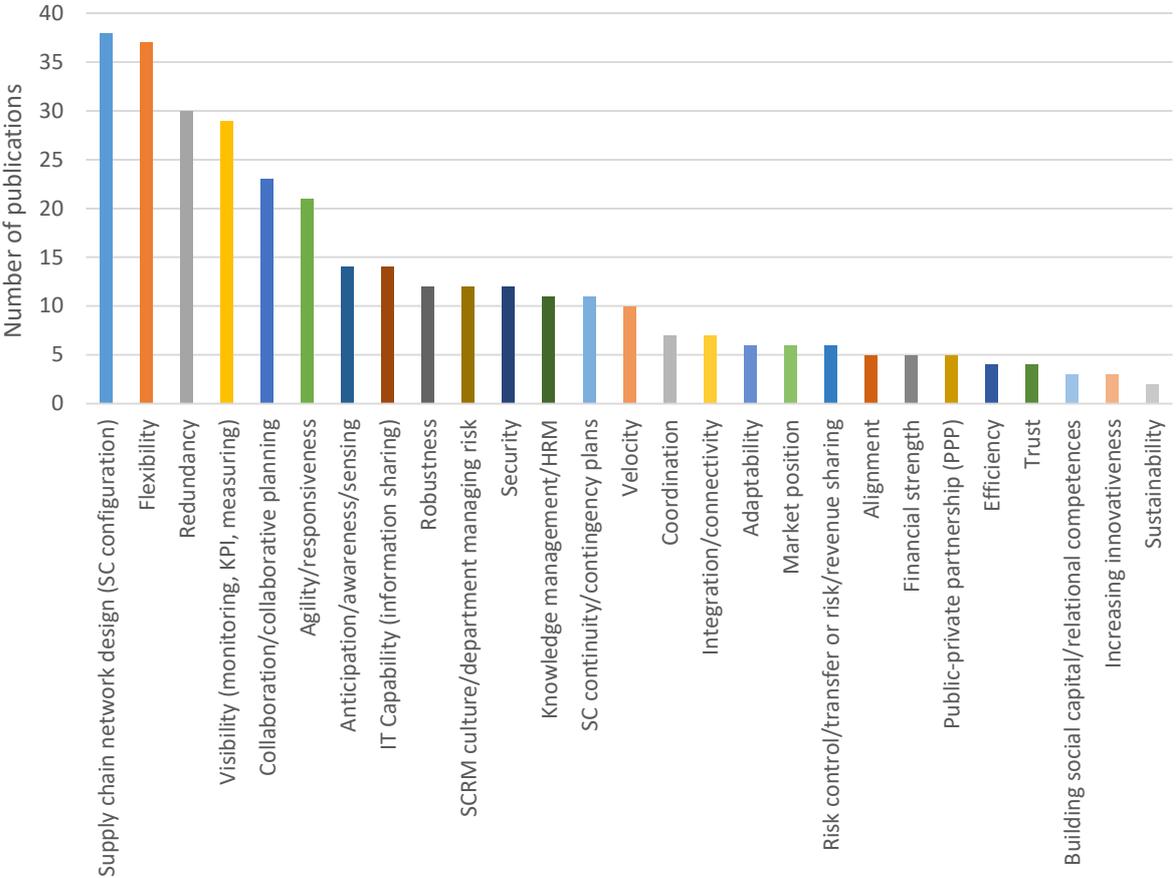
Figure 6-6: Elements of SCRES
The resilience elements shown here are the result of a large literature review including papers published from 2000-2015 (Ali et al., 2017, p. 38).

The three most frequently mentioned elements are supply chain network design, flexibility and redundancy, followed by visibility, collaboration and agility. These findings correspond to the findings of the literature review by Hohenstein et al. (2015).

6.5.5 SCRAM Framework by Pettit et al.

In 2010, Pettit et al. published their SCRAM (Supply Chain Resilience Assessment and Management) framework for the first time, proposing a holistic model to achieve supply chain resilience. It was created in a more than seven years long research project and based on an extensive literature research and numerous case studies with commercial companies to first create the framework and then validate it.

Table 6-5: Supply Chain Resilience Capabilities
This figure shows the capabilities mentioned in the SCRAM framework and which were validated to achieve supply chain resilience (Fiksel et al., 2015, p. 84).

Capability Factors	Definition	Sub-Factors
Adaptability	Ability to modify operations in response to challenges or opportunities	Seizing advantage from disruptions, alternative technology development, learning from experience, strategic gaming and simulation, environmental sustainability
Anticipation	Ability to discern potential future events or situations	Demand forecasting methods, risk identification and prioritization, monitoring/communicating deviations and "near misses," recognition of early warning signals, business continuity planning, emergency preparedness, recognition of opportunities, business intelligence gathering, government lobbying, awareness of global change
Capacity	Availability of assets to enable sustained production levels	Backup utilities, raw materials, reserve capacity, labor capacity, ecological capacity
Collaboration	Ability to work effectively with other entities for mutual benefit	Collaborative forecasting, supply chain communication, collaborative decision making, supplier/customer involvement in innovation, postponement of orders, product life cycle management, supplier/customer collaboration, risk/reward sharing with partners
Dispersion	Broad distribution or decentralization of assets	Distributed suppliers/production/distribution, distributed decision making, location-specific empowerment, dispersion of markets
Efficiency	Capability to produce outputs with minimum resource requirements	Labor productivity, asset utilization, quality management, preventive maintenance, process standardization, resource productivity
Financial strength	Capacity to absorb fluctuations in cash flow	Financial reserves and liquidity, portfolio diversification, insurance coverage, price margin
Flexibility in manufacturing	Ability to quickly and efficiently change the quantity and type of outputs	Product/service modularity, multiple pathways and skills, manufacturing postponement, changeover speed, batch size, manufacturing expediting, reconfigurability, scalability, rerouting of requirements
Flexibility in order fulfillment	Ability to quickly change the method of delivering outputs	Multisourcing, demand pooling, inventory management, alternate distribution modes, multiple service centers, transportation capacity, transportation expediting
Flexibility in sourcing	Ability to quickly/ change inputs or the mode of receiving inputs	Common product platforms, supply contract flexibility, supplier capacity, supplier expediting, alternate suppliers
Market position	Status of a company or its products in specific markets	Brand equity, customer loyalty/retention, market share, product differentiation, sustainability position
Organization	Human resource structures, policies, skills and culture	Creative problem-solving culture, accountability, diversity of skills and experience, substitute leadership capacity, benchmarking/feedback, culture of caring for employees, workforce flexibility
Product stewardship	Sustainable business practices throughout the product life cycle	Proactive product design, resource conservation, auditing and monitoring, supplier management, customer support
Recovery	Ability to return to normal operational state rapidly	Equipment reparability, resource mobilization, communications strategy, crisis management, consequence mitigation
Security	Defense against deliberate intrusion or attack	Layered defenses, access restriction, employee involvement in security, collaboration with governments, cybersecurity, personnel security
Visibility	Knowledge of the status of operating assets and the environment	Information technology, status of inventory/equipment/personnel, information exchange with supplies/customers/carriers, market visibility, external monitoring

Their model focuses on vulnerabilities on the one hand, which are *"fundamental factors that make an enterprise susceptible to disruptions"* (T. J. Pettit et al., 2010, p.6), and on the other hand on capabilities. Capabilities are attributes which supply chains can develop through management controls which *"enable an enterprise to anticipate and overcome disruptions"* (T. J. Pettit et al., 2010, p.6). They identified six vulnerabilities which might disturb a supply chain (turbulences, deliberate threats, external pressures, resource limits, sensitivity and connectivity (see section 6.1)). Furthermore, they found 14 capability factors, composed of 71 sub-factors, which later on were enhanced to 16 main and 85 sub factors (Fiksel et al., 2015). In Table 6-5 the capability factors, their definitions and their sub-factors are shown (further information on the capabilities and their respective sub-factors can be found in Pettit (2008, p. 62 ff.)). According to their research, strengthening these capabilities, should offset the vulnerabilities a company might be prone to.

6.6   Resilience in Humanitarian Supply Chains

We have now shed light on differences and similarities of humanitarian and commercial supply chains. Now let us take a look at supply chain resilience in those two contexts.

When thinking of supply chain resilience in the commercial world one usually means that an already existing supply chain is made less susceptible to disruptions (T. J. Pettit et al., 2010). In the humanitarian world it is not like that most of the time. When a disaster occurs, the demand for aid items suddenly increases significantly and the goal of humanitarian organizations is to fulfill it (Development Initiatives Ltd, 2017; Oloruntoba & Gray, 2006; Van Wassenhove, 2006) by seemingly establishing a completely new supply chain stream to the affected region. Therefore, the question is if creating something from scratch in comparison to 'repairing' an already existing system needs a different set of skills. In other words, if humanitarian supply chain resilience can be considered as comparable to commercial supply chain resilience or not.

When looking closer one can see that supply chains of humanitarian organizations such as UN organizations or the IFRC don not appear out of thin air, there is a whole supply chain network in the background, which possesses resilience capabilities (such as flexibility, redundancy, agility and a smart SC network design (Ali et al., 2017)) necessary to manage creating a new supply chain stream within a short period of time. Fiksel's (2006) supply chain resilience definition references exactly to this, when he defines it *"as the capacity of complex industrial systems to survive, adapt and grow in the face of turbulent change"* (p.16). It is always the whole system that has to be resilient. It is that system that will be faced with changing demand/capacity balances induced by disruptions. If the demand now significantly rises, because for example an earthquake happened and people needed aid material or the new iphone is more in demand than expected; or my capacity to fulfill that demand is reduced, e.g. by a destroyed warehouse or a damaged production facility; it all results in basically the same problem for the supply chain – the customer cannot be supplied and therefore, other options have to be found. That is the case for commercial and humanitarian supply chains/networks. In some cases, the response and recovery will be possible without creating new supply chain streams and just reinforcing old ones, in others this is not possible and one has to be innovative to create new streams.

Furthermore, when taking a look at the different phase of resilience (section 6.4) and disaster management (section 4.5.1), one sees that those are almost completely the same (Ponomarov & Holcomb, 2009).

6.7 Conclusion

As all of these aforementioned frameworks and SCRES elements or capabilities were found out by only considering commercial organizations the question arises, if other types of organizations might have different concepts or methods on how to reach supply chain resilience too. Especially humanitarian organizations seem to be an interesting study ground, as they respond to disasters regularly. Furthermore, they usually have to provide aid with only a moment's notice, to a beforehand unknown place, with a demand difficult to estimate (Kovács & Spens, 2009; A. Thomas & Kopczak, 2005; Van Wassenhove, 2006).

To be able to close down on humanitarian supply chain resilience capabilities and their possible differences to the commercial word a reference for the commercial world has to be found. As the SCRAM framework includes the elements (capabilities) mentioned in the other frameworks or capability lists (see section 6.5.3 and 6.5.4), shows the highest degree of detail and was validated, it was seen fit to be taken as the reference frame.

7 Empirical Study

In this chapter the organizations interviewed for the different use cases are briefly described, the found-out capabilities are described and most important results are stated first for each organization separately and then in a cross-case comparison.

7.1 Use Case World Food Programme
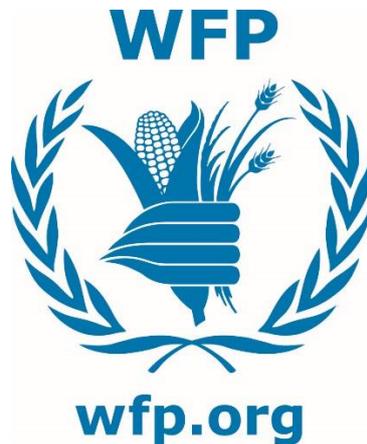
Figure 7-1: WFP logo (WFP, 2017d)

7.1.1 Introduction

With approximately 80 million assisted people in around 80 countries each year, the World Food Programme (WFP) is the leading humanitarian organization fighting hunger worldwide. WFP focuses on 4 areas: emergency assistance, development aid, relief and rehabilitation and special operations, with 2 thirds of their work being in war-affected countries.

To be able to provide such an assistance, 20 ships, 70 planes and 5.000 trucks are delivering food and other assistance for WFP to those in most need.

It is governed by an executive board, which consists of 36 member states (WFP, 2017c).

7.1.2 Facts and Figures

Motto (WFP, 2017c): Fighting Hunger Worldwide

Operations Budget (WFP, 2017c): US$ 5,9 billion (2016)

Staff (WFP, 2017c): more than 14.000 worldwide; over 90% are based in the countries where the agency provides assistance (WFP, 2017c)

Annual number of people assisted (WFP, 2017c): 80 million

Countries active (WFP, 2017c): 80

Annual food purchase (WFP, 2017c): 2 million metric tons (WFP, 2017c)

The WFP leads the following clusters (OCHA, 2017):

- Food Security (together with Food and Agriculture Organization (FAO))
- Emergency Telecommunication
- Logistic

7.1.3 History

The WFP was created in 1961 as a 3 year project with the goal of providing food aid through the UN system. As it was an experimental project, it was to be reassessed after those first three years, checking if it would have proved itself worthy and should be prolonged. After multiple positive responses to various disasters and also the start of developmental programs the reassessment was positive and by 1965 WFP was awarded the fully-fledged UN program status, which should last for "as long as multilateral food is found feasible and desirable" (WFP, 2017c).

By the end of the 20th century the nations of the world realized that hunger cannot be fought without tackling the underlying causes for it, therefore, WFP was given a new conceptual umbrella for its long-term aid projects (WFP, 2017b).

These changes manifested itself in the evolvement of WFP's mission from food aid to food assistance. Food aid which is based on a top-down vision: people are hungry we fed them, was transitioned into a long-term approach to nutritional needs of communities and societies, designed with the objective to end hunger once and for all (WFP, 2017c).

Since its foundation almost 55 years ago, WFP has grown into the world's largest humanitarian agency to fight hunger worldwide (WFP, 2017c).

7.1.4 Interview Partners

Global Logistics Cluster Coordinator (Logistics Cluster) and former Head of Operations (WFP), Head of Contracting (WFP) and Head of Logistics Ethiopia (WFP); experience: > 10 years; code: GLCC

Global Logistic Cluster Focal Point / Logistics Cluster Coordinator (Ukraine); experience: > 5 years; code: GLCFP

A literature review of publications by or concerning WFP was used as further triangulation of the interviews.

7.1.5 Process

In order to start its response after a catastrophe happened, WFP has to wait till the official appeal is made. Nevertheless, it can start preparing before that, if it is sure that there will be an appeal. Preparing in that case means getting the stuff ready in the warehouses and already starting to assess the situation on-site and also the assessment of the existing dealers in the vicinity.

Once the appeal is made, the WFP coordination depends on the size of the emergency. L1 – local office; L2 – regional office; L3 – international office.

In this case I assumed a L3, so the international office takes over. If it is not possible to procure locally or regionally, an order is placed at one of the UNHRD depots.

If needed, additional people to the already on-site being country officers (if country office exists) will be flown to the disaster region.

Figure 7-2: WFP Disaster response process to a L3 disaster

After the negotiation/assessment of the local or regional dealers by the country office, the international office places orders with them, which then is processed.

Once the goods are ready for delivering they are taken by a 3rd party carrier (e.g. UPS) and are brought to the destination country. The last mile transport is managed by the country office, the field team manages the distribution. As long as the local/regional dealers cannot provide goods, they are provided by the warehouses.

The UNDAC team is sent by UN OCHA and provides information. During the response the cluster is formed and will help coordinating or organizing (provision of last resort) deliveries etc. (GLCC, 2016; GLCFP, 2016).

7.1.6   Capabilities

Adaptability

Re-routing of requirements: Approx. 40 ships circling the earth, if anything should happen can reroute ships (not totally easy, as they have to get the donors permission first). Possible to re-locate stocks from different warehouses (GLCC, 2016).

Strategic Gaming and Simulation: Participation in exercises (e.g. TRIPLEX) is done. They even organize exercises themselves, where other organizations may participate (GLCC, 2016; GLCFP, 2016).

Alternate technology development: Drones and other innovative technologies are developed. Through their partnership with academic institutions this is strongly supported (GLCC, 2016).

Lead Time Reduction: In the Humanitarian Response Depots they use kits (wash, shelter etc. kits; no food kits – depends heavily on where you have to deliver to) to be able to respond faster to a certain emergency (GLCC, 2016; GLCFP, 2016).

Learning from Experience: The WFP has a 'lessons learned' process for their missions, the results of those are recorded in reports. The reports of the big missions are sometimes publicly published. In 2014 the Logistic Cluster (LC) created Lessons Learned Survey and Protocol which is sent out to their partners (GLCC, 2016; GLCFP, 2016).

Anticipation

Demand forecasting: There are different units and mechanisms to demand forecasting. There are for example the Analysis and Early Warning (AEW) Unit or the Operational Readiness Management (ORM) Unit. The first provides situation understanding and anticipation by trying to find the underlying reasons for things happening and what the possible effects for WFP will be. The second provides, based on AEW's information and analysis, support to development and management of preparedness and readiness actions through response plans for WFP's country and regional offices (World Food Programme, 2013). The Forward Purchase Facility (FPF) procures commodities in anticipation of the actual project demand. This reduces supply lead-times, improves timeliness of food deliveries, food can be procured at advantageous times and if possible in developing countries. In emergencies the response time can be significantly reduced through that initiative (WFP, 2017c).

Risk Identification and prioritization: Risk Identification and prioritization is done (AEW and ORM unit). For example, it was known that Nepal is a risk prone area, therefore WFP set up a "Humanitarian Staging Area" which was completed 2 months before the major earthquake in

2015 and simplified the response significantly. WFP also advises countries to prepare for certain risks, which they have analyzed before. Also, a logistics capacity assessment of countries is done to be able to respond better and faster (GLCC, 2016; GLCFP, 2016).

Monitoring and communicating deviations and "near misses": WFP monitors through their own units (e.g. AEW), their network, the internet and media (GLCC, 2016; GLCFP, 2016). Also a constant monitoring of the food security of countries and regions is done by the Vulnerability Analysis & Mapping (VAM) unit (WFP VAM, 2017).

Recognition of early warning signals: Early warning signals are recognized by their different monitoring and tracking units and also their extensive network and other reliable sources (GLCC, 2016; GLCFP, 2016). As another anticipatory measurement the WFP Log Cluster for example is willing to use its emergency fund as a so-called "no-regrets" fund, meaning that even if they don't know whether the logistics cluster will be activated they will send a first team in just in case the warning proves to be true (GLCC, 2016).

Contingency planning and preparedness: Units like AEW or ORM are tasked with that job (WFP, 2017c; World Food Programme, 2013). Also, a new strategy for 2016-2018 was developed organization wide to invest further in preparedness. There also exist framework agreements with certain countries to waive customs which they can easily sign in case of emergency (but this is no guarantee that they are actually going to do it) (GLCC, 2016). In a logistics capacity assessment the important information of a country (warehouses, airports, local supplier capacities,…) is collated and based on that contingency plans can be developed (GLCC, 2016; GLCFP, 2016).

Capacity

Reserve capacity: There are 650 strategically placed warehouses all around the world. Furthermore, there exist 6 big UN Humanitarian Response Depots (UNHRD) in Ghana, UAE, Malaysia, Panama, Italy and Spain (GLCC, 2016; GLCFP, 2016; WFP, 2017c). In some warehouses white stocks are stored, those are stocks that you have in your possessions but you don't have to pay for them until you use them. These stocks are also not branded, therefore whoever buys them then puts their name sticker on (GLCC, 2016; GLCFP, 2016). Generally, the philosophy is that: "*The less stuff you have in your warehouse the better*" (GLCC, 2016). Therefore, you have to do proper analysis on stock or buy (GLCC, 2016).

Redundant capacity: Redundancy of mission-critical parts is seen as very important (GLCC, 2016; GLCFP, 2016).

Backup capacity: White Stocks, warehouses, cluster (GLCC, 2016; GLCFP, 2016)

Collaboration

To be in good contact with governments when there are no disasters is important, so you already have a relationship when negotiating once something happens. Therefore, this is tried to be done (GLCC, 2016; GLCFP, 2016). Transport: Strategic partnerships with key, like-minded organizations are fostered to create sustainable humanitarian aviation operations (e.g. with Aviation sans frontiers, International Red Cross Committee – ICRC) (WFP, 2017c). WFP Aviation regularly provides a range of air services for third party organizations under the name of the UN Humanitarian Air Service (UNHAS), such as various NGOs, governments, UN Department of Field Support, and international organizations (WFP, 2017c). Private sector

partnerships: support includes strategic financial support, in-kind expertise and technical know-how, as well as services and products free of charge. Some companies partner with WFP independently, such as Renault Trucks, UPS and Caterpillar, while others come together in support of WFP as a consortium. When problems surface with the customs the logistic cluster helps out, tries to negotiate for all humanitarian organizations together and also OCHA gets involved. When there is no transportation available on the ground or there are so many fragmented partners, the LC will manage the needed fleet for the response. It does not make sense that 60 small partners are all renting warehouses at high costs, if there is a possibility of consolidating (GLCC, 2016; GLCFP, 2016).

Collaborative forecasting: The WFP has a strong collaboration with the Food and Agriculture Organization (FAO) of the UN and the International Fund for Agricultural Development (IFAD). They are also indulging in joint forecasts (World Food Programme, 2016b). In a big emergency the policy on which goods should get into the country are discussed on humanitarian country team level (plenary of all the heads of agencies) with the humanitarian coordinator (which is the highest ranked UN representative in the country). They decide which items should be prioritized. Very often the logistics cluster then has to implement the prioritization of things. This is not protocol but it happens because they have the capacity (trucks, planes, etc.) (GLCC, 2016; GLCFP, 2016).

Transparency of information: Much of the information is loaded up in the Virtual On-Site Operations Coordination Centre (VOSOCC). Also, information is shared in the cluster meetings and through the LC (GLCC, 2016; GLCFP, 2016).

Postponement of orders: If another humanitarian organization needs items for an emergency, it is possible that stocks are reallocated and then later on restocked by the organization (GLCC, 2016; GLCFP, 2016).

Shared product life cycle management: WFP engages in collaborated SC planning with private sector partners and governments and also with other humanitarian organizations (WFP, 2017c).

Risk sharing: Relief programs can be done together with governments or other humanitarian organizations (e.g. FAO) (WFP, 2017c). Also, strategic partnerships with the selected companies of the private sector help them share their risks (GLCC, 2016; GLCFP, 2016).

Dispersion

Human workforce dispersion: 90% of staff is national and 10% international. WFP is represented in about 80 countries (GLCC, 2016).

Leadership dispersion: WFP is represented in about 80 countries. Who coordinates the response depends on the size of it. If it is a low-level emergency (L1) it will be handled by the country offices themselves, L2 – will be handled by the regional representative and a L3 emergency will be handled by the international representation. Those levels have different mechanisms or triggers. Further coordination is done on UN and cluster level and includes for example the Humanitarian Country Team, which is the plenary of all the heads of agencies. The humanitarian coordinator, is the highest ranked UN official in a certain region or country and leads the Humanitarian Country Team. Together they decide what the most appropriate solutions for the affected region are (GLCC, 2016; GLCFP, 2016).

Market dispersion: Emergency and development aid (GLCC, 2016; GLCFP, 2016)

Efficiency

Labor, production, asset utilization: The Global Humanitarian Services (GHS) which is based in Dubai and centrally manages WFP's global vehicle pool and optimizes their fleet operations (GLCC, 2016; WFP, 2017c).

Waste elimination: To provide a faster response when a disaster happens in Iraq "one-stop-shops" were installed, where all relevant ministries are present in one room and then when a customs document is brought in, it is just passed from table to table and therefore a faster approval is possible (GLCC, 2016).

Production variability reduction: Kits strategy (GLCC, 2016; GLCFP, 2016)

Failure prevention: Suppliers are audited and evaluated before any further business is done with them, so that their premise of quality is not taunted (GLCC, 2016; GLCFP, 2016).

Financial Strength

Financial reserves and liquidity: Immediate Response Account (IRA) is the emergency fund of the WFP (GLCC, 2016). In October 2017 it held $43.2 million (WFP, 2017c).

Portfolio diversification: Governments are the principal source of funding for WFP but also the private sector and individuals donate (GLCC, 2016; GLCFP, 2016).

Insurance Coverage: Vehicle Self-Insurance Scheme: internal insurance management has reduced the time and effort needed by WFP offices worldwide to deal with its vehicle insurance needs (WFP, 2017c)

Flexibility in Order Fulfillment

Multi-sourcing: Is done through framework agreements, local partnerships, donations and warehouses. The transportation is handled mostly through chartering from partners as needed (GLCC, 2016; GLCFP, 2016).

Demand pooling: Country offices' needs and shortfalls are aggregated at corridor level for FPF project (GLCC, 2016).

Inventory management: The warehouses are managed in a professional way and their stock can be accessed via the online system (GLCC, 2016; GLCFP, 2016).

Alternate distribution channels: On any given day WFP operates an average of 70 aircraft, 20 ships and 5,000 trucks (WFP, 2017c) which can be redirected in an emergency. If the WFP fleet cannot provide transportation commercial providers are used to deliver aid material. The different means of transportation WFP uses range from aircrafts and helicopters to elephants, yaks and donkeys (GLCC, 2016; GLCFP, 2016). Whatever is possible to procure is used in an emergency situation. Also, the WFP will repair or build roads and bridges and will call in civil engineers to coordinate rehabilitation and repair work when required (GLCFP, 2016). Fast re-routing of requirements: Approx. 40 ships circling the earth, if anything should happen, it is possible to reroute. It is also possible to re-locate stocks from warehouses (GLCC, 2016).

Flexibility in Sourcing

Product platforms: Standardized kits (GLCC, 2016; GLCFP, 2016)

Product modularity: Kit strategy (GLCC, 2016; GLCFP, 2016)

Multiple pathways: Generally local suppliers are preferred, if not possible, regional, then global suppliers are used. But it also depends on the item you need, the country you are working in and the time you have (negotiating with tenders / contracting takes time). For the first week in a response you usually fly the things in, then try to procure locally/regionally. Of course, it is also possible to procure from their own warehouses or buy white stock from other warehouses (GLCC, 2016; GLCFP, 2016).

Supply contract flexibility: Long term (agree to take a certain amount of goods every year) and framework contracts with suppliers are made. Those standby partnerships are with organizations who have signed an agreement with WFP to maintain a roster of rapidly deployable staff and equipment to support emergency operations, primarily in order to meet surge capacity at the onset of an emergency (GLCC, 2016; GLCFP, 2016).

Alternate suppliers: They have multiple suppliers – the general policy is that they have a minimum of three companies on a shortlist for items. But that is not possible for every product, sometimes products are too complex and therefore there are not 3 suppliers (e.g. suppliers for building a bridge) (GLCC, 2016; GLCFP, 2016).

Market Position

Brand equity: The WFP is a worldwide known brand and the largest humanitarian agency which is providing food assistance (GLCC, 2016).

Market share: WFP is the biggest player in humanitarian food assistance (GLCC, 2016; GLCFP, 2016).

Product differentiation: WFP provides emergency and development aid (GLCC, 2016; GLCFP, 2016)

Customer relationship: Transparency is important –many documents are available online (GLCC, 2016; GLCFP, 2016).

Customer communication: Homepage is well maintained and is updated with current project reports, appeals or other important information (WFP, 2017c).

Organization

The motivation of the employees is highly connected with the received appreciation of work. Therefore, especially people who directly see the outcome of their work (e.g. people who distribute food) are highly motivated (GLCC, 2016; GLCFP, 2016). Sometimes contract problem (only short-term contracts) are a reason for a lower motivation, as it is not possible to plan ahead (GLCC, 2016). People are highly motivated to work for LC – since it is a well-considered choice; not necessarily the same for the WFP, since the salary is really high and the position prestigious (GLCC, 2016; GLCFP, 2016).

Creative problem solving: Academic Partnerships: Collaboration with academic institutions offers a unique platform to apply the latest research in the field of supply chain management and logistics to real-life humanitarian challenges. As the things need to be delivered, people find creative solutions for the task (e.g. using donkeys where cars can't drive anymore) (GLCC, 2016; GLCFP, 2016).

Accountability and empowerment: There are protocols for the accountabilities of different jobs (GLCC, 2016).

Diversity of skills: People trained for different jobs; just have to be able to do it. But highly depends on which people are available, sometimes really hard to stick to "job description" of applicant (GLCC, 2016).

Substitute of leadership: Humanitarian Coordinator should be there, if not – WFP can take over (e.g. Nepal) because WFP is one of the hugest humanitarian agency (GLCC, 2016; GLCFP, 2016).

Learning and caring: Most people at WFP do not have real job security, since most contracts are only short term and then might be prolonged. This affects the employees' attitude toward the job and the caring atmosphere there. Lessons learned reports are done (GLCC, 2016).

Product Stewardship

Resource conservation: Procuring locally or regionally (GLCC, 2016; GLCFP, 2016)

Auditing and monitoring: The quality of food is strictly monitored and audited. Only approved suppliers qualify for purchase (WFP, 2017a).

Supplier management: Purchasing for progress – aim to buy locally from small farmers to ensure sustainability. WFP's goal is to increase the supply chain spending in developing countries, enhance local retailer supply chains and strengthening government safety net programs (GLCC, 2016; GLCFP, 2016; WFP, 2017c).

Recovery

Ability to quickly mobilize resources: Goal is that within 24-48h the first response items and tools are on ground. They have an Emergency Response Team and an Emergency Needs Assessment Unit which are the first to come to a disaster location. Through a prepositioning concept relief items are located in areas vulnerable to natural disaster and therefore, a faster response is possible (GLCC, 2016; GLCFP, 2016; WFP, 2017c).

Communicate the recovery strategy: Cluster, VOSOCC, emails, meetings (GLCC, 2016; GLCFP, 2016)

Manage the crises: Through UN OSOCC, cluster collaboration, their Geospatial Support Unit – provides authoritative and clearly understandable digital and paper maps. These highly visual pictures of WFP's operating environment help in effective decision-making (World Food Programme, 2013). There also exists the Operational Information Management Unit which enables operational situational awareness. It collects, processes and disseminates the information that assists decision-making (World Food Programme, 2013).

Mitigate the consequences of the disruption: Prioritization of delivery goods and areas to be responded to first is an important tool for that. But it is not always so easy to make it happen,

since organizations want their donors to know that they were the first to deliver something. Preparedness actions are taken to develop a region before a disaster (e.g. famine) hits the region. (GLCC, 2016; GLCFP, 2016)

Security

Employee involvement: There are security trainings for employees such as the global security awareness training program (GLCC, 2016; GLCFP, 2016; WFP, 2017c).

Collaboration with governments: In most countries with conflict situations the government is hard-pressured to make sure that the security of UN employees (includes WFP employees) are guaranteed. As often not all areas are controlled by the government the UN agencies have to negotiate with the local leading parties (GLCC, 2016; GLCFP, 2016).

Cyber-security: Their systems are restricted by various measures, such as passwords, firewalls or antiviruses (GLCC, 2016; GLCFP, 2016).

Personnel security: Done through the Field Security Division. In early 2017 the Security Policy and Framework of Accountability was published, which focuses on security structures of WFP offices outside Headquarters that are not administered by regional bureaux and reporting guidelines and responsibilities for regional security officers. The WFP also participates in the High-Level Committee on Management working group on the duty of care for UN personnel. And the Field Security Division participates in several 'Inter-Agency Security Management Network' working groups to ensure further security for the WFP employees (GLCC, 2016; GLCFP, 2016; WFP, 2017c).

Visibility

Information technology: Different IT systems are used for different areas of tasks, such as SAP or the Vehicle Management Software (GLCC, 2016). Then there is the Relief Item Tracking Application (RITA) which makes sure that the stock is tracked and accounted for throughout the journey (WFP, 2017c). And since 2010 the WFP has been using GT Nexus, which provides status of shipments in real time, an also pushes information to supply chain participants through exceptions and alerts (GLCC, 2016). Historical data in GT Nexus can also be used to adjust plans or plan for different scenarios (GT Nexus, 2010).

Knowledge of asset status: Everything is tracked via an SI (ship infrastructure) number (GLCC, 2016; GLCFP, 2016). The commodity accounting and tracking system (RITA) guarantees that stocks are accounted for throughout their journey. Then there also is the aforementioned Operational Information Management Unit which enables operational situational awareness (World Food Programme, 2013).

Information exchange: Through the different clusters, the VOSOCC and their general network and the internet (GLCC, 2016; GLCFP, 2016).

7.1.7 Results

The most important results from the analysis will be summed up in the following.

The WFP has got a very advanced and IT supported supply chain management, for which they have already won several awards, including the European Supply Chain Excellence Award in 2011.

Starting from accurate vehicle tracking to management of the immense Humanitarian Response Depots and the highly credited logistics and other trainings for organization internal or external people, their supply chain demonstrates almost all the supply chain resilience capabilities described by Pettit et al. (2010). Of course, it is not pure coincidence that the WFP heads the Logistics Cluster. As mentioned in chapter 4.7, a cluster lead has the responsibility to offer the provision of last resort, if all other means fails. As the WFP is one of the biggest players in the humanitarian world and the largest one fighting hunger, it is also one of the few that actually could provide the last resort assets and resources, which entails a huge SCM responsibility.

Collaboration is of great importance to the WFP; therefore, information is exchanged frequently with other organizations and also joint demand forecasting and supply chain planning with different organizations like the FAO is conducted. Despite some organizational difficulties, which lower employee motivation, the motivation level is usually high. As described it is higher if people see the outcome of their work and are working closer to the field. Also, high efforts in the field of product stewardship, as WFP wants to help developing countries to help themselves by generating flourishing markets.

7.2 Use Case IFRC

7.2.1 Introduction

With 190 member National Societies the International Federation of Red Cross and Red Crescent Societies (IFRC) is the world's largest humanitarian organization. It is part of the International Red Cross and Red Crescent Movement, which also includes the International Committee of the Red Cross (ICRC) and the aforementioned National Societies. The Movement is guided by seven fundamental principles: humanity, impartiality, neutrality, independence, voluntary service, unity and universality (Charles, Gatignon, & Van Wassenhove, 2011; IFRC, 2017d).

7.2.2 Facts and Figures

Motto (IFRC, 2017d): Protecting Human Dignity

Operations Budget:

- National Societies: CHF 30.8 billion (without in-kind donations and voluntary services and contributions) (IFRC, 2017a)
- IFRC Secretariat: CHF 426 Mio (IFRC, 2015)

Number of National Societies (IFRC, 2017a): 190

Staff number (IFRC, 2017a):

- Volunteers: 16 million
- Paid staff: 451, 952
- Secretariat staff: 2,920

Local Branches (IFRC, 2017a): 160.000

People reached by long-term services and development programs (IFRC, 2015): 160.7 million (2015)

People reached by disaster response and early recovery programs (IFRC, 2015): 110 million (2015)

IFRC leads the Emergency Shelter cluster for natural disasters together with UNHCR (OCHA, 2017).

7.2.3 History

The Red Cross was first thought of in 1859, when a young Swiss businessman named Henry Dunant came to witness the aftermath of a battle in Solferino, Italy. There the armies of imperial Austria and the Franco-Sardinian alliance had fought and 40.000 men lay either dead or dying on the battlefield and were lacking medical attention. This shocked Dunant severely, so that he organized the medical care for the soldiers with local people, convincing them that medical service was to be provided to all, regardless of their side in the conflict.

This incident provided him with the idea of establishing national relief societies who would assist those wounded in war. In 1863 the International Committee for Relief to the Wounded (the later on International Committee of the Red Cross (ICRC)) was founded officially in Geneva.

In 1919, in the aftermath of World War I, the International Federation of Red Cross and Red Crescent Societies (IFRC) was founded to enhance the cooperation between the Red Cross Societies. By then already millions of volunteers were part of the movement. The primary objective of the IFRC was "*to improve the health of people in country that had suffered greatly during the four years of war (…) [and] strengthen and unite already existing Red Cross Societies and to promote the creation of new Societies*" (IFRC, 2017b). Nowadays the IFRC is responsible for the coordination of the Movement's international assistance to victims of natural and technological disaster, to refugees and in health emergencies. Furthermore, it is the official international representative of its member societies (Charles et al., 2011).

The National Societies provide a range of services including disaster relief, health and social programs in their respective countries. They also function as auxiliaries in the humanitarian field to the national public authorities. When a country is faced with war the National Societies assist the affected civilians and support the army medical services where needed and in-line with their fundamental principles (Charles et al., 2011).

The International Red Cross and Red Crescent Movement is made up of almost 100 million members, volunteers and supporters of 190 National Societies. They are all independent bodies, with their own tasks and status and do not exercise authority over one another (IFRC, 2017d).

In 1901 the Nobel Peace Prize was awarded to Henry Dunant. The ICRC was awarded the Nobel Peace Prize three times (1917, 1944 and 1963), the third time together with the League of Red Cross Societies (nowadays IFRC). This makes the ICRC the recipient who has won the most Nobel Peace Prizes ever (nobelprize.org, 2017).

7.2.4 IFRC Supply Chain Flows

In Figure 7-3 the supply chain flows of an average international IFRC response is shown.

The fictitious disaster that Figure 7-3 represents is a volcano eruption, which affected a certain area. As this area is also inhabited by people, a response mission was triggered.

In the capital of the country in focus there exists an IFRC National Society headquarter, which owns a warehouse. Other humanitarian organizations also have local offices in the capital – to represent this local offices of Caritas, WFP and IOM are shown. The government itself and governmental organizations, like the military, are also located in the capital.

Other IFRC facilities include the HQ in Geneve, Regional Logistics Units (one is located in the neighboring country) and National Societies all around the globe.

Furthermore, suppliers of the IFRC are shown. Some of those are in the affected country, others in the neighboring ones, thus making a land transport possible. Suppliers located farther away have to transport their goods via ships or planes.

In the affected area the Field Assessment and Coordination Team (FACT), the Emergency Response Units (ERUs) and local relief teams are active. Those are trying to assess the damage and manage the crisis on hand, as well as transmitting information to other IFRC units. As the cluster is active, the local forces are also represented there and exchange information with other relief organizations.

Between the mentioned national and international entities information, material and also money is exchanged. These exchanges are represented by the different arrows. Either indicating that it is a unidirectional or a bidirectional flow.

In Figure Figure 7-4 the legend of Figure Figure 7-3 is shown.
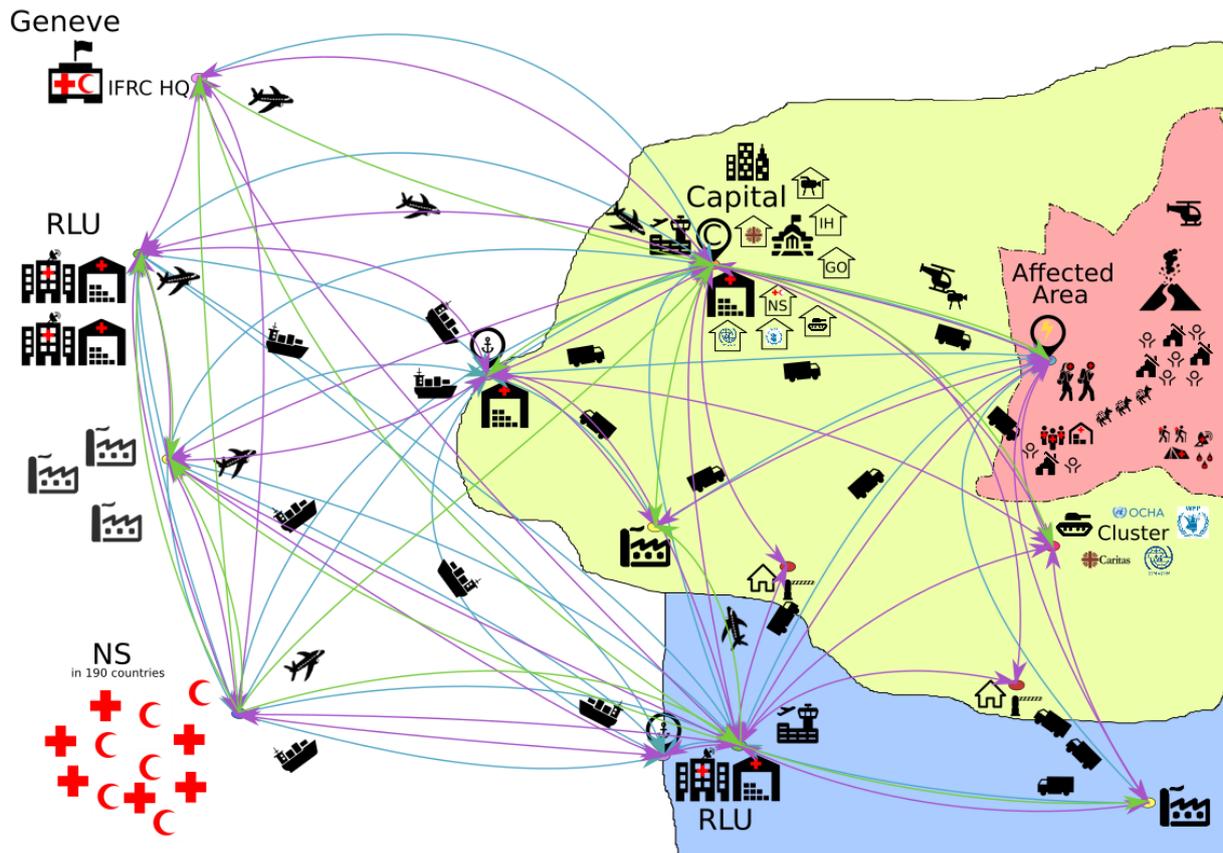
Figure 7-3: IFRC SC Flows

The response after an erupted volcano of the IFRC network is shown. This figure was created to give an overview of the complexity of a humanitarian supply network and is a fictional example.
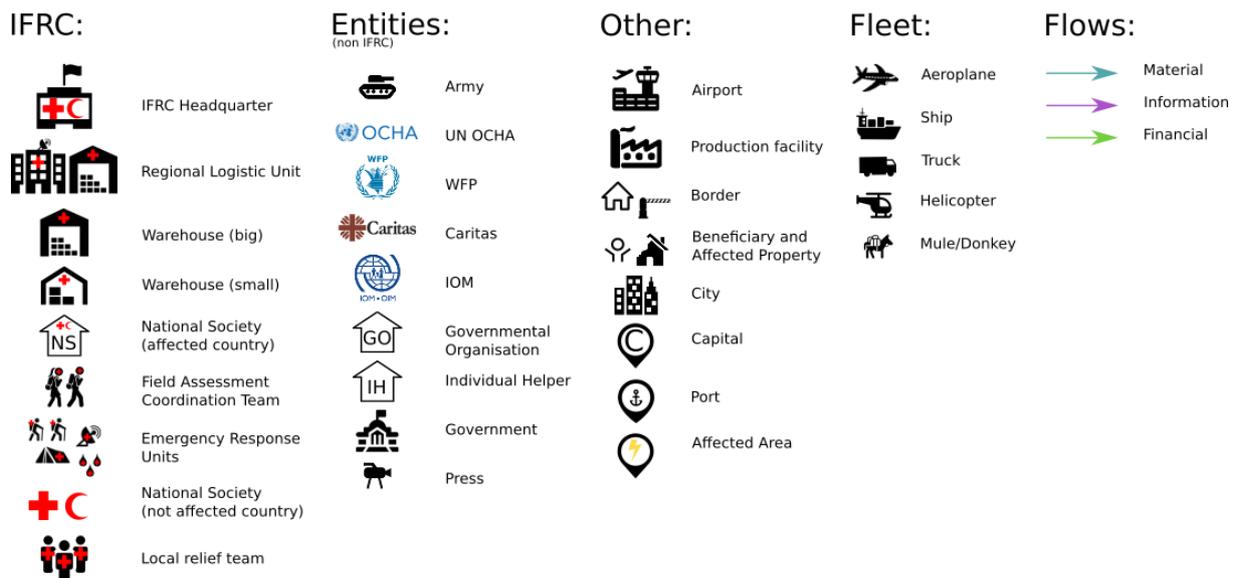

Figure 7-4: Legend of Figure IFRC Supply Chain Flows

Head of Purchase and Supply (Austrian Red Cross) – experience: > 15 years at IFRC; code: ARC

Director Logistics, Procurement and Supply Chain Management (Geneva) -experience IFRC: close to 2 years; logistic sector: > 8 years; code: GEN

Volunteer of Austrian Red Cross (Graz) – experience: > 10 years; code: VO

A literature review of publications by or concerning IFRC was used as further triangulation of the interviews.

7.2.6 Capabilities

Adaptability

Re-routing of requirements: Can be done if needed. For example, if a warehouse, which currently supplies a disaster is being emptied, the further deliveries of the NS could be directed to that warehouse, to re-establish the needed safety stock there. (RCA)

Strategic Gaming and Simulation: The IFRC and its member societies take part in multi-organizational trainings (like the TRIPLEX). They organize trainings for their own members and there exist simulators to prepare people for different assignments (IFRC, 2017d; RCA, 2017). In "The Principles and Rules for Red Cross Red Crescent Humanitarian Assistance" (PRRCHA) it is stated that NS shall take part and/or organize such simulations or trainings (IFRC, 2013).

Seizing advantages of disruptions: The IFRC Movement's vehicle purchasing service (Global Fleet Base in Dubai) is also available for other HO (IFRC, 2017d; RCA, 2017).

Alternate technology development: Drones are being used for assessments. IFRC has partnerships with universities, research institutions and the private sector to indulge to improve their methods and approaches (RCA, 2017).

Lead Time Reduction: Based on the demand forecasts their warehouses are stocking goods and framework agreements are made (RCA, 2017).

Learning from Experience: The lessons learned process is important, therefore, a debriefing is done after the missions (RCA, 2017). In the Disaster Management Information System (DMIS) existing knowledge is captured and retrievable for other units (Samii et al., 2002a). The goal is to consolidate and institutionalize the lessons learnt process. Also sometimes case studies or reports are issued (IFRC, 2017d).

Anticipation

Demand forecasting: Forecasts are based on experience (e.g. roughly 14 hurricanes will hit the Americas between June and November each year). Usually once a year these forecasts are updated, to reflect changes in society or risks (RCA, 2017). The FACT (Field Assessment Coordination Team) does demand assessments of big disasters (Samii et al., 2002b).

Risk Identification and prioritization: Logistics ERU (Emergency Response Unit) carry out logistics analysis, including topics like: capacity, capability and status of port of entry in terms of receiving/handling, transportation and storage facilities as well as customs and immigration rules and regulations. FACT is responsible for demand assessment of big disasters (Samii et al.,

2002b). Community disaster action teams prepare a disaster action plan and also a risk and resources mapping, which identifies local hazards, who and what may be at risk and which mitigation measures are possible (IFRC, 2003). NS are requested by the PRRCHA to indulge in risk, vulnerability, capacity and market assessments and develop contingency plans and processes with stakeholders (IFRC, 2013).

Monitoring and communicating deviations and "near misses": NS monitor and use regional and national hazard forecasts for early warning and early actions (IFRC, 2013).

Recognition of early warning signals: Online databases are consulted (IFRC, 2017d). NS monitor and use regional and national hazard forecasts for early warning and early actions (IFRC, 2013).

Contingency planning and preparedness: At National Society level standard training programs and on-the-job training is done (RCA, 2017). FACT and ERU Teams exist (Samii et al., 2002a). NS are requested by the PRRCHA to indulge in risk, vulnerability, capacity and market assessments and develop contingency plans and processes with stakeholders (IFRC, 2013).

Capacity

Reserve capacity: A network of permanent logistics units exists; where logistics specialists can be found and pre-positioned stock to meet the immediate needs of 450,000 people at anytime and anywhere is kept (IFRC, 2017d).

Redundant capacity: Often critical parts of items are sent twice to ensure redundancy. For general redundancy capacity of the NS can be merged with that of the IFRC. Through their world-spanning network items are almost always available in a redundant way (RCA, 2017).

Backup capacity: Their items are sent in a way so that they can function without further things such as electricity. Providing water sanitation in disaster struck areas is one of the main focus of the Austrian RC (RCA, 2017).

Collaboration

Work together with other NGOs and UN organizations active in the humanitarian field (Samii et al., 2002a):

- Strategic alliances with significant "non-Red Cross" organizations – make use of the other organizations country presence and infrastructure, areas of technical experience, human knowledge and experience capital. Example Oxfam: Oxfam has technical expertise in water and sanitation. Through strategic alliance under specified conditions there is no need to coordinate and negotiate our respective contributions and roles in a disaster as a framework agreement would already be in place
- Partnership with press – the better covered, the more funds
- Close links with researchers affiliated with reputable academic institutions
- Partnership with municipal and provincial government units: helps to root the preparedness concept in local planning, to gain technical and financial support for mitigation measures and ensure program's long-term sustainability (IFRC, 2003).
- Active member of the Cluster Approach.

Also, partnerships with commercial partners exist. These partners often help the IFRC with in-kind donation of air freight space for example (GEN, 2017).

National Societies shall encourage and support the relevant public authorities (IFRC, 2013).

Collaborative forecasting: Donors (NS) are involved in needs assessment phase (to avoid wrong donations) (Samii et al., 2002a). Prioritization is done jointly with other organizations.

Transparency of information: IFRC works together with other humanitarian organizations and shares their information with them (IFRC, 2017d; RCA, 2017). Also the IFRC is the cluster lead of the emergency shelter cluster together with UNHCR; therefore, information is shared in cluster meetings (OCHA, 2017). There is a strong connection of NSs with IFRC – share information in case of sudden or slow-onset disasters for which international assistance might be needed. NSs may request bilateral assistance of other NSs (IFRC, 2013; RCA, 2017).

Shared product life cycle management: Involve donors (NS) in needs assessment phase (to avoid wrong donations) (Samii et al., 2002a). Collaboration since 2012 with Airbus Corporate Foundation in air transport and exchange of expertise (IFRC, 2017d).

Risk sharing: It is tried to share assets as often as possible with other movement members (GEN, 2017).

Dispersion

Human workforce dispersion: Structure is made up by National Societies in 190 countries. Then there exists the IFRC which coordinates and directs international assistance following natural and man-made disasters in non-conflict situations. The ICRC on the other hand focuses on the conflict situation. There exist emergency relief teams like the FACT or the ERUs (Logistics, Basic Health Care, Water and Sanitation, Referral Hospitals and Telecommunications ERU). The FACT team consists of a pool of 200 experts, which carry out rapid assessments immediately after a disaster. They are from all over the world. The ERUs are the Federation's disaster response tools and belong to certain National Societies (IFRC, 2017d).

Global Structure:

- Logistics, Procurement and Supply Chain Management HQ in Geneva (GEN, 2017)
- Divisioin into 5 regions (Americas - Panama, Asia-Pacific Region -Kuala Lumpur, Europe - Budapest, Middle East and North Africa Regional (MENA) - Beirut and Africa – Nairobi (GEN, 2017)
- A Logistics hub and Fleet Base in Dubai (IFRC, 2017d)
- Stockpiles of relief items in Las Palmas, Guatemala, Nicaragua, Honduras, Ecuador and Peru. With plans to expand to Senegal, Cameroon, Namibia and Zimbabwe in Africa, and a sub-regional warehouses in the Pacific and in the Caribbean (IFRC, 2017d).
- A roster of logistics specialists and equipment for rapid deployment (Emergency Response Unit) maintained by 5 member National Societies (IFRC, 2017d).
- A pool of logisticians deployed at operational level around the world (IFRC, 2017d).

Leadership dispersion: The leadership of the respective RC members are clearly defined and who does what in a disaster is also formalized. (National Societies: cope with small disasters; Regional Level: medium size disasters; IFRCs global network or people and resources: big disaster) (Samii et al., 2002a)

Within AP (Asian Pacific) structures country, region, zone and Geneva offices exist, however the IFRC Secretariat has moved towards a 2 – tiered approach where (IFRC, 2011)

- the Zone and Geneva work as a global disaster management team which is represented by the Zone Office.
- the regional and country offices are focused at the country level. Those two are automatically the country office. However, where there is no country office the regional office plays the role of the country office.

Downstream customer dispersion: Through their variety of offered services, they are in touch with different beneficiaries (EMS, people affected by disasters, blood donation services,…) (IFRC, 2017d).

Market dispersion: IFRC is active in international relief activities, national relief activities, national disaster preparedness activities, training of public, blood donation service, civil Emergency Medical Services (EMS),… (IFRC, 2017d).

Efficiency

Labor, production, asset utilization: Through regionalizing the operational capacity, the costs have dropped significantly (e.g. Family kit by 75%). The vehicles are managed by the Dubai Logistics office, which have an optimized vehicle management strategy implemented, which enables them to secure the best possible pricing with the most appropriate vehicle specification. (IFRC, 2017d).

Waste elimination: Some suppliers are in a pool of trusted suppliers, which when needed to call upon can act faster, since they have already undergone a background check (compliance to guidelines etc.). Therefore, the focus can be on the relief effort instead of negotiating and deciding the content of kits with NSs and analyzing competitive bids from various suppliers. FACT and ERU teams are established to fasten up the response process. To save time in the DMIS links to relevant websites that hold key information regarding geography, climate, population…. Through the vehicle management optimization system waste can be reduced (IFRC, 2017d). Following a disaster, IFRC launches an Emergency Appeal (EA) which is a document proving information on the National Society/IFRC plan of action to assist the affected population. The EA is accompanied by a MT which is practically the list of relief items needed for the planned assistance. The items refer to standardized specifications through our Emergency Items Catalogue. This EA and MT is circulated to all National Societies and if any National Society would like to respond to the disaster through the EA through in-kind donations, they have to donate relief items that are on the Mobilization Table. If not, it is not allowed to be sent. This ensures a coordinated response to the disaster, ensuring that high quality items are delivered to the beneficiaries within the sphere standards (GEN, 2017).

Production variability reduction: The mainly needed relief items are standardized (RCA, 2017).

Failure prevention: Risk assessments are carried out by the National Societies and development projects are issued to prevent disasters (IFRC, 2013). Standard and Guidelines: National Disaster Preparedness and Response Mechanism Guidelines: contain shared standards, key indicators, guidance notes, key questions and real-life experiences (IFRC, 2016a). Suppliers are audited and screened to guarantee a certain quality level.

Financial Strength

Financial reserves and liquidity: Disaster Relief Emergency Fund (DREF) exists and funds first response of a disaster (IFRC, 2017d; RCA, 2017).

Portfolio diversification: IFRC is active in international relief activities, national relief activities, national disaster preparedness activities, training of public, blood donation service, civil Emergency Medical Services (EMS),… (IFRC, 2017d). Also warehouse management for other organizations can be done by the IFRC (RCA, 2017).

Insurance Coverage: Insurance is of great importance, especially for transportation and storage of goods (IFRC, 2017d; RCA, 2017).

Flexibility in Order Fulfillment

Multi-sourcing: Items can be from warehouses, external suppliers, National Societies or private sector donations (IFRC, 2017d; RCA, 2017).

Demand pooling: Consolidation of orders and sourcing items strategically is done with a goal of cutting costs (IFRC, 2017d). This is done within the movement but not with organizations outside of it (GEN, 2017).

Inventory management: It is usually handled by the National Societies, the IFRC region offices or the warehouses themselves (e.g. warehouse in Las Palmas) (IFRC, 2017d). During an operation the logistics ERU (if deployed) handles storage capacity, capability and status of port of entry in terms of receiving/handling, transportation and storage facilities as well as customs and immigration rules and regulations in an emergency (RCA, 2017).

Alternate distribution channels: The transportation to final port of entry can be done in different ways (IFRC, 2017d):

- needed goods are in stock: transportation will be arranged directly from the regional logistics unit warehouse to the final port of entry.
- needed items are not in stock:
    - ordered and delivered to the regional logistics unit warehouse before delivery to the final port of entry or
    - delivered directly to the final port of entry by the supplier.

National Societies sometimes manage transportation by themselves (RCA, 2017).

Fast re-routing of requirements: Through global structure it is possible to re-route goods in a fast way. The Logistic ERU is responsible for that (IFRC, 2017d). Through regional teams/offices it is possible to have a direct contact with donors (in the same time zone) and therefore faster decisions are possible (IFRC, 2008; RCA, 2017).

Flexibility in Sourcing

Product platforms: The items in kits are standardized for all of the big humanitarian organizations (e.g. an IFRC health kit contains the same as an MSF health kit) and they are used in different kits (RCA, 2017).

Product modularity: Use the kit strategy, which is designed in a modular way (RCA, 2017).

Multiple pathways: Goods may be procured from National Societies, external suppliers, private donations other humanitarian organizations (IFRC, 2017d). As National Societies are active in almost every country of the world, lots of different contacts are known and can be used when needed (RCA, 2017).

Supply contract flexibility: There exist pre-agreements (framework agreements) based either on a disaster response plan or individual/specific kit with NSs or external suppliers for key relief items (RCA, 2017). There the price, quality and delivery requirements are defined and it obliges suppliers to stock (at their own premises) a certain level of inventory) (Samii et al., 2002a). There exist different types of framework agreements (IFRC, 2017d):

- Global framework agreements
  - used for standard relief and medical items which are needed in emergency operations
  - most common framework agreements
- Regional framework agreements
  - for goods that will be specifically used by communities of that region
  - regional agreements when a more tailored approach is required
- Local framework agreements
  - used to cover local needs within a specific country
  - this type of agreement is rarely used

Alternate suppliers: There have to be at least 3 suppliers for an emergency item (RCA, 2017; Samii et al., 2002b). Framework agreements with different suppliers and National Societies exist (IFRC, 2017d; RCA, 2017).

Market Position

Brand equity: IFRC is the largest humanitarian organization in the world. It is therefore well-known all around the world (IFRC, 2017d). Through regulations they try to avoid corruption, fraud and other image harming problems (IFRC, 2013).

Important information when choosing supplier (IFRC, 2017d):

- adhere to the Fundamental Principles of the International Red Cross and Red Crescent Movement
- maintain ethical business practices at all times
- are not involved in any form of corruption or any fraudulent activities
- do not engage in any collusive or coercive practices

Market share: IFRC is one of the world's most well-known brands next to Coca-Cola (IFRC, 2017d; RCA, 2017).

Product differentiation: IFRC is active in international relief activities, national relief activities, national disaster preparedness activities, training of public, blood donation service, civil Emergency Medical Services (EMS),… (IFRC, 2017d). Also warehouse management for other organizations can be done by the IFRC (RCA, 2017).

Customer relationship: It is tried to maintain a good relationship with customers (in that case donors). For example, when donating blood one gets a thank-you message if that blood was actually used. Also achieving transparent processes is important. As for example the Austrian

Red Cross is periodically audited by the General Accounting Office everything needs to be documented and be done in a traceable way (RCA, 2017).

Customer communication: The partnership with the press (to get media coverage) and transparency is very important, many documents, project and financial reports are published online. IFRC saying: "A happy donor today is a good donor tomorrow!" (Samii et al., 2002a, p. 3)

Organization

Concerning employee motivation those working in the emergency response of IFRC are highly motivated, although, they salary is distinctly lower than in the private sector. The reason for that high motivation is seen in doing something purposeful and having made a difference at the end of the day. The higher motivation results in a better and faster executed work, where more time than compulsory mandated is invested (RCA, 2017; VO, 2017).

Creative problem solving: drone usage for assessment. Basically, in every deployment creative problem solving has to be applied – as the situations vary greatly. Also academic partnerships exist to create creative and innovative solutions to problems (RCA, 2017).

Accountability and empowerment: Different levels of accountability exist, which are clearly communicated (Samii et al., 2002b). National Societies, IFRC, ICRC, FACT team, ERUs, Field Logistics Unit (FLU), community based disaster response teams, branch disaster response teams, National Disaster Response Teams, Zone Leader, Regional Intervention Teams (RITs)…(IFRC, 2017d)

Diversity of skills: FACT, RITs, ERU are trained in different specialties and made up of different experts. Also special training in National Societies for staff and volunteers to be able to help effectively and efficiently in a disaster (IFRC, 2017d).

Substitute of leadership: Hierarchy is formalized and known (RCA, 2017).

Learning and caring: Lessons learned process is important. DMIS saves lessons learned reports and makes them accessible throughout the movement. Debriefing sessions are held after a deployment (RCA, 2017; Samii et al., 2002a). Work is being done regionally to coordinate and share experience. Team members learn from each other's experience (IFRC, 2016a).

Product Stewardship

Proactive product design: It is tried to implement mitigation and preparedness strategies (RCA, 2017).

Resource conservation: A Clean Fleet Strategy was adopted in 2010 to show IFRC's strong commitment to reducing the adverse effects of their fleet on the environment (IFRC, 2017d).

Auditing and monitoring: Received funds for an operation is subject to external audits (IFRC, 2013). The risk of losing their good reputation is for the IFRC to great, as to contract suppliers without a previous audit. The Austrian Red Cross is periodically audited by the General Accounting Office, therefore, everything needs to be documented and be done in a traceable way (RCA, 2017).

Supplier management: Suppliers have to adhere to the principles of IFRC and have to use only ethical business practices. Also they are audited and monitored before contract is awarded (and after that) (IFRC, 2017d).

Customer support: Is of great importance, as without donations the whole organization could not function. Therefore, transparency is crucial (RCA, 2017).

Recovery

Ability to quickly mobilize resources: Regionalization is important to act faster (and cheaper). Therefore, capacity is built at the NS level. There exist the ERU, FACT and RIT and a global network of permanent logistic units (Panama, Dubai,…) where pre-positioned stock for the needs of 450.000 people is stored (IFRC, 2017d; RCA, 2017). The FACT team can be deployed within 12h and within 24h the first situation assessment is available (RCA, 2017).

Communicate the recovery strategy: Contingency plans are made with the community and the processes within the movement are tried to be standardized so that the communication is easier and faster (IFRC, 2013, 2016a). It is always tried to prioritize jointly, so that duplication efforts and not solicited donations are minimized (RCA, 2017).

Manage the crises: The disaster is managed by different levels, depending on the size of it. There also exist the FACT, ERU, RIT (RCA, 2017).

Mitigate the consequences of the disruption: Disaster risk reduction and capacity building activities are done in the communities. Contingency plans with the community are done, where risks are analyzed (IFRC, 2016a).

National disaster response system (IFRC, 2016a):

- Teams at community level (community-based disaster response teams)
- Branch level (branch disaster response teams)
- National Disaster Response Teams (NDRT): act as focal points that can build networks from local to the regional and reinforce national preparedness and response

Security

Layered defense: Guardians and other security staff can be employed (RCA, 2017).

Access restrictions: exist (RCA, 2017)

Employee involvement: Briefing is held before people are deployed, there safety or health issues are addressed. Once in the foreign country contact is established with the NS and experiences are shared. Only people who have completed foreign deployment training (ERU, FACT,) are allowed to go. It is tried to have a certain experience variety of employees when deploying, so that the less experienced ones can learn from the others (RCA, 2017).

Collaboration with governments: National Societies work together with the government and it is one of their duties to support the government in disaster preparedness and relief actions (IFRC, 2013).

Cyber-security: Password restrictions and firewall exist (RCA, 2017).

Personnel security: IFRC has an own security department, which monitors the different aspects of security (GEN, 2017). Security frameworks for the protection of staff and volunteers and for

the safe access to disaster-affected areas and people exist (IFRC, 2013). If the risk to stay in certain country is rendered to high, the staff is pulled out (RCA, 2017).

Visibility

Information technology: There exist different tools such as the Disaster Management Information System (DMIS), Humanitarian Logistics Software (HLS), Standard software tools (spreadsheets and dbases) to manage logistic unit activities. Then there is the federation-wide Databank and Reporting System (FDRS), which covers key domains of information and provides a single repository of key documents such as annual reports, audited accounts, and strategic plans. It is maintained by the National Societies (IFRC, 2017a). IFRC collaborates with Facebook on disaster maps that uses aggregated Facebook data to show where communities are located after a disaster, where they are moving, and where they are checking in as safe (IFRC, 2016b). They are also part of the "missing maps" project, where through crowd sourcing and local involvement, detailed maps of distant regions are created, which make response easier (Missing Maps, 2017). They also have an internal IT system at the Federation, but due to a complex structure (e.g. different apps for warehouse management, procurement management and logistics management) it is used for the dedicated areas but not as much as an enterprise resource planning (ERP) system. As of today, the tracking is mostly done via Excel and if external carriers are doing the transportation, via their tracking apps (GEN, 2017).

Knowledge of asset status: An IT system with a very complex structure is used at the Federation, which does not make it easy to see what happens/happened in different regions or to communicate between them. Therefore, monthly reports on stock movement and levels are used to exchange information (GEN, 2017). The information of the respective National Societies is known by them. There is no central database for the whole movement, as it is too difficult to maintain and without almost real-life data it would not be of much use. In case of an emergency the NS informs itself about their respective asset status (via Email or telephone) and then forwards those data to the IFRC. The IFRC know about the asset status of their warehouses (RCA, 2017).

Information exchange: In cluster meetings, through their network, with other humanitarian organizations (IFRC, 2017d; RCA, 2017).

7.2.7 Results

The RC movement is made up of a much-decentralized network, with close to 200 member NSs, active in almost every country of the world. This huge network gives them a reaction velocity advantage, as one NS is usually always situated in the vicinity of the affected region. Also, procurement and delivery flexibility are enhanced through the movement network and the established good relationships with local partners and governments. In general, it is tried to use the network in a very beneficial way for all, for example to save resources by sharing assets or by division of labor (depending on operation sizes). To manage and govern the IFRC network clearly stated principles and rules exist, which clarify responsibilities, goals and standards (e.g. supplier selection rules).

In procurement a localization agenda is followed. Nevertheless, massive warehouses in different strategically selected locations are used to be able to deliver fast in an emergency situation or if no local/regional sourcing options are available. To be able to achieve a fast

response, tools like ERU or FACT teams have been introduced quite some time ago. Those can be deployed after a big disaster and will help the relief efforts in their specialization areas, like logistics, assessment or telecommunication. As well as the other interviewed humanitarian organizations the IFRC relies on the kits, when distributing goods. This not only makes the first response easier, but the supply base is larger, as these kits are standardized and used by many humanitarian organizations.

There exist different IT systems which allow communication or exchange of data. But due to complexity issues, supply chain visibility is not achieved through those. Reports and other information is usually exchanged via emails. This is also true for files like mobilization tables or stock movement numbers.

Gaming and other training events are frequently organized or participated in to facilitate and fasten a response. If in multi-organizational training events or in a real-life scenario information exchange is considered as very important and is done on a very broad basis both within and outside the movement. One of the biggest problems in disaster relief missions, the problem of non-requested goods, is tackled through Mobilization Tables, in which the assessed demand is listed and only pledges for as many items as are listed will be accepted.

7.3 Use Case Médecins Sans Frontières

Figure 7-5: Logo MSF **(Médecins Sans Frontières, 2017)**

7.3.1 Introduction

The following chapter focuses on the international humanitarian organization Médecins Sans Frontières (MSF). Besides being one of the largest humanitarian organizations worldwide, MSF is known for its engagement in highly risk-prone zones of the world, where the probability of supply chain disruption is extremely high. For example MSF was one of the main actors in the Ebola outbreak in West Africa in 2014, which not only required a highly resilient supply chain, but also posed major risks to aid workers in the region (Médecins Sans Frontières, 2015b).

Its organizational focus lies on medical humanitarian aid for people that are affected by epidemics, natural disasters, armed conflicts and exclusion from healthcare. In 2015 the organizations was active in 69 countries, working on 450 different projects with around 39.000 local and international health professionals, logistics specialists and administrative staff (Médecins Sans Frontières, 2015a).

7.3.2 Facts and Figures

Motto (Médecins Sans Frontières, 2017): Medical aid where it is needed most. Independent. Neutral. Impartial.

Annual Budget (Médecins Sans Frontières, 2015a): 1,444 billion

Staff number (Médecins Sans Frontières, 2015a): 39,000

Countries active (Médecins Sans Frontières, 2015a): 69

People assisted (Médecins Sans Frontières, 2017): 8.6 mio patients assisted in 2015 (Médecins Sans Frontières, 2017)

MSF is divided into two branches (Figure 7-6). The fundraising, recruiting and advocacy activities are managed by the 24 independent MSF associations. The actual humanitarian assistance programs are the responsibility of the 5 Operational Centers, located in Amsterdam, Barcelona, Brussels, Geneva and Paris. Therefore, they supervise the project teams on-site and are in constant contact with their respective procurement centers (MSF Logistique, MSF Supply or the Amsterdam Procurement Unit), which are in charge of the procurement, warehousing and delivery. (Médecins Sans Frontières, 2017)
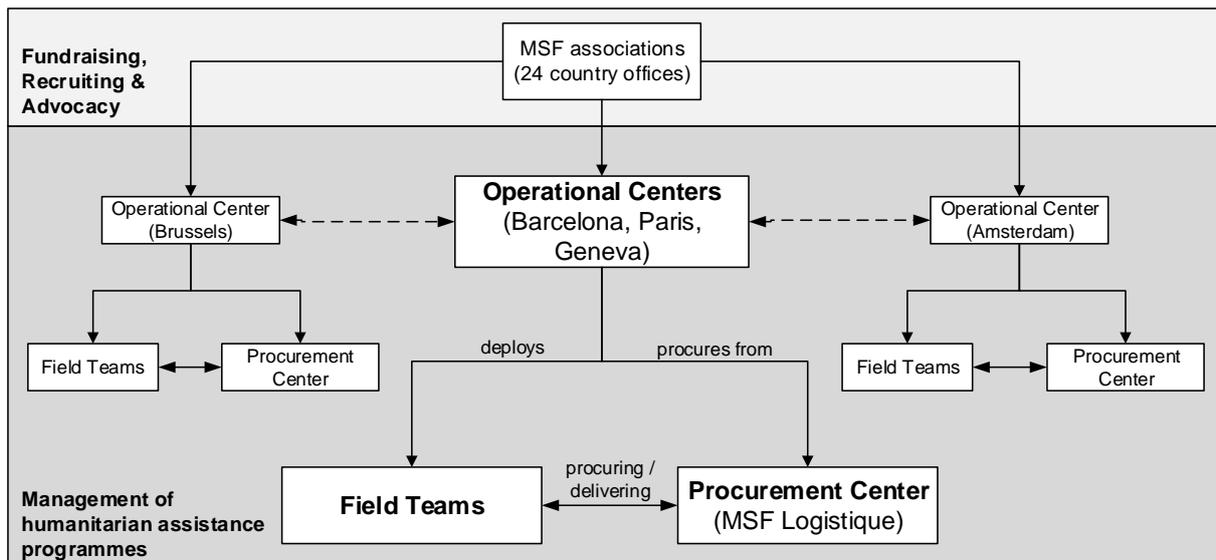
Figure 7-6: MSF Organizational Structure
MSF is divided into two main branches. One takes care of fundraising, recruiting & advocacy and the other of their humanitarian assistance programs. The second one is further subdivided into operational centers, field teams and procurement centers (Médecins Sans Frontières, 2017)*.*

7.3.3   History

Médecins Sans Frontières, was founded in France in 1971 by a group of young French doctors and journalists after the Biafra crisis. They wanted to create an independent organization that focused on delivering emergency medical aid in an effective and impartial way.

After their first deployments, their weaknesses in the area of supply chain management, preparation and support became apparent. Thus, MSF was restructured and has opened offices in 28 countries since 1980. By now they have treated over a hundred million patients over the years, with a growing yearly patient number (Médecins Sans Frontières, 2017).

In 1999 MSF received the Nobel Peace Prize "in recognition of the organization's pioneering humanitarian work on several continents" (nobelprize.org, 2017).

7.3.4   Interview Partners

MSF employees at different SC relevant levels were approached in course of the interviews.

The interviews were conducted with the following people:

- humanitarian coordinator and former head of mission, logistics coordinator, finance controller and emergency coordinator; experience > 13 years; code: SCCMSF
- supply chain coordinator of an Operational Centers (OCs); experience > 5 years; code: HCMSF
- project coordinator (MSF Logistique); experience > 5 years; code: MSFLOG

A literature review of publications by and on MSF was used as triangulation of the interviews.

7.3.5   Process

In the following the basic disaster relief process is described.
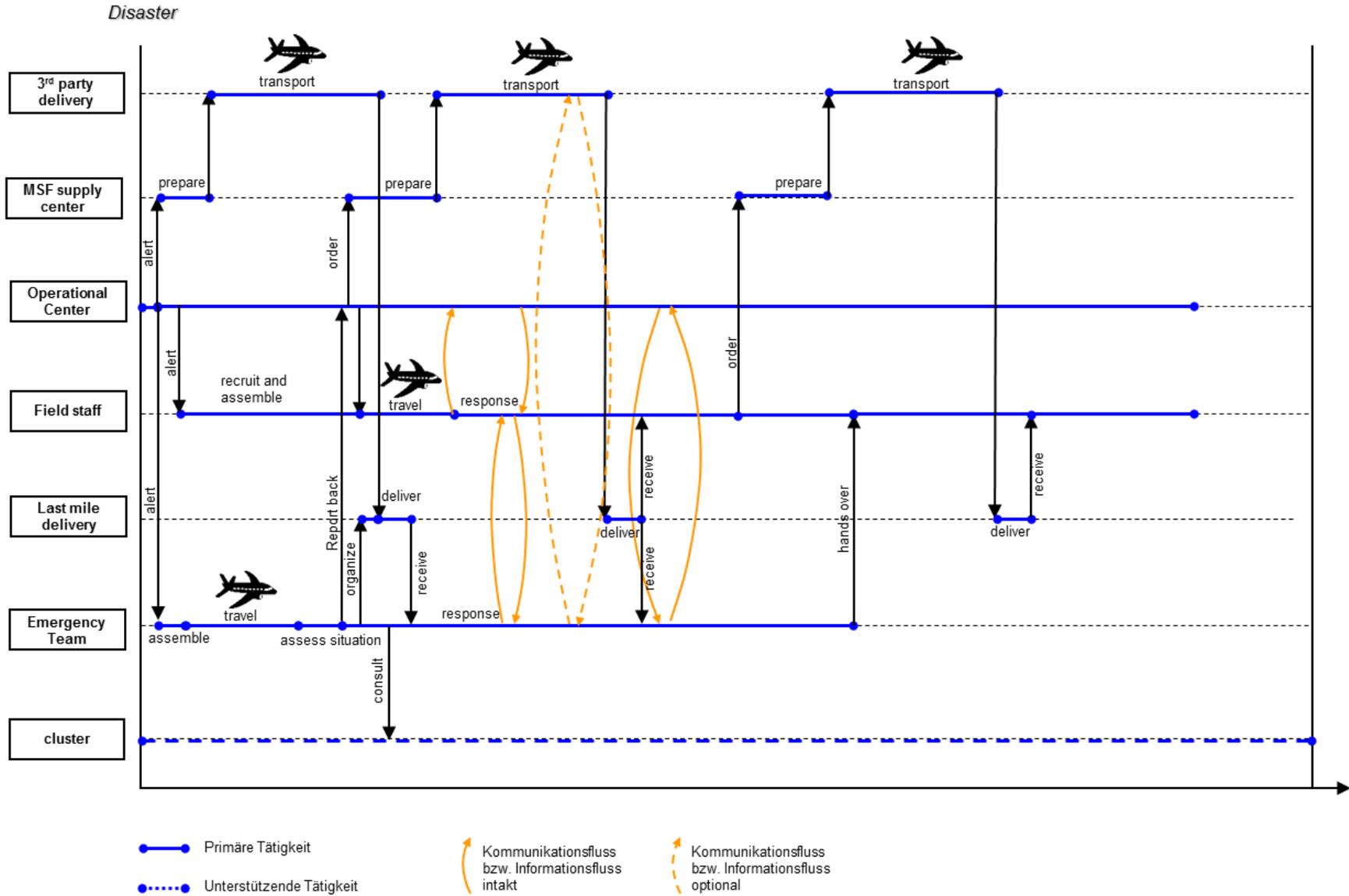
Figure 7-7: MSF disaster response generic process

After a disaster happened, the Operational Center (OC) is alarmed, which not necessarily is a passive action – as MSF is constantly monitoring the countries where they have projects in or get the news via other channels. After the alarm an Emergency Team (ET) is sent to the region (or if an emergency unit exists in the region, the team is assembled regionally), to make the first assessment and start (if necessary) with the first response. Therefore, the ET sometimes already takes a bit of cargo with it. At the same time the supply center is alarmed too, so that it can start with the preparation of the most-likely needed items. Also, a response team is assembled, which is made ready for departure to the disaster struck region.

The result of the ET assessment is sent back to the OC, which forwards it to the supply center and the response team. The supply center prepares the goods and arranges the delivery with a private sector provider. The last mile delivery and distribution is done by the ET (or the response team, once it arrives). The OC and the supply center are in constant contact with the field teams and arrange further deliveries if needed.

After a few weeks the ET is going home. The response team stays till the project is finished.

7.3.6 Capabilities

Adaptability

Re-routing of requirements: Is possible, if stock is needed by another mission on higher priority (SCCMSF, 2016).

Strategic Gaming and Simulation: There are training and exercises in which MSF takes part (HCMSF, 2016; SCCMSF, 2016).

Alternate technology development: MSF is investing a lot in research and has a few research and reflection centers all over the world (Médecins Sans Frontières, 2017). They developed a cough analyzer app, which checks, based on the sound of the cough, if somebody got pneumonia (HCMSF, 2016).

Lead Time Reduction: Part of the stock is organized in kits, which can be easily ordered (and includes all important items for a certain crisis) and therefore, fastens the response (MSFLOG, 2016; SCCMSF, 2016).

Learning from Experience: MSF issues three different types of "lessons-learned" reports, a final project report, a report of an evaluation unit and a CRASH (Centre de Réflexion sur l'Action et les Savoirs Humanitaires) report. The first is part of every project and handed in by the project team together. It is made up of the review of the project and also documents apparent shortcomings. After big projects, an evaluation unit can be assembled to objectively analyze and document the according project. The report of the evaluation unit will also be published online. About 5-10 years after a mission the third, a CRASH report, can be requested. This report will not only critically reflect about the shortcomings of the mission but also inspects if the humanitarian principles were met during the whole time of the project, what the impact of the project in the long run has been and if subsequently the objectives of the mission were achieved (HCMSF, 2016; SCCMSF, 2016).

Anticipation

Demand forecasting: Is done based on consumption and updated every 6 months. As forecasts for disasters are difficult, they keep safety stocks (MSFLOG, 2016; SCCMSF, 2016).

Risk Identification and prioritization: Additionally, to the Emergency Preparedness Plan which includes potential risks in the region where MSF is operating, a constant monitoring of various risk factors is done (HCMSF, 2016; SCCMSF, 2016).

Monitoring and communicating deviations and "near misses": Constant monitoring of various risk factors is done via the network, online data, own people in foreign countries (HCMSF, 2016; SCCMSF, 2016).

Recognition of early warning signals: It is done through constant monitoring of various risk factors (HCMSF, 2016; SCCMSF, 2016).

Contingency planning and preparedness: Whenever MSF starts a new project, an Emergency Preparedness Plan is developed. Among other things, this plan includes cultural information of the country/region, geographical data and experience of previous MSF projects. Furthermore, what-if scenarios are defined and attributed a likelihood of happening. Based on these scenarios, certain preparedness actions can be taken (HCMSF, 2016; SCCMSF, 2016).

Capacity

Reserve capacity: MSF relies on three huge procurement centers in strategic positions (MSF Logistique, MSF Supply and Amsterdam Procurement Unit) and small regional warehouses (HCMSF, 2016; MSFLOG, 2016; SCCMSF, 2016).

Redundant capacity: Redundancy of mission-critical parts is seen as very important(HCMSF, 2016; SCCMSF, 2016).

Backup capacity: As for some devices and operations loss of electricity would be critical, own measurements are taken (HCMSF, 2016).

Collaboration

Negotiations as a group of humanitarian organizations, since then have greater power (usually UN OCHA or WFP log cluster help) (HCMSF, 2016; SCCMSF, 2016)

Collaborative forecasting: When a project is done with another organization, the forecast can be done jointly (HCMSF, 2016; SCCMSF, 2016).

Transparency of information: With other humanitarian organizations, as one usually tries to support each other on-site. MSF sometimes joins cluster and shares its information there too.

Postponement of orders: Possibility to divert goods to other humanitarian organizations (often informal basis), it is also possible to make concessions among clients and projects in the procurement centers (SCCMSF, 2016).

Shared product life cycle management: In order to get better prices and make negotiations more efficient, teaming up and engaging in a pool procurement process with other organizations is a frequently used method (e.g. endTB initiative where MSF Logistique teamed up with UNITAID and Partners in Health (PIH) (MSF Logistique, 2015; MSFLOG, 2016).

Risk sharing: Through the cluster approach a way of risk sharing is done (SCCMSF, 2016). Some missions are done together with other humanitarian organizations (e.g. endTB initiative where MSF Logistique teamed up with UNITAID and Partners in Health (PIH)) (MSF Logistique, 2015).

Dispersion

Human workforce dispersion: MSF has a very central structure; therefore, no permanent regional offices exist. MSF is only on project base in a country. When establishing mission teams, employees with experience and new ones are always mixed, to make sure that people learn from each other. There is the possibility of hiring freelancers (HCMSF, 2016; SCCMSF, 2016).

Leadership dispersion: Through the 5 Operational Centers the missions are coordinated. The mission leader and his/her team then manage the operational stuff of mission (HCMSF, 2016; SCCMSF, 2016).

Downstream customer dispersion: Through their different types of missions, many people benefit from their actions (HCMSF, 2016; SCCMSF, 2016).

Market dispersion: MSF engages in development aid, emergency aid and research activities (HCMSF, 2016; SCCMSF, 2016).

Efficiency

Labor, production, asset utilization: Through central management at the OCs an overview of assets is provided and tried to have a high utilization rate (SCCMSF, 2016). The big procurement centers are monitored by their respective sub-organizations (MSFLOG, 2016; SCCMSF, 2016).

Waste elimination: There is an online procurement portal for mission leaders to save time when ordering. Through customs pre-arrangements and pre-cleared goods, also precious times in an emergency response is saved (MSFLOG, 2016; SCCMSF, 2016).

Production variability reduction: Their ready to be dispatched kits reduce production variability. Also, processes are tried to be standardized (MSFLOG, 2016; SCCMSF, 2016).

Failure prevention: Through their maxim of providing quality healthcare some failures are prevented (HCMSF, 2016; SCCMSF, 2016).

Financial Strength

Financial reserves and liquidity: They have an Emergency fund and as almost 90% of their budget is done via private donations, they can react fast as they do not have to lobby governments or institutional donors (HCMSF, 2016; Médecins Sans Frontières, 2017; SCCMSF, 2016).

Portfolio diversification: They rely on donations and project funding (HCMSF, 2016; SCCMSF, 2016).

Insurance Coverage: People are insured when going to a mission. Also, items get insured (HCMSF, 2016; SCCMSF, 2016).

Flexibility in Order Fulfillment

Multi-sourcing: The delivery can either be done by a private sector company, can be arranged by MSF or by a humanitarian organization partner (HCMSF, 2016; MSFLOG, 2016; SCCMSF, 2016).

Delayed commitment/production postponement: It is possible to make concessions among clients and projects in the procurement centers, to benefit other organizations or divisions (MSFLOG, 2016; SCCMSF, 2016).

Demand pooling: In order to get better prices and make negotiations more efficient, teaming up and engaging in a pool procurement process with other organizations is an often used method (e.g. endTB initiative where MSF Logistique teamed up with UNITAID and Partners in Health (PIH) (MSF Logistique, 2015; MSFLOG, 2016)). Pool-Procurement between procurement centers is also done; e.g. MSF Logistique together with MSF Supply or APU in Holland - so MSF Logistique does the negotiation and the procurement for all the sections (MSFLOG, 2016).

Inventory management: Is a very important process at the MSF warehouses / procurement centers (MSFLOG, 2016).

Alternate distribution channels: Different options are possible – air, ship, land etc. depending on what the delivery time may be. Also, different private operators or other humanitarian organizations can be used (HCMSF, 2016; MSFLOG, 2016; SCCMSF, 2016).

Fast re-routing of requirements: It is possible to make concessions among clients and projects in the procurement centers (HCMSF, 2016; SCCMSF, 2016).

Flexibility in Sourcing

Product platforms: Kit strategy (HCMSF, 2016; MSFLOG, 2016; SCCMSF, 2016)

Product modularity: Kit Strategy (HCMSF, 2016; MSFLOG, 2016; SCCMSF, 2016)

Multiple pathways: Supply out of warehouse, from the private sector, goods donations or from other MSF missions or other humanitarian organizations. Procurement guidelines for every country exists – there the accountabilities are also stated (who can make decisions until which money limit,…) (HCMSF, 2016; MSFLOG, 2016; SCCMSF, 2016).

Supply contract flexibility: Framework agreements are used (MSFLOG, 2016; SCCMSF, 2016).

Alternate suppliers: For each product they have a panel of suppliers; those suppliers are ranked by criteria such as quality, cost or lead-time. Therefore, when something happens one can choose from this panel. It is tried to have at least three suppliers for every item. When in a country local suppliers are being assessed for their appropriateness of sourcing, this information is stated in the Emergency Preparedness Plan (HCMSF, 2016; SCCMSF, 2016).

Market Position

Brand equity: Many missions in highly dangerous regions, e.g. during the recent Ebola crisis, and their enforced transparency made MSF one of the most well-known humanitarian organizations and therefore a strong brand. Beside many other benefits, this cognition ensures credibility with governments, donors and the private sector (HCMSF, 2016).

Customer loyalty: As stated before their brand name ensures a certain customer loyalty (HCMSF, 2016; SCCMSF, 2016).

Product differentiation: MSF provides different types of aid (emergency and development) and also does a lot of research. Their money income is based on project money and donations (HCMSF, 2016; SCCMSF, 2016).

Customer relationship: As MSF is a non-profit organization and depends vastly on private donations, one of their major concerns is to ensure the donors of their trustworthiness. Therefore, they make their procedures and money flows transparent to the public (e.g. financial or project reports on their website) to assure them that their money is spent well (HCMSF, 2016; SCCMSF, 2016).

Customer communication: Transparency of information is very important, as donors want to know where their money is going. Therefore, reports and other documents are regularly published online and in magazines (HCMSF, 2016; SCCMSF, 2016).

Organization

One of the major factors of MSF's successful work is the motivation of their employees. According to the interviewees, people who work for MSF show a high level of motivation. The interviewees attributed this behavior to the well-considered choice when entering the humanitarian sector, where wages are not high and the work is extremely hard. Furthermore, the immediate feedback is crucial and keeps the motivation of the employees on a high level. Consequently, this motivation and the strong identification with the organizations mission leads to a very collaborative environment, where knowledge is shared, help is willingly offered and people are ready to "go the extra mile" to achieve their goal (HCMSF, 2016; MSFLOG, 2016; SCCMSF, 2016).

Creative problem solving: Employees are deeply encouraged to be innovative and find new ways on how to solve problems (HCMSF, 2016; SCCMSF, 2016). App was developed which can diagnose pneumonia just by analyzing the sound of a person's cough (HCMSF, 2016).

Accountability and empowerment: People are trained to understand how important certain things (like having correct data are). Through several guidelines processes are not only standardized, but also responsibilities and eligibilities of persons (e.g. who is allowed to purchase products until what amount of money) are made known to the project teams. Generally speaking, MSF has a reputation to be very self-critical (HCMSF, 2016; SCCMSF, 2016).

Diversity of skills: MSF provides different training modules, which can either be taken online or as a few days' courses. To make sure that important knowledge is passed on, it is a credo of MSF to have at least 40% of first mission employees in every project. Thus, they will receive support from more experienced colleagues and important knowledge will spread faster through the whole organization. To comply with their maxim of providing high quality aid, a new employee is required to have a minimum of three years' work experience in his/her profession. As MSF is not the place to learn the basic skills, but where to apply them (HCMSF, 2016; SCCMSF, 2016).

Learning and caring: The high motivation and the strong identification with the organizations mission leads to a very collaborative environment, where knowledge is shared, help is willingly offered and people are ready to "go the extra mile" to achieve their goal. Employees are permanently pushed to the limit – but great support from colleagues and operations desk (OCs) (HCMSF, 2016; MSFLOG, 2016; SCCMSF, 2016)

Product Stewardship

Resource conservation: Sustainability issues are gradually taken into account by MSF. Energy consumption shall be decreased by focusing on environmental friendly solutions. Reverse SCM exists sometimes – often things are donated to other humanitarian organizations on-site. The criteria of sustainable production processes, when deciding on suppliers for the organization, will be included soon (HCMSF, 2016; SCCMSF, 2016).

Auditing and monitoring: To make sure that no problems with delivered goods will arise, MSF has set a priority to deliver high quality medical care. This entails strict regulations for suppliers and the entire delivery process, which makes procurement more difficult, but benefits the end user (MSFLOG, 2016; SCCMSF, 2016).

Supplier management: There are strict regulations for supplier and the entire delivery process (MSFLOG, 2016; SCCMSF, 2016).

Recovery

Ability to quickly mobilize resources: MSF has installed an international emergency response team that consists of approximately 200 experts worldwide. They have years of experience in disaster management and can be sent to any disaster location within 24h. Upon arrival, they immediately start with a situation assessment and the emergency response (HCMSF, 2016; SCCMSF, 2016). Furthermore, to be able to supply a disaster response quickly and support the emergency response team all the warehouses have emergency stocks, which can be readily distributed (MSFLOG, 2016; SCCMSF, 2016). The ready to be dispatched kits allow for a fast response (HCMSF, 2016; MSFLOG, 2016; SCCMSF, 2016).

Communicate the recovery strategy: Emergency Teams (ETs) are in constant contact with their OC and report their findings, so the OC can map the progress of the response. Once the field team takes over, it is also in close contact with the respective OC - the OCs manage a mission from above and field teams act (HCMSF, 2016; SCCMSF, 2016).

Manage the crises: Is managed by the different OCs, their field teams and the ET. Also, the operators from MSF Logistique are in contact with the OC or the coordinator of the field; people from freight are in direct contact with people from the field, usually concerning customs issues – so that the information comes fast to the right point (HCMSF, 2016; MSFLOG, 2016; SCCMSF, 2016).

Mitigate the consequences of the disruption: Through information campaigns, contact with governments and development aid projects it is tried to mitigate the consequences of the next disruption (HCMSF, 2016; SCCMSF, 2016).

Security

Layered defense: Active security - guards (without arms) and protection of material (physical); passive security - try to stay on good terms with parties – tell them that you are not part of any government, usually best protection – context analysis (HCMSF, 2016; SCCMSF, 2016)

Access restrictions: Internal network are secured by passwords and firewalls. Guards (without arms) are installed, for the protection of stock or other important things (HCMSF, 2016; SCCMSF, 2016).

Employee involvement: There exist several guidelines and protocols which state the basic behavior rules when in a foreign country or how to handle aid material and different trainings are provided (HCMSF, 2016; SCCMSF, 2016).

Collaboration with governments: To ensure the safety of their supplies and people, MSF relies heavily on a good relationship with all parties involved. The circumstance that MSF is not part of any government usually helps the endeavor in some countries a lot, as this avoids any subliminal political issues between the funding countries government and the one where the response is in. If no agreement can be reached with the different parties in the affected region, MSF will not start a project (HCMSF, 2016; SCCMSF, 2016).

Cyber-security: They have passwords and firewalls (HCMSF, 2016; SCCMSF, 2016).

Personnel security: There exist several guidelines and protocols which state the basic behavior rules when in a foreign country or how to handle aid material. Also, scenarios for different course of actions are developed, to be prepared in the case of anything happening (HCMSF, 2016; SCCMSF, 2016). But as can be seen by recent tragedies (bombing of a MSF hospital in Kunduz, Syria (MSF, 2015)), those precautions cannot always ensure the safety of employees or goods.

Visibility

Information technology: There exists an online portal for procurement at supply centers and a tracking tool for the goods, which is accessible via the procurement center websites (MSF Logistique). The local IT systems are not based on sophisticated software and usually the management of logistics is done via access or excel database (HCMSF, 2016; MSFLOG, 2016; SCCMSF, 2016).

Knowledge of asset status: The OCs track the progress of their missions and are in contact with their field teams. Also, the operators from MSF Logistique are in contact with the OC or the coordinator of the field; people from freight are in direct contact with people from the field, usually concerning customs issues – so that the information reaches their receiving point fast. The supply centers know the status of their warehouses and there is a tracking tool of goods, which is accessible via the website (HCMSF, 2016; MSFLOG, 2016; SCCMSF, 2016).

Information exchange: Information is exchanged with other humanitarian organizations and within the MSF network. The information exchange between OCs is hardly existent and is the focus of a new project (HCMSF, 2016; SCCMSF, 2016).

7.3.7   Results

MSF often collaborates closely with other humanitarian organizations, if it seen as beneficial to them. For example, co-sourcing of logistics service providers is done to save money when delivering goods or flying people to an area. Although MSF is not an official member of the cluster approach they frequently join it actively or at least come to the meetings.

Warehouses are still very important for MSF. They have three large procurement centers located in Europe (with subdivisions in Dubai) which supply their missions. Therefore, a global sourcing strategy is pre-vailing. This is something which sets them apart from the other interviewed organizations.

They also rely on kits when delivering goods, this strategy simplifies and fastens their response, as they are highly preconfigured and therefore one knows that nothing will be forgotten if such kits are ordered for respective emergencies (e.g. Cholera kit for a Cholera crisis). As many products of MSF are medical items regulations and restrictions are strict when handling them. In general, the want to avoid certain supply chain disruptions due to products not meeting standards by putting a focus on delivering only quality goods.

There is a strong alignment of personal organizational values and goals. According to the interviewees the high motivation of the employees, which results in an enhanced performing willingness, is triggered by the very conscious decision to work for MSF. As MSF is known for being very self-conscious and keen on being independent and improving processes, lessons learned reports are seen as very important for organizational growth.

IT usage - especially in the field- is limited, most things are done via emails or Microsoft office software. Besides their lack of IT software, they have a huge interest in research and are active in many academic collaborations.

As they almost exclusively rely on private donations transparency and marketing are very important issues for them. Therefore, lots of reports and other documents are made available for the public through their homepage.

7.4 Use Case International Organization for Migration

Figure 7-8: IOM logo (IOM Tanzania, 2017)

7.4.1 Introduction

The International Organization for Migration (IOM) is the leading intergovernmental organization in the field of migration. It works closely together with governmental, intergovernmental and non-governmental partners all around the world.

IOM's main focus lies on the orderly and humane management of migration. This is done by promoting international cooperation on migration issues, to help the affected nations in the search for practical solutions to migration problems and to provide humanitarian assistance to refugees and internally displaced people (IDP).

IOM comprises 166 member states and offices in over 100 countries (IOM, 2017a).

7.4.2 Facts and Figures

Motto (IOM, 2017a): Managing Migration for the Benefit of All

Operations Budget (IOM, 2017a): $1.4 billion

Number of local offices (IOM, 2016): 400+

Staff number (IOM, 2017a): 9,000

Countries active (IOM, 2017a): over 150

People assisted (IOM, 2016): nearly 20 million per year

IOM is the leader of the Global Camp Coordination and Camp Management (CCCM) Cluster for Natural Disasters (IOM, 2017a).

7.4.3   History

The Provisional Intergovernmental Committee for the Movement of Migrants from Europe (PICMME), the former name of IOM, was established in 1951 in the chaos and the huge displacement of Western Europe from the Second World War. Its mandate was to find resettlement for the approximately 11 million people which had been forced to leave their homes behind. For almost a million migrants transportation was arranged during the 1950s.

After being renamed several times through the following decades it came to its today's name of International Organization for Migration (IOM) in 1989.

Nowadays the focus of the organization has broadened from purely operational logistics at its beginning to the objective of understanding migration issues, encouraging social and economic development through migration and the effort of trying to uphold the human dignity and well-being of migrants.

In 2016 IOM officially joined the UN as their 'UN Migration Agency' and therefore, the already close collaboration will deepen further (IOM, 2017a).

7.4.4   Interview Partners

Global CCCM Civil Protection Specialist, Global Mass Evacuation Coordinator; experience: 18 years of experience in humanitarian sector (2 years with IOM); code: GCPS

Shelter Support Officer / Shelter Coordination Focal Point for Nepal; experience: 1 year with IOM; code: SCFP

A literature review of publications by and concerning IOM was used as triangulation of the interviews.

7.4.5   Capabilities

Adaptability

Re-routing of requirements: IOM has strategic partnerships and framework agreements with partners which allow the re-routing of requirements on short notice (GCPS, 2016; SCFP, 2016).

Strategic Gaming and Simulation: There are different types of trainings either internal of IOM or for a certain focus group, like the CCCM trainings (GCPS, 2016; SCFP, 2016). Also, IOM participates in exercises like the TRIPLEX which includes over 30 humanitarian organizations (GCPS, 2016).

Alternate technology development: Drones are being used to surveillance refugee camps. Research on the predominant topics such as migration causes and social issues is conducted (GCPS, 2016; IOM, 2017a).

Lead Time Reduction: Framework agreements and collaboration with other HOs to be able to deliver fast (GCPS, 2016; SCFP, 2016).

Learning from Experience: Is not of overarching importance yet. Best-practice reports and project reports are published of big projects (GCPS, 2016; SCFP, 2016).

Anticipation

Demand forecasting: When in a country IOM develops scenarios of possible developments. Those scenarios provide the baseline data for demand forecasts (GCPS, 2016; SCFP, 2016).

Risk Identification and prioritization: In many risk prone countries IOM trains the civil population (mostly members of the government) on how to manage a refugee camp, how to deal with IDPs or similar things, so that those people can help when a crisis occurs. Risk identification and prioritization are done based on certain attributes, like level of affectedness by the disaster, altitude of area,… (GCPS, 2016)

Monitoring and communicating deviations and "near misses": The Preparedness and Response Division of Department of Operations and Emergencies is tasked with that (IOM, 2017a).

Recognition of early warning signals: Preparedness and Response Division of Department of Operations and Emergencies: undertakes the collection and analysis of information, conducts contingency planning and acts as IOM's early warning service for humanitarian crises. It also undertakes rapid needs assessments and assists in the development of response operations, including strategic planning, capacity-building, staff surge support, the emergency roster and the mobilization of stand-by partners (IOM, 2017a).

Contingency planning and preparedness: Often capacity building and preparedness activities cannot be done, due to insufficient funding. IOM operates in countries for a very long time, therefore they know the respective culture and processes and usually have good relationships with the government and local supplier, which facilitate a fast response when a disaster strikes. Scenarios of possible developments are created, which function as contingency plans. Looking at customs issues, IOM tries to meet up with the customs official of the country they are working in and discuss the steps which have to be taken, once a disaster will strike. There also exist official agreements with about 60 countries, where the customs issues are already pre-arranged. In some areas "Community Disaster Plans" are created and handed out to the population. These plans are basically contingency plans for the population, stating what to do, if something happens (GCPS, 2016; SCFP, 2016).

Preparedness and Response Division of Department of Operations and Emergencies: undertakes the collection and analysis of information, conducts contingency planning and acts as IOM's early warning service for humanitarian crises. It also undertakes rapid needs assessments and assists in the development of response operations, including strategic planning, capacity-building, staff surge support, the emergency roster and the mobilization of stand-by partners. Transition and Recovery Division's (TRD) work complements IOM's Preparedness and Response Division (PRD), to ensure the continuity of humanitarian interventions and an effective, sustainable transition to recovery and development in a range of crisis contexts and technical areas. TRD also works closely with national and international counterparts in efforts to re-build, mitigate conflict, build resilience to shocks, and minimize risks of future crises, ultimately contributing to the prevention of further forced displacement, the promotion of durable solutions, and providing the foundation for sustainable development (IOM, 2017a).

Capacity

Reserve capacity: As IOM is only project funded they do not have the money to fund a permanent warehouse. In a project they may have small warehouses which store the needed

products. But IOM has contracts with UN organizations so that a certain part of their stock in a warehouse belongs to IOM (GCPS, 2016).

Redundant capacity: Redundancy of mission-critical parts is seen as very important (GCPS, 2016; SCFP, 2016).

Collaboration

IOM collaborates with many humanitarian organizations, such as the IFRC, the log cluster, the WFP, UNHCR..., e.g. in Gorkha (Nepal) IOM worked closely together with WFP. IOM stored their stock in WFPs warehouse and used the log cluster services and the helicopter services. Because of IOMs good collaboration with the government and local suppliers, it was possible for them to procure things in Nepal, which other humanitarian organizations could only get from abroad. Through the cluster IOM cooperates with many humanitarian organizations. There information is shared and working areas are defined. IOM also used the information gathered there to help other organizations with procurement problems and procured for them. The other organizations distributed those items. The international humanitarian partnership usually helps IOM with the logistics when organizing long-term camps. Important for the collaboration is that every organization gets its own sticker on the relief items, so that it is clear who those items belonged to. For example, when IOM procured for the other organizations in Nepal, there was not only IOMs sticker on it but those of the donors and of the distributing organization (GCPS, 2016; SCFP, 2016).

Collaborative forecasting: There is a collaboration with other humanitarian organizations, such as UNDAC, IFRC or UNHCR. Especially it is tried to clarify what and how much every organization can contribute (GCPS, 2016; SCFP, 2016).

Transparency of information: Through the cluster information is shared (GCPS, 2016; SCFP, 2016). IOM is the cluster lead of the shelter cluster in natural disasters (UNHCR in man-made disasters) (IOM, 2017a). IOM sometimes is one of the only organizations which stays in a country after an "immediate evacuation" rating by the UNDSS (UN Department of Safety and Security). Therefore, it is a huge source of information for others (GCPS, 2016). The Global Disaster Alert and Coordination System (GDACS) is a source of information to many humanitarian organizations, including IOM (IOM, 2017a).

Postponement of orders: Can be done when stock is re-allocated to another organization, because it is needed for an emergency. There also exists the so-called white stock in the humanitarian depots, which does not yet belong to any organization. If the need arises, the organization can purchase this white stock and get it delivered to affected area fast (GCPS, 2016; SCFP, 2016).

Shared product life cycle management: Projects are done with other organizations as well. Where a certain planning has to be done together. Also, IOM works on a basis of a MoU with partners, where for example IOM takes over the procurement part and the partners are responsible for the distribution (GCPS, 2016; SCFP, 2016).

Risk sharing: As projects are shared also part of the risk is shared (GCPS, 2016; SCFP, 2016).

Dispersion

Human workforce dispersion: IOM is highly decentralized, as it is made up of many local offices (about 7.000 employees worldwide) and only a rather small headquarters in Geneva (approx. 300 employees). Therefore, in most countries IOM has already people on-site to react fast (GCPS, 2016; IOM, 2017a; SCFP, 2016). Since September 21, 2016 IOM is part of the UN (GCPS, 2016; IOM, 2017a).

Leadership dispersion: IOM has a highly decentralized structure. There are different hierarchy levels installed when responding to a disaster. There is a chief of mission, whose responsibility is the overall coordination of the project, division heads for certain districts of a country, then area coordinators in that districts which cover a certain area each and then the areas were covered by local teams (hubs). Those hubs reported their needs to headquarters (usually in capital) and there the hub-allocation decisions were made, including the procurement and transportation arrangements (GCPS, 2016; SCFP, 2016). Example Nepal: The IOM teams of an area forward their demand to headquarters in the Kathmandu. The capital office would take care of the further on arrangements of procurement and transport (SCFP, 2016). Through the cluster structure there exists also a certain leadership dispersion, although the cluster can only advise organizations to do something and not order them (GCPS, 2016; SCFP, 2016).

Market dispersion: IOMs mandate is focused on helping refugees, as in literally every crisis and disaster refugees have to be dealt with, IOM is active basically all the time. They are project funded and since recently member of the UN (GCPS, 2016; IOM, 2017a; SCFP, 2016).

Efficiency

Labor, production, asset utilization: It is tried to keep the bureaucracy to a minimum. The overhead is usually only about 7% per operation (GCPS, 2016).

Waste elimination: Through the cluster it is tried to minimize doubled efforts. Some things are already pre-arranged with partners/ governments. Contingency plans to eliminate wasted time when a disaster strikes are created (GCPS, 2016; IOM, 2017a).

Production variability reduction: Kit strategy (GCPS, 2016; SCFP, 2016)

Financial Strength

Financial reserves and liquidity: Internal emergency funds exists (e.g. Migration Emergency Funding Mechanism, Rapid Response Fund) and IOM is also eligible to receive from external emergency funds like the UN Central Emergency Response Fund (GCPS, 2016; IOM, 2017a).

Portfolio diversification: Direct donations and project funds (GCPS, 2016; SCFP, 2016).

Flexibility in Order Fulfillment

Multi-sourcing: It is preferred to do the procurement locally, if that is not possible, it is done regionally or globally. IOM can buy white stock from certain warehouses. Some stocks in warehouses (UN humanitarian depots) belong to IOM. Sometimes IOM outsources the distribution part and just procures (GCPS, 2016; SCFP, 2016).

Delayed commitment/production postponement: Through the white stock the labeling of items is postponed until a humanitarian organization actually needs the stock and buys and labels it (GCPS, 2016; SCFP, 2016).

Inventory management: In general, as IOM is mostly financed on a project base they do not own big warehouses. Small ones can be established during an operation. Their inventory management is done in a rough way (GCPS, 2016; SCFP, 2016).

Alternate distribution channels: Several options: either IOM is doing it by itself, or it outsources it to another organization or the logistics cluster is asked for support (GCPS, 2016; SCFP, 2016).

Fast re-routing of requirements: As IOM usually is on good terms with local suppliers, it is possible to re-route things, since the lead times are shorter than when delivering globally (GCPS, 2016; SCFP, 2016).

Flexibility in Sourcing

Product platforms: They use standardized kits (GCPS, 2016; SCFP, 2016).

Product modularity: Kit system (GCPS, 2016; SCFP, 2016)

Multiple pathways: The items for the first response are usually either bought from other humanitarian organizations or from Humanitarian Response Depots. Then it is tried to switch to local or regional suppliers. IOM tries to be on good terms with local suppliers and procures mainly from them, therefore the re-routing of things is easier, since the lead times are shorter than when delivering globally. Through partnerships with other humanitarian organizations IOM can procure items as well. Especially in cooperation with WFP and the logistics cluster. Also, IOM receives donations, which they distribute (GCPS, 2016; SCFP, 2016).

Supply contract flexibility: There exist framework agreements with different suppliers. They also have lists were possible suppliers are listed, this list includes tenders which are ready to be purchased anytime. The white stocks offer a certain flexibility, since things can be purchased on demand (GCPS, 2016; SCFP, 2016).

Alternate suppliers: They rely on different suppliers, with whom they try to foster good relationships, so that they can rely on those in case of an emergency. Usually framework agreements exist with those. IOM procures from other humanitarian organization and if it is not politically problematic, also stocks from the army can be used (GCPS, 2016; SCFP, 2016).

Market Position

Brand equity: In countries where disasters occur frequently (like the Philippines) IOM is well-known, as it interacts a lot with the public. In Europe they have been known since the refugee crisis. The visibility of the own brand name in a disaster area is very important, therefore whenever IOM is active in an area all aid material is labeled with their sticker (GCPS, 2016).

Customer loyalty: They are funded on a project basis and from governmental funds. Through their small overhead their offers are appealing for donors (GCPS, 2016).

Customer relationship: In countries where disasters occur often (like the Philippines) IOM is well-known, as it interacts a lot with the public. In other countries hardly, e.g. in Europe have only been known since the refugee crisis in 2015 (GCPS, 2016). They want to keep their

processes transparent, therefore they publish lots of reports and other information on their homepage (GCPS, 2016; IOM, 2017a).

Customer communication: Lots of reports are published on the homepage (GCPS, 2016; IOM, 2017a).

Organization

Employees are highly committed. Everyone is striving towards the goals and vision of the organization (GCPS, 2016; SCFP, 2016). "*Working with IOM makes you more committed, as you are working with locals who have the knowledge of the culture and the country. Overall there is a really good working atmosphere, IOM staff of different sectors is so keen on wanting to help and make sure that the response is as good as possible*" (SCFP, 2016).

Getting the feedback directly from people helps a lot in keeping the motivation high of employees. Because of that high motivation it is possible to overcome other process weaknesses (such as a missing standardized project management). Nevertheless, employees get frustrated when a problem arises which cannot be solved by them (e.g. Nepal Fuel Crisis) (GCPS, 2016; SCFP, 2016).

Creative problem solving: Being flexible is one of the most important character trades when working in the humanitarian field, also mentioned in nearly every job description. Employees are often faced with difficult problems, which have to be solved under time pressure. Through mixture of teams (international 15% and national staff 85%) processes are scrutinized and possibly adapted. Usage of UAVs, especially in emergency response and camp management (GCPS, 2016; SCFP, 2016).

Accountability and empowerment: Through missing guidance and management, people often can define their role very freely. Problem that a lot of responsibility is shifted to the employees (GCPS, 2016; SCFP, 2016).

Diversity of skills: People are hired on a project base and often have to take over different jobs as the ones they were hired to as new challenges arise (GCPS, 2016; SCFP, 2016). "*When working in the humanitarian field, you have to be flexible. Because of the high motivation through the humanitarian mindset a lot of things can be overcome*" (SCFP, 2016).

Learning and caring: The employees of IOM help each other (GCPS, 2016; SCFP, 2016).

Product Stewardship

Is not yet an important topic for IOM (GCPS, 2016).

Auditing and monitoring: Due to IOM's Code of Conduct for Suppliers they have to agree to be monitored by IOM (IOM, 2017a).

Supplier management: Vendors should be chosen based on IOM's procurement policy and defined selection criteria (GCPS, 2016; IOM, 2017a). Which is not always possible (GCPS, 2016).

Recovery

Ability to quickly mobilize resources: Because of minimal bureaucracy IOM can react very fast. They often already have an office in the affected country (GCPS, 2016). Within 72h first goods should be in the area of the disaster. There exists an own department for that (Department of Operations and Emergencies - Preparedness and Response Division) (IOM, 2017a)

Communicate the recovery strategy: Statistics and Knowledge Management Unit - responsible for maintaining quality control for IOM operations by providing support for data collection, analysis and evaluation and for the systematic consolidation of knowledge to strengthen IOM's humanitarian response and recovery operations (IOM, 2017a).

Manage the crises: The IOM headquarters (HQ) is the highest ranked office in a country and usually is located in the capital. Division heads and division offices in the countryside manage the crisis there. The HQ manages the logistics and local offices inform them about the demand. The UN-OSOCC and the cluster try to coordinate the response of the different humanitarian organizations (GCPS, 2016; SCFP, 2016).

Mitigate the consequences of the disruption: Transition and Recovery Division (TRD; part of the Department of Operations and Emergencies (DOE)) is responsible for overseeing IOM programs and to assist in reducing and preventing the impacts of a disaster. Also it helps in the recovery from long-term consequences of crises (IOM, 2017a).

Security

Employee involvement: Trainings are provided through the UN Security Management System (SMS) (IOM, 2017b).

Collaboration with governments: Strong collaboration with governments is fostered (GCPS, 2016; SCFP, 2016).

Cyber-security: Password, antiviruses etc. are used (GCPS, 2016; SCFP, 2016). But it is not one of the main focuses of the organization (GCPS, 2016).

Personnel security: Since 1998 IOM has been a member of the UN Security Management System (SMS), therefore, IOM employees are entitled to the same security measures as UN personnel (IOM, 2017b). Sometimes additional guards are hired (GCPS, 2016; SCFP, 2016).

Visibility

Information technology: IOM has an IT system for the whole organization but it is hardly used due to its complexity. Excel sheets are used to exchange logistics data (GCPS, 2016). In Nepal usage of IT system (database) which was programmed by an IOM employee (SCFP, 2016). The VOSOCC is also used (GCPS, 2016; SCFP, 2016).

Knowledge of asset status: The Statistics and Knowledge Management Unit is responsible for maintaining quality control for IOM operations by providing support for data collection, analysis and evaluation and for the systematic consolidation of knowledge (IOM, 2017a). As IOM is a much-decentralized organization, the knowledge of assets is often only due to being onsite.

Information exchange: The information exchange is done through the cluster, the internet, their network, the VOSOCC (GCPS, 2016; SCFP, 2016).

7.4.6 Results

The supply chain of IOM is highly based on relationship building and collaboration. As IOM cannot maintain big warehouses due to only project funding, they are in need of good framework agreements and relationships, so that they still can procure fast. IOM offices in countries are usually permanent locations, which means that they already know the local or regional governments and authorities.

The usage of IT infrastructure is very limited and an ERP software for the whole organization does not exist. The area of product stewardship is not of real importance yet, despite the effort of trying to procure locally or regionally first, which also is a goal for them, since it is usually cheaper and easier to manage. Also, as they mostly rely on project funding they cannot afford to have an own big warehouse, therefore, being on good terms with local and regional suppliers proved as vital for an efficient and fast response.

Their employees were mentioned to be highly motivated, as they see the outcome of their work directly. This motivation leads to creative problem solving and going the last mile, when things get tough.

As IOM has got a very decentralized organization, accountabilities are sometimes not clearly defined.

Although the lessons learned process is done, many times nothing is changed afterwards. When procuring they rely on kits. For a fast response they are also part of the UNDAC team and have an own department which deals with the recovery of a disaster.

Generally speaking, it was perceived that supply chain management and logistics is not a core concern for IOM (yet). Nevertheless, they are the co-leader of the shelter cluster.

7.5 Use Case Caritas Internationalis

Figure 7-9: Caritas logo **(Caritas, 2017)**

7.5.1 Introduction

Caritas Internationalis is the humanitarian assistance branch of the Catholic Church. It consists of national Caritas organizations who are members of their own regional Caritas networks and the international confederation. The size of those ranges from small groups of volunteers to some of the world's largest humanitarian and development organizations, such as the Catholic Relief Services (CRS) in the USA or Caritas International in Germany. The headquarters of Caritas Internationalis is in Rome, from where it is coordinating emergency operations, formulating development policy and doing advocacy work for a better world.

Their main area of work is humanitarian assistance in the fields of conflicts and disasters, food, health, migration and development (Caritas, 2017).

7.5.2 Facts and Figures

Motto (Caritas, 2017): Toward a civilization of love

Operations Budget: > € 1 billion (CRS budget alone was over € 782 million in 2016 (CRS, 2017a) see section 2.9.1.1)

Staff (incl. volunteers) number (Caritas, 2017): > 1 million

Member organizations (Caritas, 2017): 165

Countries active (Caritas, 2017): over 200

People assisted (Caritas International, 2017): over 60 million people each year

7.5.3 History

In 1897, the first official Caritas agency was founded in Germany, already looking back on a century-old history of the Catholic Church working alongside the poor. Especially the Second World War gave a boost to the establishment of further Caritas agencies all over North America and Europe, as the need for national Catholic humanitarian organizations was distinctly perceived.

In 1951, the International Caritas Conference was established in Rome and is henceforth described by the Catholic Church as their official voice in the area of charity work. Three years later the name was changed to Caritas Internationalis to adhere to the geographical distribution of its member Caritas agencies on all continents.

Nowadays the Caritas has 165 members and is active in almost every country of the world (Caritas, 2017).

7.5.4 Interview Partners

Emergency Response Officer (Caritas Austria); experience: > 10 years (Humanitarian area); code: CARAUT

Coordinator Humanitarian Assistance (Caritas International Germany); experience: > 10 years (Humanitarian area); code: CARGER

A literature review of publications by and concerning Caritas was used as triangulation of the interviews.

7.5.5 Capabilities

Adaptability

Strategic Gaming and Simulation: Training with partners are done in countries where disasters happen on a more or less regular basis, e.g. Philippines or Indonesia (CARAUT, 2016; CARGER, 2016).

Alternate technology development: Research on the predominant topics such as migration causes and social issues is conducted (Caritas, 2017; Caritas International Germany, 2017).

Lead Time Reduction: Through framework agreements and strategic partnerships (CARAUT, 2016; CARGER, 2016).

Learning from Experience: Caritas is actively promoting a 'lessons learned' process. After a mission the crisis staff and the mission itself is evaluated, what did work, what didn't work, what can be learned from that and what instruments should be developed further (CARAUT, 2016; CARGER, 2016). Furthermore, there is a yearly global conference where every expat of Caritas International participates and where lessons learned are discussed. It is a concern to Caritas that it is developing, internally and externally through the network, so it actively includes the network for further inputs (CARGER, 2016). Also, in the country working groups a 'lessons learned' process exists. All in all, the lessons learned process is done on different levels (CARAUT, 2016; CARGER, 2016).

Anticipation

Demand forecasting: For some missions there already exist case scenarios and corresponding forecasts. This is usually done for recurring disasters of certain regions (typhoon season in Asia-Pacific Region). But there is no fixed annual plan, many things are based on experience and on handling methods which worked out. Of course, there are also ad-hoc missions. There is a disaster management operations chart which states the internal processes when handling a disaster, the responsibilities, etc. (CARAUT, 2016; CARGER, 2016).

Risk Identification and prioritization: Some things do have more or less seasonal recurring, therefore a certain risk identification can be done. This is mostly done based on experience or

using external tools. Caritas always demands a security when doing a project, in which different scenarios for certain dangerous events are defined (CARAUT, 2016; CARGER, 2016).

Monitoring and communicating deviations and "near misses": No own risk management systems have been employed, due to a lack of resources and capacity. Many exist on the market which can be used (CARGER, 2016).

Recognition of early warning signals: Through experience and information available on the internet or through partners early warning signals are detected (CARAUT, 2016; CARGER, 2016).

Contingency planning and preparedness: In certain risk-prone countries exist plans how to react to a disaster. A very important role here plays the good relationship with local partners. Those are also trained in certain partner trainings. From experience certain seasons are known for disasters (typhoons) so things can be prepared in advance (CARAUT, 2016; CARGER, 2016).

"*Every dollar spent reducing people's vulnerability to disaster saves around seven dollars in economic losses*" (UNDP, 2012). Based on that principle many projects all around the world are done to increase the resilience of the population. After the Haiti earthquake in many towns evacuation plans were created, houses were rebuilt more robust and refugee shelter was built. When the typhoon in 2016 hit Haiti hundreds of people could be brought to save spaces by that measures. Usually those process plans are not formalized, they are based on experience (CARGER, 2016).

Capacity

Reserve capacity: Caritas does not own big storage facilities around the globe where aid material is on stock. They have at most small storage facilities in the areas of their projects (CARAUT, 2016; CARGER, 2016; Caritas, 2017).

Redundant capacity: Redundancy of mission-critical parts is seen as very important (CARAUT, 2016; CARGER, 2016).

Collaboration

Often it is not possible for one organization alone to charter a plane, but when teaming up with others they get the critical mass of aid material to make the charter worthwhile. This kind of collaboration exists with the Diakoniekatastrophenhilfe (emergency branch of the Diakonie), with whom the Caritas International works closely together. Besides the Diakonie and the international Caritas network a preferred partner is the Malteser International organization (CARGER, 2016). With other humanitarian organizations the cooperation, e.g. when chartering a flight, is done on a very pragmatic "*if it is for the mutual benefit in the right situation then yes*" (CARGER, 2016) approach. Also, a cooperation with other humanitarian organizations is done when official appeals have to be made, as the power of the Caritas and the Austrian Red Cross is bigger than the one of the organizations alone. In Austria a platform of humanitarian help exists through which a regular information exchange with other humanitarian organization is done. The "Globale Verantwortung" Association fosters further cooperation between aid organizations (MSF, Austrian RC, Caritas,…) (CARAUT, 2016)

The cooperation with the military is difficult, as Caritas wants to stay independent and neutral. If a situation arises in which the humanitarian aid could not be delivered by the humanitarian organizations, Caritas will take a pragmatic decision (CARAUT, 2016; CARGER, 2016).

Caritas is usually joining the Cluster system, when it is installed in an area. Normally they are part of the shelter cluster. If no customs waiver has been issued, UN OCHA negotiates with the country on behalf of the humanitarian aid agencies (CARAUT, 2016; CARGER, 2016).

Collaborative forecasting: Through collaboration with the IFRC, data of the UN and other partners' forecasts can be made. Data from the affected government normally needs to be triangulated because it sometimes is misleading (CARGER, 2016).

Transparency of information: Caritas distributes the information in the network. Besides getting information by the UN, the media and the network, Caritas International makes inquiries from contacts on-site about the current situation. Also, information is exchanged with other humanitarian organizations. In the cluster meetings information and status updates are exchanged. Baseline data of different countries are made available through other humanitarian organizations. The lessons learned of different Caritas organizations are shared within the network (CARAUT, 2016; CARGER, 2016).

Postponement of orders: Often one organization alone would not be able to charter a plane, but when teaming up with others they get the critical mass of aid material to make the charter worthwhile. Another positive aspect is the control over the whole plane, which simplifies negotiations for landing permission among other things (CARAUT, 2016; CARGER, 2016).

Shared product life cycle management: The different Caritas country associations team up with each other, as the network together is stronger and the capability of acting increases. Caritas International is the only European Caritas partner which owns a logistic unit (CARAUT, 2016; CARGER, 2016). If other Caritas country organizations need help by it, the Caritas International is very willing to use synergies. For example, sometimes the German government donates aid goods to Caritas international, often these capacities are then offered to other Caritas branches. This is done as different Caritas branches have different accesses to local authorities or regions of a country, and therefore, take over the distribution in a certain part of the affected country. The Caritas partner only has to pay for the distribution costs in that case and not the product costs, as those are covered by the German government (CARGER, 2016). Also, the Caritas International may procure for other Caritas Partners like Caritas Austria, in that case the Austrians have to reimburse the Germans for their expenses (CARAUT, 2016; CARGER, 2016). The collaboration with the commercial world mainly focuses on procurement and transport. But right now, a new project lead by the "Auswärtiges Amt: Referat für humanitäre Hilfe" is focusing on synergies between humanitarian and commercial organizations. Sometimes commercial companies such as Lufthansa or DHL offer a certain freight capacity on their planes for free to aid organizations (CARGER, 2016).

Risk sharing: Caritas teams up with the other Caritas member organizations which are in the affected area. Caritas is usually joining the Cluster system, when it is installed in an area. Normally they are part of the shelter cluster. If different Caritas organizations are in the affected areas, it is usually coordinated in a way that only one representative of the network is present at the meeting and then distributes the information in the country group working meeting and the things are coordinated (CARAUT, 2016; CARGER, 2016).

Dispersion

Human workforce dispersion: The Caritas network is very decentralized and has 165 member organizations, which are active in 200 countries (Caritas, 2017). These country offices act like a worldwide network and can help faster. Especially in the EU it is very easy to enroll people from other EU country offices. In other places of the world it is sometimes easier to let the local Caritas organization hire somebody and then pay them their expenses. When a disaster strikes different Caritas country offices send people on-site, once there they act as a network and therefore join assignments. Through the cluster the workforces of many humanitarian organizations are joint in their relief effort and duplication of work is tried to be avoided (CARAUT, 2016; CARGER, 2016).

Leadership dispersion: As the Catholic Church and the Caritas is spread all over the world, different people might assume the leadership. Onsite there are coordination meetings held within the Caritas network (CARAUT, 2016; CARGER, 2016). Furthermore, there exists an Emergency Response Support Team which is a rapid response mechanism of the Caritas network. It is an interdisciplinary team, which consists of emergency specialists needed for the mission ahead and which supports the local Caritas during the first time of a response (CARAUT, 2016; CARGER, 2016; Caritas, 2017; Caritas International Germany, 2017). The Caritas partners which are from abroad are coordinated by their home offices, operative decisions are taken on-site. During the lessons learned process the different Caritas country offices collaborate and share information (CARAUT, 2016; CARGER, 2016).

Downstream customer dispersion: Caritas is active in many different fields, many of those focused on the country they are residing in (helping the poor, helping the hungry etc.). The emergency branch is only one of those (CARAUT, 2016; CARGER, 2016; Caritas, 2017).

Market dispersion: Caritas is active in many different fields, many of those focused on the country the individual member is residing in (CARAUT, 2016; CARGER, 2016; Caritas, 2017).

Efficiency

Labor, production, asset utilization: Not every Caritas office has their own logistics officer, but those from other local offices do help those who do not have one with their logistics problem (CARAUT, 2016; CARGER, 2016)s.

Waste elimination: Keeping in good contact with important persons, helps save time during emergencies, because one already knows which people to call and how the processes work. (CARAUT, 2016; CARGER, 2016)

Production variability reduction: Caritas uses kits; through those kits the provision of aid material is simplified. One item is found in many kits (CARAUT, 2016; CARGER, 2016).

Failure prevention: A lessons learned review is done after every mission and shown gaps are tried to eradicate, therefore preventing further failures (CARAUT, 2016; CARGER, 2016).

Financial Strength

Financial reserves and liquidity: The different member organizations of Caritas Internationalis have emergency funds (CARAUT, 2016; CARGER, 2016; Caritas, 2017; Caritas International Germany, 2017).

Portfolio diversification: Caritas is active in different fields such as emergency aid, second-hand shops, care for the homeless, care for people with disabilities,… (CARAUT, 2016; CARGER, 2016; Caritas, 2017; Caritas International Germany, 2017).

Flexibility in Order Fulfillment

Multi-sourcing: Caritas has framework agreements with different commercial carriers. Through those stand-by agreements with various aid material distributors and contacts to agencies, which allocate free freight capacity, a fast reaction when a disaster strikes can be guaranteed (CARGER, 2016; Caritas International Germany, 2017). It is perceived as of essential importance to keep in close touch with those contacts (CARGER, 2016).

Demand pooling: As in the European Caritas network nobody besides Caritas International (Germany) has a logistics unit, many of the other Caritas organizations outsource their logistics to them (CARAUT, 2016; CARGER, 2016). They then organize a cost-efficient variant, where sharing of transportation vehicles is frequent (CARGER, 2016).

Inventory management: Caritas usually procures locally and does not have big warehouses (CARAUT, 2016; CARGER, 2016).

Alternate distribution channels: Through their framework agreements different distribution channels can be addressed. In the first time of a crisis, when time is of the utmost importance, usually flights are the preferred measure of transport. Later on, one can switch to slower and cheaper variants. If no streets exist, other possibilities are found to reach to affected population. In Nepal they were reached by foot (CARAUT, 2016; CARGER, 2016).

Flexibility in Sourcing

Product platforms: They pack their goods usually in kits. One item can be used for many kits, this makes the forecasts easier (CARAUT, 2016; CARGER, 2016).

Product modularity: The kits have a modular structure (CARAUT, 2016; CARGER, 2016).

Multiple pathways: First it is tried to procure locally, as this is usually cheaper and certain transportation problems can be avoided (e.g. customs issues). Sometimes they get donations of a transportation vehicle or of aid goods. Also, things like the UNICEF children nutrition is sometimes distributed. Through the Caritas network sometimes things can be procured, especially via the logistics unit of the Germans (CARAUT, 2016; CARGER, 2016).

Supply contract flexibility: They have framework agreements with certain suppliers. In general, they try to keep up a good relationship with their suppliers, so that when something happens they can act fast (CARAUT, 2016; CARGER, 2016).

Alternate suppliers: They have framework agreements with many suppliers (CARAUT, 2016; CARGER, 2016).

Market Position

Brand equity: Caritas is a well-known brand; therefore, many people want to work with them and people are willing to donate to them (CARAUT, 2016; CARGER, 2016). The strong connection with the Catholic Church helps that (CARGER, 2016).

Customer loyalty: As the Caritas also represents the Catholic Church it also represents certain basic philosophies, which for many people make the difference between other aid organizations and the Caritas. Therefore, people tend to keep donating and/or working with them (CARGER, 2016).

Product differentiation: Caritas is active in many different fields, many of those focused on the country the individual member is residing in (CARAUT, 2016; CARGER, 2016; Caritas, 2017; Caritas International Germany, 2017).

Customer relationship: They have their own fundraising department which is specialized on customer relationship and PR (CARAUT, 2016; CARGER, 2016).

Customer communication: They have their own fundraising department which is specialized on customer relationship and PR. Whenever something happens and donations are needed, big TV spots are made (CARAUT, 2016; CARGER, 2016).

Organization

As the Caritas also represents the Catholic Church it also represents certain basic philosophies, which is appealing for many people. The decentralized structure of the organization, the possibility to change to a different local group, where one can work permanently and the same shared values throughout the network are very important things for the employees. Since most of them actually feel part of a global network with the same beliefs. This also directs the spending of money, so that there is a long-lasting benefit for the areas where it is spent. Many employees can identify with that. For the employees the helping part is a huge motivational factor and gives their work meaning. The motivational level was estimated to be very high (CARAUT, 2016; CARGER, 2016).

Creative problem solving: In a mission usually not everything goes according to plan, therefore people have to be flexible and are working in a very problem oriented way (CARAUT, 2016; CARGER, 2016).

Accountability and empowerment: A code of conduct which is known by the employees is the basis for every mission (CARAUT, 2016; CARGER, 2016).

Learning and caring: After every mission a 'lessons learned' process is started, through which optimization potentials are identified (CARAUT, 2016; CARGER, 2016). People who join the Caritas usually share a similar world view, as the Caritas is part of the Catholic Church (CARGER, 2016).

Product Stewardship

Proactive product design: It is tried to foster resilience in affected areas and therefore mitigate the consequences of the next crisis (CARAUT, 2016; CARGER, 2016; Caritas, 2017).

Auditing and monitoring: After every mission a 'lessons learned' process is started, through which optimization potentials are identified (CARAUT, 2016; CARGER, 2016). Suppliers are audited, to prevent corruption (CARGER, 2016; Caritas, 2017).

Recovery

Ability to quickly mobilize resources: There exists an Emergency Response Support Team which is a rapid response mechanism of the Caritas network. It consists of members of the Caritas network which are fast deployable. It is an interdisciplinary team, which consists of emergency specialists needed for the mission ahead and which supports the local Caritas during the first time of a response (CARAUT, 2016; CARGER, 2016; Caritas, 2017). They try to be on-site within 48 hours (realistically 72 hours) (CARAUT, 2016; CARGER, 2016).

Communicate the recovery strategy: Caritas member organizations distribute relevant information in the network. There is also a coordination and information exchange between different branches which are working in a disaster response (CARAUT, 2016; CARGER, 2016).

Manage the crises: The strategic management and the PR strategy is done by the home offices of the respective Caritas branches (CARAUT, 2016; CARGER, 2016). They do not have formalized contingency plans but they act upon experience. Some things nevertheless are formalized, when it comes to behaving when a disaster strikes (CARGER, 2016).

Mitigate the consequences of the disruption: Even before an official crisis is declared, they start preparing for the mission. Especially during typhoon season or similar re-occurring events. The earlier you start, the faster your response, the more lives saved. It is tried to foster resilience in affected areas and therefore mitigate the consequences of the next crisis (CARAUT, 2016; CARGER, 2016).

Security

Employee involvement: As they are having a global network of Caritas offices, there usually is a local office in an affected region. Those people know their way around and help the expats. Before going to a disaster region certain trainings are usually done, which educate people in what to do and how to behave (CARAUT, 2016; CARGER, 2016).

Collaboration with governments: Usually the Caritas is trying to talk with the government beforehand so that the security is guaranteed from a higher level. As a humanitarian mission usually is of benefit to the state it will make sure that their people and their warehouses are safe. If this situation changes, the Caritas will chain their helping approach (draw-back, only air travel for people and goods) (CARAUT, 2016; CARGER, 2016).

Cyber-security: There exist password restrictions and firewalls, and antiviruses are installed (CARAUT, 2016; CARGER, 2016).

Personnel security: When concerning the security of the staff a 'security policy' is employed. It states what things are allowed to do and what things are not allowed to do. Also, Caritas always demands a security plan, in which different scenarios for certain dangerous events are defined. To avoid the risk of accidents the transport policy states that transports can only be made by professional drivers and not by humanitarian personnel. A guideline for security is the UN, if the UN issues an evacuation of their stuff, Caritas will do the same (CARAUT, 2016; CARGER, 2016).

Visibility

Information technology: The IT usage is limited. There is an internal system, where one can access certain data bases (CARAUT, 2016; CARGER, 2016). What interests the HQ of the Caritas

is usually only: where are the people, how many people are there, how many people can they reach with their efforts and how much material is used/ will be needed. Information normally is exchanged via emails, this information is then aggregated into a situational picture, also a protocol of those things is made. Based on those things the logistician gets the requests for goods. Parallel to that it is tried to raise the money for it. There is no digitalized system included, all the things converge at the logistic department (CARGER, 2016).

Knowledge of asset status: The knowledge about the asset status resides with the country offices (CARAUT, 2016; CARGER, 2016).

Information exchange: There is abundant exchange of information within the Caritas network. Through the cluster also information is shared (CARAUT, 2016; CARGER, 2016). With some partners such as the Diakoniehilfswerk a closer relationship exists, therefore an extended exchange of information, reaching to co-planned projects, is done (CARGER, 2016). There are also certain networking events and other initiatives where the partnership with other humanitarian organization is fostered and therefore information exchanged (CARAUT, 2016; CARGER, 2016).

7.5.6   Results

Like IOM the Caritas network is highly decentralized with 165 members. To hold this network together collaboration is of high importance, which is strongly fostered by the Caritas Internationalis umbrella organization. An example for that would be the logistics collaboration in Europe, as only Caritas International (German Caritas) owns a supply chain department. Nevertheless, this also shows that logistics and supply chain management is not yet perceived as a core function in the European network. Additionally to their inter-organizational collaboration they are also well-connected to other humanitarian organizations, such as the Diakoniehilfswerk. There are no huge global Caritas warehouses, but procurement is done as close to the affected region as possible, their decentralized structure helps them through local or regional connections to suppliers.

Their supply chain IT usage is very limited and most things are done manually; therefore, demand forecasts are also based on experiences and not simulations or other digital methods.

The lessons learned process is taken very seriously within the respective country organizations but also exchanged through the network.

Altogether employees are reported to be highly motivated. This is related to the humanitarian work itself, which gives their effort meaning. Furthermore, being part of a worldwide stretching network with the same shared values, the possibilities through that network to work in different countries and the related decentralized structure.

Caritas also owns an Emergency Response Support Team, which allows them to act fast when a disaster happens.

7.6 Use Case Austrian Armed Forces
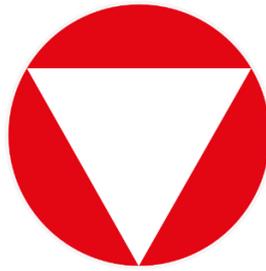
Figure 7-10: Austrian Armed Forces logo **(Ministry of Defense and Sports, 2017)**

7.6.1 Introduction

The Austrian Armed Forces (AAF) form the armed power of the Republic of Austria. Their primary objective is the military defense of Austria. Besides that, other tasks such as defending constitutional institutions, maintaining order and security and providing humanitarian aid in case of natural catastrophes are fulfilled. Since 1955 Austria is a neutral country. Therefore, the AAF only participates in peacekeeping and other humanitarian missions abroad. In times of peace, the Army is made up of professional and military soldiers, conscripts and further employees, amounting up to 47,000 people (Ministry of Defense and Sports, 2017).

The Austrian Federal President is the Commander-in-Chief, but the supreme command is exercised by the Minister of Defense and Sports and his offices and subordinated commanders (Ministry of Defense and Sports, 2017).

7.6.2 Facts and Figures

Operations Budget (Kurier, 2016): € 2.318 billion (2016)

Staff number (Ministry of Defense and Sports, 2017): 47,000 (soldiers, civilian employees, and militia soldiers)

A literature review of publications by and concerning the AAF was used as triangulation of the interviews.

7.6.3 Mandate of the Military in Humanitarian Response

The strength in logistical and organizational structure of the military[11] has long been known and appreciated after disasters struck and the military provided support in the response (Heaslip & Barber, 2014). With their ability to quickly mobilize troops and deliver relief in the first hours and days following a disaster, they are highly valuable for the disaster response, as this usually is the most critical time (Barber, 2012).

In the Oslo Guidelines (UN Guidelines on the Use of Foreign Military and Civil Defense Assets in Disaster Relief) which were created in 1992, exists a basic framework on how the military

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[11] When using the word "military" in this paragraph, not a specific national military is meant, but generally armed forces of countries.

can be involved in international disaster relief missions (United Nations Office for the Coordination of Humanitarian Affairs, 2007).

There the role of the military is described as a matter of last resort.

"Therefore, foreign military and civil defence assets should only be requested where there is no comparable civilian alternative and only the use of military or civil defence assets can meet a critical humanitarian need" (United Nations Office for the Coordination of Humanitarian Affairs, 2007 p. 8).

The military shall only respond when a so-called "humanitarian gap" (see Figure 7-11) between the requested and the available disaster relief resources exists.
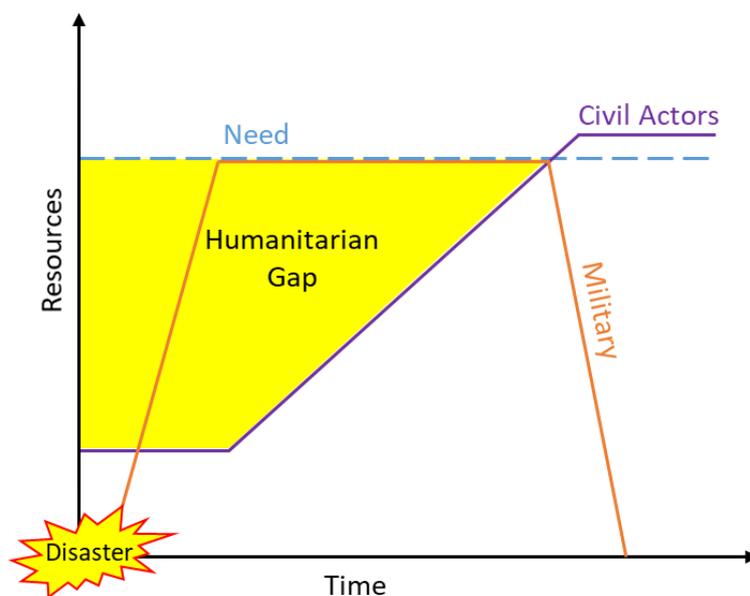

Figure 7-11: Humanitarian Gap
The humanitarian gap is where the military is supposed to be active in an emergency, meaning that it should only spring to action, when humanitarian organizations cannot handle the situation at hand by themselves (modified: BMLVS, 2015 p. 124).

All relief actions must be requested by the state affected and are to be carried out under full respect of the sovereignty of states. Since these are humanitarian assistance missions they must adhere to the humanitarian principles of humanity, neutrality, impartiality and independence (United Nations Office for the Coordination of Humanitarian Affairs, 2007).

Requests for help can be done on different levels (HALA, 2016; HLD, 2017):

- EU level: in the Common Emergency Communication and Information System (CECIS) countries pledge what they could offer the affected country.
- UN level: requests are done by VOSOCC or Military and Civil Defense Assets (MCDA) registry in Geneva. In the MCDA response assets of different countries are remarked.
    - For example – a UN coordinator tells UN OCHA in Geneva that they need something (e.g. aircraft carrier) and they organize it for them.
- Bilateral Agreements: where the affected state approaches the other state directly and asks for support

What complicates the military deployment in relief missions are the manifold differences in for example cultural, motivation, procedures, goals, etc. of military and civil actors, which often pose a challenge for an effective cooperation (BMLVS, 2015).

7.6.4 Process

In Figure 7-12 the "ideal" response process of the AFDRU (Austrian Forces Disaster Relief Unit) to a disaster requiring an Urban Search and Rescue (USAR) mission is shown. All other AFDRU missions basically have the same response process, the USAR missions just do have the highest time pressure because of the so-called "Golden Day" or "100 hours" rule. This rule states that if after collapses of buildings people are not rescued within 100 hours the survival chances drop significantly (BMLVS, 2015).
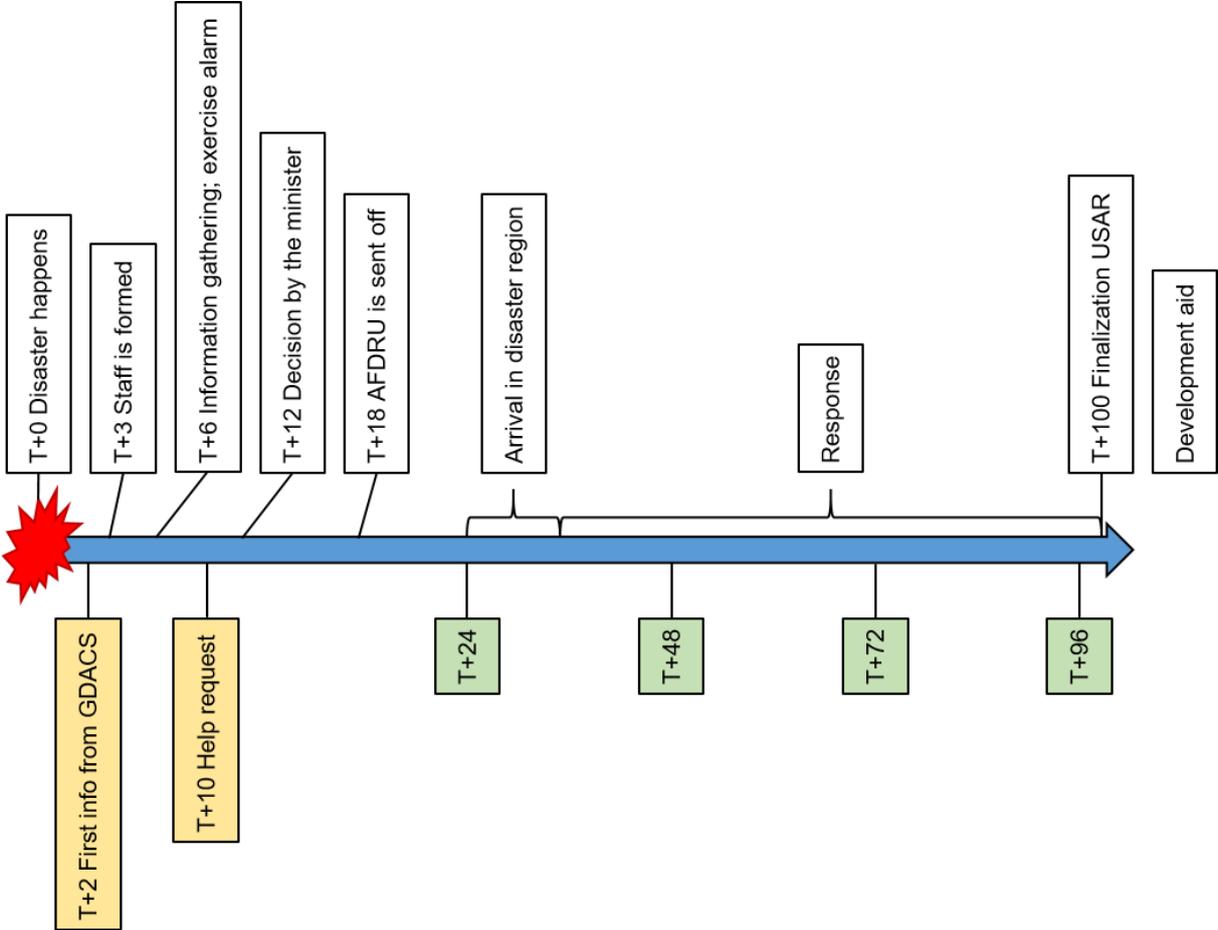

Figure 7-12: AFDRU USAR Process
An USAR mission of the AFDRU will is done on a very tight schedule, since after approx. 100 hours survival chances of victims drop significantly (modified: BMLVS, 2015, p. 376).

Nowadays news is readily available at all times and most disaster will be report almost immediately after their occurrence. But relying on news alone is too dangerous, as not every catastrophe is covered by them. Therefore, the GDACS (Global Disaster Alert and Coordination System) was developed by the UN, the European Commission and other catastrophe management organizations (BMLVS, 2015). Its goal is to improve alerts, information exchange and coordination in the first phase after major sudden-onset disasters (GDACS, 2017).

After a disaster happened somewhere on earth the GDACS puts the information online. About 3 hours after such a disaster the AAF response staff is already formed. It is tasked with information gathering, to simplify the later on decision by the minister to respond or not, and to start an exercise alarm. This is done, if a response is very likely to save time when the official affirmation of the mission comes. About 10 hours after the disaster happened, the help request of the affected country will be received and the minister decides approx. 2 hours later, if the AFDRU will be deployed. At t+18 the AFDRU (plus supply for the first response) is sent off to the affected region. Once they arrive there, the response starts. After t+100 USAR missions usually stop, as the probability of survival drops significantly and development aid starts (BMLVS, 2015).

7.6.5 Interview Partners

Humanitarian Affairs and Legal Advisor to the Austrian Chief of Defense Staff (AAF); experience: > 15 years (since 1978); code: HALA

Head of a Logistics Division (Multinational Joint Headquarters Ulm) / Former Head of the Military Logistics Branch Austria (AAF); experience: > 10 years; code: HLD

A literature review of publications by and concerning the AAF was used as triangulation of the interviews.

7.6.6 Capabilities

Adaptability

Strategic Gaming and Simulation: There are different types of courses, ranging from AFDRU base or mine course to a certification based on the UNO INSARAG program which classifies teams into a light, medium or heavy one. This is done in order to be sure what a certain team is capable of. There is also a classification as a field medical team (Gürtlich & Lampl, 2013; HALA, 2016). In Austria various simulation games are performed. The AAF also participate in international exercises and trainings (HALA, 2016; HLD, 2017).

Alternate technology development: The military has an own research department. Usage of drones or 3D printers are just two examples (HALA, 2016; HLD, 2017).

Lead Time Reduction: First response equipment has to be readily available at all times. Guidelines on how to estimate demand for a certain amount of people/equipment exist and therefore (HALA, 2016; HLD, 2017). The NSPA (NATO Support and Procurement Agency) has a list of preferred suppliers (which are already evaluated and certified), through which the procurement process is fastened (HLD, 2017).

Learning from Experience: A report on lessons learned is done after a deployment. The NBC (Nuclear, Biological, Chemical) Defense unit is in charge of actively learning from those reports and therefore raising the response standards (Gürtlich & Lampl, 2013).

Anticipation

Demand forecasting: What-if scenarios are created for Austria. AFDRU (Austrian Forces Disaster Relief Unit) always has everything prepared for an immediate launch of a response.

Guidelines on how to estimate demand for a certain amount of people/equipment exist and therefore (Gürtlich & Lampl, 2013; HALA, 2016; HLD, 2017).

Risk Identification and prioritization: When doing logistics mapping for multi-national army, risk screening is done and countries get assigned certain risks to monitor (HALA, 2016; HLD, 2017).

Monitoring and communicating deviations and "near misses": Are monitored and reported (HALA, 2016; HLD, 2017).

Recognition of early warning signals: Through the network and media early warning signals are looked at(HALA, 2016; HLD, 2017).

Contingency planning and preparedness: In Austria certain preventive measures are taken. In foreign countries it is politically not easy to do those things as the Austrian Armed Forces. AFDRU is usually activated once the catastrophe has already happened, sometimes when a catastrophe is seemingly inevitable the AFDRU is activated at first for an exercise. Then once the catastrophe is official and the AAF have been summoned by the pledge of the foreign country and the approval of the ministries the exercise is called off and the response is started immediately. This saves precious time. Contingency plans for customs procedures or similar things always have to be readily available. With NATO partner countries customs issues are already sorted out (HALA, 2016; HLD, 2017).

Capacity

Reserve capacity: AFDRU (Austrian Forces Disaster Relief Unit) always has everything prepared for an immediate launch of a response (Gürtlich & Lampl, 2013; HALA, 2016; HLD, 2017). In Austria the AAF has permanent warehouses, abroad usually not. But there are framework-agreements with companies (HALA, 2016; HLD, 2017).

Redundant capacity: Yes, in Austrian warehouses (HALA, 2016; HLD, 2017).

Backup capacity: Yes, in Austrian warehouses (HALA, 2016; HLD, 2017).

Collaboration

"*No army of the world is doing missions alone anymore*" (HLD, 2017). The different armies helping in a humanitarian crisis can join forces and work together. For example, during the tsunami catastrophe over 30.000 soldiers from 35 different countries were working together. Approximately 98% of requirements could be fulfilled either locally or regionally. The rest was done via Geneva (HALA, 2016). There are guidelines which regulate the military humanitarian response in a foreign country (OSLO Guideline, MCDA Guideline, INSARAG (International Search and Rescue Advisory Group) Guideline,…) (HALA, 2016; HLD, 2017). With some countries customs related issues are already arranged, especially those surrounding Austria or countries like Jordan (where Austria has had a long relationship with) (HALA, 2016). Especially NATO partners do have customs pre-arrangement with other NATO countries. If a cluster exists there is a collaboration with it (if it is wanted) – e.g. when getting to the affected country it will be teamed up with the cluster team (Wash – cluster for example) and asked what needs to be done (HLD, 2017). Sharing of transport vehicles with IFRC has already been done. Sometimes the collaboration is more difficult because civil organizations have certain concerns when working together with the army. Usually the army does not have that much of

a problem with civil organizations. In Austria exists a so-called "Österreichpaket" which includes several Austrian humanitarian organizations which are trying to create a unified disaster response in Austria (HALA, 2016; HLD, 2017).

Collaborative forecasting: When in a multi-national regiment, it is tried to have a "logistics lead nation" which handles the logistical demand for all troops – till now it has not really worked that well; but usually a "logistics role specialist nations" exist, which take over the supply of one area (e.g. fuel for everybody) (HLD, 2017).

Transparency of information: A Reception/Departure Center is created by the first Search and Rescue Team which reaches the disaster area. This center is for informing other organizations about the current situation, the organizations already helping, which equipment is already on-site and what is needed. Also, the RDC tries to organize the transport with civil freighters and armies (Gürtlich & Lampl, 2013; HALA, 2016; HLD, 2017). In the Virtual OSOCC, hosted by the UN, information regarding a new or upcoming disaster is accessible. Also, international humanitarian organizations share information concerning the situations in certain districts with each other. The state which needs help usually writes a request of what is needed (HALA, 2016; HLD, 2017). Through the DACHL (Germany, Austria, Switzerland and Luxemburg) cooperation the member countries look for synergies concerning transport or other things so that a more efficient response is possible (HALA, 2016). In the NATO LOCFAS System information is available for all partner (HLD, 2017).

Shared product life cycle management: Sharing of assets (e.g. Germany shares space on one of their Antanow airplanes for free, so that smaller nations can transport their troops also) (HLD, 2017).

Risk sharing: Army missions in foreign countries are hardly ever done alone, usually different countries or networks (NATO) join together (HALA, 2016; HLD, 2017).

Dispersion

Human workforce dispersion: The AAF can join forces with other military personnel on-site to fulfill their assignment together. As the symbols and other things are standardized for the military forces through many countries, interoperability is possible in an easier way, as one can be sure that the other person understands what one wants to convey. The military helps other organizations to distribute their goods (HALA, 2016; HLD, 2017). Some people are not actively working for the military but are militia. Those can be activated in case of an emergency (BMLVS, 2015; HALA, 2016; HLD, 2017). Generally, there is a double redundancy of teams in the military. One team which is on duty, one is standby and one which after a short preparation time would also be ready for deployment (HALA, 2016; HLD, 2017).

Leadership dispersion: As the forces can be joined with those from other countries, the leadership of the troops might not be fulfilled by an Austrian soldier. As it is common in the military an order has to be fulfilled. This also creates a certain trust in tasks which the military takes over, as those are sure to be carried out (HALA, 2016; HLD, 2017). The RDC coordinates the arriving military forces (Gürtlich & Lampl, 2013). The response of the AAF is coordinated in Vienna and important decisions are made there. Other things are coordinated on-site and information is passed on to Vienna, e.g. when taking part in a cluster meeting the staff is informed about the happenings (HALA, 2016; HLD, 2017). Field Headquarters leads the mission on-site and in Europe is the Operational Headquarters which is in contact with the 27

EU member states. Above that are the Brussels Agencies (strategic decisions for the military) (HLD, 2017).

Efficiency

Labor, production, asset utilization: Important things are readily kept in the AAF warehouses, things are palletized, batteries are charged and customs are done. Everything has to be ready in case of emergency (HALA, 2016; HLD, 2017).

Waste elimination: Customs can be done before departure, in that case only military equipment or equipment of certified organizations (like Technisches Hilfswerk THW) can be sent. As local purchasing is usually cheaper and faster, it is preferred to importing items from somewhere far away (HALA, 2016; HLD, 2017).

Production variability reduction: Many processes are standardized and therefore easier to carry out (HALA, 2016; HLD, 2017). Through the INSARAG classification program it is made sure that the deployed teams are assigned the right duties for which they were trained for (BMLVS, 2015). At the UN joint logistics center checklists and standards have been defined which regulate the exploration (not for the following processes as those depend largely on the location of the disaster) (HLD, 2017). Also, there exists an edict about personnel management abroad, where all steps from the intent of going abroad till insurances and what happens if someone dies, are formalized (HALA, 2016; HLD, 2017).

Failure prevention: All the equipment is managed by the logistics unit and it is their responsibility to check it and if necessary prepare it, therefore the risk of failure is minimized (HALA, 2016; HLD, 2017).

Financial Strength

Financial reserves and liquidity: There is a small emergency fund for the military which is dedicated for humanitarian missions abroad (HALA, 2016; HLD, 2017).

Flexibility in Order Fulfillment

Multi-sourcing: Things are either managed by framework contracts, own capacity or means which are available on the market (HALA, 2016; HLD, 2017).

Delayed commitment/production postponement: An AFDRU team consists of a leading element, an operations support element and a modular response team which can be of several specialties (NBC recon, USAR, water purification) (Gürtlich & Lampl, 2013).

Demand pooling: Through the DACHL (Germany, Austria, Switzerland and Luxemburg) cooperation the member countries look for synergies concerning transport or other things so that a more efficient response is possible. In Austria exists a so-called "Österreichpaket" which includes several Austrian humanitarian organizations which are trying to create unified disaster response in Austria (HALA, 2016; HLD, 2017).

Alternate distribution channels: Can use either own transportation means or buying other means (e.g. space on a transportation vehicle). Also, the transport can be organized by the RDC, which then enlists civil carriers or the military (HALA, 2016; HLD, 2017). Always creating at least 2 Points of Entry in a country where a response is being done (HLD, 2017).

Fast re-routing of requirements: Working together with other military forces on-site allows for flexibility (HALA, 2016; HLD, 2017).

Flexibility in Sourcing

Product platforms: Yes, exist (HALA, 2016; HLD, 2017).

Product modularity: Yes, exist (HALA, 2016; HLD, 2017).

Multiple pathways: The AAF have different ways of sourcing. They have their warehouses, frame contracts, sometimes get donations, and can source from globally to locally (HALA, 2016; HLD, 2017). Usually sourcing locally is preferred, as it is cheaper – "*better to get a guy with credit card to the affected area and purchase there, than shipping all the stuff to the other side of the world*" (HALA, 2016). Sometimes the state of Austria buys response material and stores them at a warehouse (Austrian RC) and once a disaster happens gives them to the military for distribution (HLD, 2017).

Supply contract flexibility: They do have framework agreements with specified time limits (HLD, 2017).

Alternate suppliers: Possibility to procure locally, regionally or globally. If needed things can also be transported from Austria to the place where needed (HALA, 2016; HLD, 2017).

Market Position

Brand equity: The military is a brand. Although they do not get money from donors, application of people for enlistment in the military services depends largely on their brand. Therefore, advertisement is placed and reports of their response are made publicly. Usually getting people for humanitarian responses is easy, there are actually too many applications received than possible job openings (HALA, 2016; HLD, 2017).

Product differentiation: Emergency response is only a small part of the militaries tasks (HALA, 2016; HLD, 2017; Ministry of Defense and Sports, 2017).

Customer communication: Reports and documents are accessible via the homepage, also there usually pictures or videos are released to be distributed to the media (Ministry of Defense and Sports, 2017).

Organization

All in all, there is a motivational level of the humanitarian mission team is high. Sometimes the soldiers are even mad if they are not assigned to a rescue mission (because of limited team sizes), as they just want to help (HALA, 2016; HLD, 2017).

Creative problem solving: New technology is often used in the military, there are units which main business is to develop new technologies. Basically, once on-site people have to be creative and work with what is given to solve the task given. "One Fuel Concept": creative approach to simplify procurement for fuel (nowadays engines to specialized than to be able to do that). Other examples would be 3D printers, UAVs and autonomous vehicles (HALA, 2016; HLD, 2017).

Accountability and empowerment: Is done very strictly in the military. Every rank has its competences (HALA, 2016; HLD, 2017).

Diversity of skills: People need to undergo a long training before they are deployed to a region. As the armed forces of different countries can join forces, a wide variety of different skills is ensured. Also, teams are tried to be made interdisciplinary, so as that there is an expertise for many problems (HALA, 2016; HLD, 2017). For example, when doing a water supply mission engineers, hygiene and purification personnel, will be deployed in a team (if possible) (HALA, 2016).

Substitute of leadership: Then the task is taken over by another equal or similar ranked officer (HALA, 2016).

Learning and caring: A report on lessons learned is done after a deployment (HALA, 2016; HLD, 2017). The NBC Defense unit is in charge of actively learning from those reports and therefore raising the response standards. After a mission one can draw upon psychological counseling. All in all, the motivational level of the humanitarian mission teams is high (Gürtlich & Lampl, 2013).

Product Stewardship

Proactive product design: Things are designed or purchased in a way that they already fit in a Hercules plane for example (HALA, 2016; HLD, 2017).

Resource conservation: Is not of over-arching importance for the military, the most important thing is that it works in the field (HALA, 2016; HLD, 2017).

Auditing and monitoring: There is an audit (report) done after missions. Suppliers are also evaluated before a purchase (HLD, 2017).

Supplier management: The NSPA has a list of suppliers (which are already evaluated and certified), which are in a pool of preferred suppliers (HLD, 2017).

Recovery

Ability to quickly mobilize resources: There exists the OLRT (Operational Liaison and Reconnaissance Team) which is ready to be deployed whenever a next flight is available (approx. 24h – government has to give consent first) (HLD, 2017). If in the inland a situation of imminent danger arises the military can react immediately without further permission. The equipment is on stock, so everything is already prepared by the AFDRU only the personnel has to be informed (HALA, 2016; HLD, 2017). The target is that within 8 hours one is ready. The probability to recover people alive drops significantly after the first 72-100h. After that time period it does not make sense to deploy further Search and Rescue teams (BMLVS, 2015; HALA, 2016). As a Search and Rescue Missions is activated faster than a humanitarian mission, the AAF often just does USARs. Some people are not actively working for the military but are militia. Those can be activated in case of an emergency. If a disaster is foreseeable often exercises are set up, so that all the required people are instantly deployable. Once the disaster strikes and the military is requested, the exercise is transformed into a mission (HALA, 2016; HLD, 2017).

Communicate the recovery strategy: This is done via the VOSOCC, the UNDAC team, portals such as the CECIS (Common Emergency and Communication Information System) and other

internal reports (HALA, 2016; HLD, 2017). The RDC is tasked with briefing the arriving military forces with the current situation information (Gürtlich & Lampl, 2013). In the cluster meetings strategies are also discussed (HALA, 2016; HLD, 2017).

Manage the crises: The UN –OSOCC coordinates the international relief organizations (HALA, 2016; HLD, 2017). A Reception/Departure Center is created by the first Search and Rescue Team which reaches the disaster area. This center is for informing other organizations about the current situation, the organizations already helping, which equipment is already on-site and what is needed (Gürtlich & Lampl, 2013). Also, the RDC tries to organize the transport with civil freighters and armies (HLD, 2017). Through the cluster and the UNDAC Team a certain task distribution is done, although the cluster can only ask the organizations to do something and the organization can voluntarily follow that request. According to the interview partner this system usually works quite well, as in chaotic situation organizations tend to be happy if there is a coordinating force. In the military itself a taskforce is in charge of managing the crisis and the commands of it are carried out (HALA, 2016; HLD, 2017).

Mitigate the consequences of the disruption: These missions are almost only done in Austria, as it is very difficult to do such things abroad as the Austrian Armed Forces (HALA, 2016; HLD, 2017).

Security

Layered defense: There is a layered defense strategy (HALA, 2016; HLD, 2017).

Access restrictions: There exist access restrictions (HALA, 2016; HLD, 2017).

Employee involvement: Soldiers are trained in security measures. Before an immediate mission to a foreign country they get a report with all the important facts and do's and don'ts in that country (HALA, 2016; HLD, 2017).

Collaboration with governments: The government has to request the AAF (BMLVS, 2015; HALA, 2016; HLD, 2017). The OSLO regulation prohibits arms in a humanitarian mission, but negotiations can be made with the government of the affected countries, if it is felt necessary (HALA, 2016). Always close cooperation with the LEMA (Local Emergency Management Authority) (HALA, 2016; HLD, 2017).

Cyber-security: Have their own private network, which is heavily secured against outside activities and also prohibits connection with outside computers etc. (HALA, 2016; HLD, 2017).

Personnel security: The military is not deployed to a country for a humanitarian mission if it is too dangerous there. Reports are made which brief the persons deployed about the current status in the foreign country, the do's and don'ts, the climate, the weather, the political situation etc. – a whole report is made. There is also a Code of Conduct for foreign countries which dispatched soldiers are trained in before departure (HALA, 2016; HLD, 2017).

Visibility

Information technology: There exist different tools, such as the CECIS for European Union (EU) requests where one can see the requests of the affected countries. Then there is the VOSOCC, the Phönix, the LOGFAS (Logistics Functional Area Services) and other tools (HALA, 2016; HLD, 2017).

Knowledge of asset status: There is a logistics unit for that. This unit has programs for that such as the LOGFAS or the Transportation Visibility Estimator (HLD, 2017).

Information exchange: The reports on the situation of the targeted countries can be exchanged with other organizations, if a Memorandum of Understanding exists. The VOSOCC is used as an information exchange platform. Is done on-site in the cluster meetings or if no cluster exists with partners in the joint operational area in the military HQ (HALA, 2016; HLD, 2017). The RDC manages the information exchange (Gürtlich & Lampl, 2013; HALA, 2016; HLD, 2017).

Business intelligence gathering: In Training and Partnership Weeks trust is created which enables organizations to anticipate the actions of other organizations. Furthermore, reports and official statements of humanitarian organizations help for this endeavor. Also, one of the core activities of the military is to gather information about other agencies and entities (HALA, 2016; HLD, 2017).

7.6.7 Results

Responding to disasters is only one part of the work of the military. Nevertheless, it is one of the least controversial. When looking at motivational levels of the humanitarian division, one perceives them as high. Soldiers want to contribute to the emergency responses and help people. Collaboration and cooperation is very important for military organizations, as usually nowadays such aid missions are not done by one country alone, but the military of different countries join forces. This is rather easily done for them since almost everything is already standardized (rankings, symbols on maps etc.) within the different armies. When joint in collaboration, tasks can be divided between different countries, e.g. fuel unit, and/or regiments can be joint.

Emergency response units exist, which can be deployed within a short timeframe and are already equipped with first response equipment. Generally speaking, the military is very good at logistics, since it historically was developed there. They have IT systems, which not only are used by one country but throughout the NATO network for example. These systems are used for supply chain tracking and allow transparency of actions. In their warehouses things which are needed for the first response are on stock, the rest is procured via framework agreements.

Budget is usually not their main concern, once a mission is approved. They do not need to find donors for their activities, as the state finances them.

Their focus on security is high and sometimes other humanitarian organizations draw on their forces.

7.7 Cross-Case Comparison

In the following the results of the cross-case analysis will be presented.

7.7.1 Results

Adaptability:

Re-routing of requirements: Is usually possible as distribution priorities shift. Nevertheless, it requires some effort as often the permission of donors has to be gained first.

Strategic Gaming and Simulation: All of the interviewed organizations participate or even organize trainings and simulation games. Many of those are held on an international and multi-organization level.

Seizing advantages of disruptions: As the primary goal of humanitarian organizations is not to gain market share but to alleviate suffering, gaining advantages of a disruption is not really corresponding to their goal. Nevertheless, performing good in the aftermath of a disaster helps with donors.

Alternate technology development: MSF, WFP, IFRC and AAF are investing in research and academic and industry partnerships to develop new solutions to problems. Although Caritas and IOM are not actively investing in technical research, they are using new technologies such as drones and are researching on their predominant topics such as migration causes and social issues.

Lead Time Reduction: Is done through framework agreements, kit policies and readily available first response equipment.

Learning from Experience: All of the interviewed organizations have a 'lessons learned' process in place. For most of them these generated reports are taken into account when planning for the next mission.

Anticipation

Demand forecasting: Demand forecasting is mostly based on experience and given geographical data (such as amount of people living in a risk-prone area). WFP is also using simulations and other sophisticated analysis method.

Risk Identification and prioritization: All of the interviewed humanitarian organizations conduct risk identifications and prioritizations, also so-called "Emergency Preparedness Plans" are generated. The AAF is doing a risk identification and prioritization for Austria, here also response plans exist. If considering missions abroad, risk assessments are conducted.

Monitoring and communicating deviations and "near misses": Constant monitoring and near miss analysis is done via different channels. Either own units are tasked with that (WFP, National Societies of IFRC, AAF, IOM) or network data, the internet or own people on site are used for that.

Recognition of early warning signals: Through the constant monitoring done by the HO and thresholds based on experience or historic data early warning signals are usually recognized.

Contingency planning and preparedness: The aforementioned "Emergency Preparedness Plans" are created by the interviewed organizations. Also, it is often tried to get those

contingency plans to the people, so that negative effects can be further reduced. It is also part of the nowadays philosophy of the interviewed humanitarian organizations to foster preparedness, as this reduces costs significantly when a disaster happens.

Capacity

Reserve capacity: Besides IOM and Caritas, all of the interviewed organizations have huge warehouses, from which they can support disaster affected regions in a short time. As IOM is funded on a project base, they cannot afford warehouses. Caritas owns only small warehouses, due to the costs of hosting huge warehouse facilities and their widespread organizational distribution over the whole word.

Redundant capacity: All of them have redundant capacities.

Collaboration

Extensive collaboration on intra- and inter-organizational level could be perceived.

Collaborative forecasting: Most of the interviewed organizations, engage in collaborative forecasting. The partners used for a collaborative forecasting are often not from their own supply chain but different organizations (such as IFRC and IOM).

Transparency of information: Information is usually very willingly shared. The VOSOCC is one of the major sources of information, as well as cluster meetings or internet databases (such as the GDACS).

Postponement of orders: When owned stock is needed by another organization for a mission with a higher urgency, it often happens that stocks are reallocated.

Shared product life cycle management: Projects are done with other humanitarian organizations, if cost advantages can be gained from that. In the highly dispersed organizations such as IOM, IFRC or Caritas, collaborations in-between national offices are fostered.

Risk sharing: Through shared projects the risks which are corresponding to those are shared.

Dispersion

Human workforce dispersion: Besides MSF and the AAF (which is a special case) all of the interviewed organizations have a world-wide network of country offices, which allows them to be on-site very fast if something happens. As the AAF is the military force of neutral Austria, it is only on project base in different countries. Nevertheless, when the military is also active in disaster response, the different countries join forces.

Leadership dispersion: The interviewed organizations have clearly defined leadership roles and accompanied accountabilities.

Downstream customer dispersion: Most of the projects HOs do are not emergency but development aid. Besides that, IFRC and Caritas indulge in further activities, such as patient transports or running nursing homes.

Market dispersion: As mentioned before there exist different branches of humanitarian aid (development and emergency). Also, some organization are active in other fields.

Efficiency

Labor, production, asset utilization: The organizations try to improve their utilization rates of resources, as this cuts costs and is seen positively by the donors and allows a bigger budget for relief operations.

Waste elimination: All of the interviewed organization are trying to eliminate waste, in one way or the other.

Production variability reduction: Through standardization of processes and the usage of standardized items it is tried to reduce variability.

Failure prevention: Screenings and audits are made of suppliers, to guarantee their trustworthiness and their quality. In general, high quality standards are of importance to the interviewed organizations, as this in their opinion, prevents certain failures and therefore is good for their reputation.

Financial Strength

Financial reserves and liquidity: All of the interviewed organizations have emergency funds which can be accessed fast if needed.

Portfolio diversification: The services offered by the different HO are mostly based in humanitarian fields, ranging from development to emergency aid and from patient transports to retirement homes. Of course, the military is also active in warfare related activities.

Insurance Coverage: For some things it is tried to get insurance coverage (like personal security, shipment…) but an area getting hit by a natural catastrophe is not insured by the HO.

Price margin: The work of the humanitarian organizations is non-profit.

Flexibility in Manufacturing: As humanitarian organizations are offering mainly services and are not the manufacturer of the goods distributed the points under "flexibility of manufacturing" do not apply for them.

Flexibility in Order Fulfillment

Multi-sourcing: They all have framework agreements with different carriers, collaborate with other humanitarian organizations or military forces and those with different national offices have another possibility to get further order fulfillment resources.

Demand pooling: Is done by most organizations, usually within one organization but also between different organizations.

Inventory management: The organizations owning big warehouses are investing in inventory management systems. As some organizations do not have big warehouses anymore, the inventory management systems are only implemented in a rough way.

Alternate distribution channels: All of the interviewed organizations have different channels of distribution, being it planes, ships or trucks.

Fast re-routing of requirements: The organization which rely on a warehouse-driven approach, can re-route requirements fast between those. Also, the network of different suppliers and

framework agreements are important for that and especially when not having warehouses having a good relationship with suppliers can help fast re-routing of the requirements.

Flexibility in Sourcing

Product platforms: The items for the different kits are standardized and therefore, the variability is reduced greatly. All of the kits offered by the "big" humanitarian organizations are basically the same (a IFRC and an MSF health kit includes the same standardized items)

Product modularity: The kit strategy is based on a modular approach.

Multiple pathways: All of the interviewed organization are relying on a multiple pathway approach, therefore, procuring via different channels. Also, the purchase of white stock is possible.

Supply contract flexibility: All rely on framework agreements with suppliers. These can differ in the quantity, the geographic spread of the delivery or the timeframe within which the products have to be delivered.

Alternate suppliers: Most of the organizations have a rule of having at least 3 suppliers per critical item. Generally, it seems, that having alternate suppliers is one of their basic philosophies.

Market Position

Brand equity: To be well-known is of crucial importance to the humanitarian organizations, as donations depend upon that. Therefore, all of them try to be well-known. Although the funding of the military does not directly depend on the degree of popularity of it, the military tries to create a positive brand, as enlistments depend largely on it and the public finances the army through their paid taxes.

Customer loyalty: The interviewed organization track who donates to them and therefore, customer loyalty can be identified. This is often part of their transparency policy.

Market share: The interviewed organizations are within the world's biggest humanitarian organizations.

Product differentiation: As long as disasters happen and/or people suffer from hunger, thirst etc. and governments cannot deal with these things alone, humanitarian organizations will not be obsolete.

Customer relationship: To understand and keep donors is of great importance, thus, it is tried to keep them interested by transparency of money flow and reports.

Customer communication: As HO rely on donations transparency is of major importance. Therefore, good customer communication, including well- maintained homepages or newsletters – are of major concern.

Organization

All of the interviewed organization pointed out that the motivation level of their employees is unusually high, in comparison to the motivation level of the average commercial employee. This profits their working style, as they are willing to invest more and overcome any obstacle

to reach their goal. Most of them see this high motivation rooted in people finding meaning in their work by helping others.

Creative problem solving: Finding creative solutions is encouraged by the organizations and necessary, as every mission differs from the previous one and new problems surface. WFP, IFRC and MSF are working together with academic institutions to further create innovate and creative solutions.

Accountability and empowerment: WFP, MSF, IFRC and AAF have clearly defined accountabilities. Caritas and IOM do not have such precise definitions.

Diversity of skills: Often it is not possible to find an expert for every task, therefore, employees need to perform different tasks, sometimes not really related to their education. To be able to cope with these things, people are getting trainings prior to being deployed and teams are made up of experts from diverse fields.

Substitute of leadership: As the interviewed organizations are big players in the field (counting the AAF as part of military general) substitute of leadership is provided.

Learning and caring: The atmosphere in humanitarian organizations as described as very cooperative. Therefore, people help each other and try to achieve the best solution for the common goal. Also, most of the interviewed organizations had an institutionalized 'lessons learned' process in place.

Product Stewardship

Proactive product design: As the interviewed organizations are also working in the development aid sector, a disaster prevention or mitigation work is done.

Resource conservation: Is not yet of overarching importance to most of the interviewed organizations. Most of them procure locally or regionally and therefore, preserve resources and foster a more sustainable approach.

Auditing and monitoring: On the one hand side suppliers are audited and monitored and on the other side the own processes are tracked and audited by most.

Supplier management: All of the interviewed organizations audit and monitor their suppliers, as corruption and quality of aid goods are of concern. Nevertheless, not all of the organization prioritize it that high.

Customer support: Is of importance to the organization as the proliferation of them depends on the support of the customers (donors).

Recovery

Ability to quickly mobilize resources: All of the interviewed organizations have an emergency response team and/or are active in the UNDAC team. The organizations which a very decentral structure (IFRC, Caritas) usually also have a country office in the disaster affected region, which helps to respond fast.

Communicate the recovery strategy: Most of the interviewed organizations are either part or lead a cluster division, where information is shared and the response is coordinated. Also, contingency plans exist, which map out the response. In the VOSOCC information is shared.

Manage the crises: Who the crisis actually manages, depends by most organizations on the size of the disaster and the degree of destruction. Mostly PR and similar issues are managed on a global level, by the HQ of the organization and the operational decisions are made on – site or on a regional level. All of the organizations have a specific unit, which deals exclusively with managing and coordinating a crisis response.

Mitigate the consequences of the disruption: Development aid is a way to mitigate consequences of disruptions, also procuring locally is seen as helping to stabilize the region faster. Furthermore, through information campaigns and contact with the government it is tried to be able mitigate consequences. Nevertheless, humanitarian organizations perceive a lack of funding willingness in preparedness projects.

Security

Layered defense: The security protocols of the interviewed organizations is based on a layered defense. Employees are involved, access restrictions are in place, as well as a collaboration with government should lead to a reduced risk from the beginning.

Access restrictions: There are access restrictions. Warehouses are being surveilled, often the help of the government is used for protection. Fences and locks exist. Nevertheless,

Employee involvement: Employees are briefed prior to their missions and should report concerns regarding their own safety or other suspicious activities.

Collaboration with governments: Is done by all the interviewed organizations. Without permission of the government to act, it is not possible to be in a foreign country. Also ensuring the government that the mission done is of interest to it is important. Often the government helps in ensuring safety and security.

Cyber-security: Passwords, firewalls and VPN networks are standard. Often the first problem is more to get internet access at all. This is the main responsibility of the telecommunication cluster.

Personnel security: Employees receive a security briefing and a code of conduct before departing. Also needed vaccinations are mandatory and plans for emergency evacuations are being thought of.

Visibility

Information technology: The usage of IT software to produce visibility throughout the supply chains was very different for each of the interviewed organizations. Most of them, do not have an ERP system. Also, due to their complex structure and often many local offices, the information is not automatically available at one point, but has to be retrieved from many. The local IT infrastructure when responding to a disaster is usually rather rough and only involves excel or access sheets. In contrast to that WFP has a sophisticated use of IT.

Knowledge of asset status: The knowledge of asset status relies mostly with the country offices of the decentralized organizations (Caritas, IFRC, IOM). WFP uses SAP to give access to information. At MSF the OCs know the asset status of the projects supervised by them. The exchange with other OCs is done manually and not too often. IFRC has its knowledge of assets either residing with the country offices or with their regional offices, it is exchanged on a monthly basis (via Email) with headquarters.

Information exchange: A widely used portal for that is the VOSOCC. Also, in the cluster or in the network information concerning the supply chain can be shared, but this is not done automatically.

Business intelligence gathering: This is only done by the AAF.

7.7.2   Conclusion

When looking through the results of the cross-case analysis one finds similarities and discrepancy between the interviewed organizations. Many of those differences can be traced back to the different structure of the organizations. Organizations such as IOM, Caritas or IFRC are highly decentralized and therefore, most things are managed by their local or regional divisions. In the following paragraphs the most interesting findings are shortly described.

When taking a look at Van Wassenhove's (2006) claim that humanitarian supply chains are about 15 years behind commercial ones and humanitarian organizations have not realized the importance of logistics and supply chain management yet and tending to fall into a fire-fighting mode, one can say that is only partially true today. SCM has gotten more to the center of those organizations and most of them have an own department only responsible for that, which is seen as an important part of disaster response. Nevertheless, some organizations, such as WFP, have already implemented more sophisticated and digitalized supply chain solutions as others. In general, a certain lack of IT usage in the organizations can be perceived, such as the only seldom existence of organization wide ERP systems. This lack manifests itself for example in restricted supply chain visibility, forecasting difficulties and resource tracking. In the IFRC or Caritas network for example the supply chain knowledge lies within the respective country offices.

What could be perceived in all interviewed organization is a close collaboration within one and with other (humanitarian) organizations. Information is exchanged and through cluster meetings coordination is provided. Even engaging in pool procurement or delivery activities with other HOs is a frequently used method to achieve better prices.

What was mentioned as a very important feature of being able to respond to disasters, was the high motivation of the employees, due to identifying with the values and goals of the organizations and the feeling of doing something of worth. According to the interviewed people this enables the employees to think of more creative solutions, to handle difficult situations better and to be willing to go the "extra mile" for achieving the task at hand.

Trainings and simulation exercises are done by all interviewed organizations. On the one hand they function as capability trainings and on the other hand they are seen as essential to relationship and trust building, especially when done with other organizations together.

Good relationships with suppliers and governments are also seen as important ingredients to a successful response. As it enables the organization to react faster or to procure certain rare items when faced with an emergency. Being able to react faster seems to be a general goal of organizations responding to disasters, therefore, highly pre-configured application modules for emergencies such as emergency response teams or different kits and emergency preparedness plans are things found in the response of all the interviewed organizations.

As responding fast is the major concern of the organizations, efficiency is often not as important (at least when concerning the first phase of an emergency response), which can be reflected in huge just-in-case stocks. Many organizations see it better to invest a bit more and

save people, than to cut costs and then maybe not being able to deliver goods when needed. Although, organizations are trying to standardize more and more processes, as reported there is still room for improvement.

Product stewardship is gradually taking into account; some organizations try to invest into the regional market to stabilize it.

As these are non-profit organizations and mainly based on donations, certain restrictions apply on the finances, as not all projects which would need funding can be funded.

A difference between cluster lead organization and others in their supply chain resilience capabilities could not be perceived. Besides WFP, IT usage is not on the forefront yet. Most of the other resilience strategies are implemented in a similar way, depending mostly on the decentralization level of an organization.

8 Cross-Learning Potentials

As was seen in the previous chapter, which analyzed the capabilities of humanitarian organizations, almost all of the capabilities mentioned by Fiksel et al. (2015) could be found in humanitarian supply chains. This therefore reinforced the claim made in chapter 5 that the supply chains are very similar. The claim of Van Wassenhove (2006), which states that humanitarian supply chains are still behind commercial ones concerning digitalization, could also be supported. Nevertheless, concerning fast and efficient responses, humanitarian supply chains have quite a plethora of tools in store. All of the interviewed organizations have an emergency response team which can be/arrive at the affected site within a short time frame and usually also provides first aid items. Also, all of the organizations rely on a kit-strategy, which facilitates the delivery of items to beneficiaries since these items are predefined to suit certain mission goals (e.g. Cholera kits). Of course, this standardization is also beneficial to the procurement process.

The field of efficiency can be analyzed from different points of view. On the one hand side, being efficient usually saves money on daily operations. However, on the other hand side, when considering a company like Boston Scientific (see section 2.4), sometimes pure efficiency is too dangerous for an organization as the organization might have too much to lose if supply chain disruptions occur. Humanitarian organizations are often faced with the same problem. Many of the interviewed organizations fear that if costs are cut down further and efficiency would be the main goal, that they might not be able to respond adequately if needed. Nevertheless, a better IT system and therefore also visibility throughout the organizational system would most likely yield many cost-saving opportunities.

So far, various small cross-learning potentials which were not or only partly included in the SCRAM framework have been mentioned. In the following, the most promising potentials will be described in more detail.

8.1 Motivation

One factor that all of the interviewed organizations stated as an important part of their successful responses was the high motivation of their employees. Through shared values and goals with their organizations, most employees feel highly connected and consider themselves an integral part of bringing aid to people who need it. Giving their job meaning and knowing that they have done something important spurs their motivation.

To verify whether motivation really affects business performance, the following paragraphs will focus on how motivation can be fostered and what its effects are based on work and organizational psychology literature.

The work and organizational psychology literature has long focused on the different ways on what fosters motivation of people and what the effects of it are.

Work motivation can be defined as *"a set of energetic forces that originates both within as well as beyond an individual's being, to initiate work-related behavior, and to determine its form, direction, intensity, and duration"* (Pinder, 1998, p. 11)*.*

When considering this definition, one can determine three important features of the concept. Firstly, Motivation is an energizing force, thus it enables actions in employees. Secondly,

motivation can come from different loci and thirdly, motivation explains what people are willing to accomplish, how they will do it, how hard they will work to achieve their goals and when they will stop (Meyer, Becker, & Vandenberghe, 2004).

Keeping this definition in mind, what motivates people? There are several different theories.

Maslow (1954) formulated five classes of needs that motivate people to satisfy them. The most basic needs are physiological needs, like food or water and safety needs, followed by the psychological needs of belongingness, love needs and esteem needs. The highest-level need is self-actualization. According to Maslow's theory, a person must first fulfill their basic level needs before secondary or higher level needs can be fulfilled (Maslow, 1954). As was often mentioned in the interviews, working in the humanitarian area is a very conscious decision, as payment is usually worse than in the private sector, hours are long and the stress level is high. Thus, doing something that a person really wants to do would cater to the final step of Maslow's pyramid.

In his work, Herzberg (1968) describes two categories of motives: motivators which contribute to job satisfaction (and motivation) and hygiene factors which lead to dissatisfaction. Figure 8-1 shows the identified motivators and hygiene factors and their level of influence.

Three of the most important motivators are achievement, recognition and work itself, which were mentioned by the interviewed people as well: knowing that they are doing something good/the right thing, being able to help people and receiving a direct feedback from beneficiaries that were helped through their own actions. Thus, high employee motivation can be explained.


Factors Affecting Job Attributes as Reported in 12 Investigations*
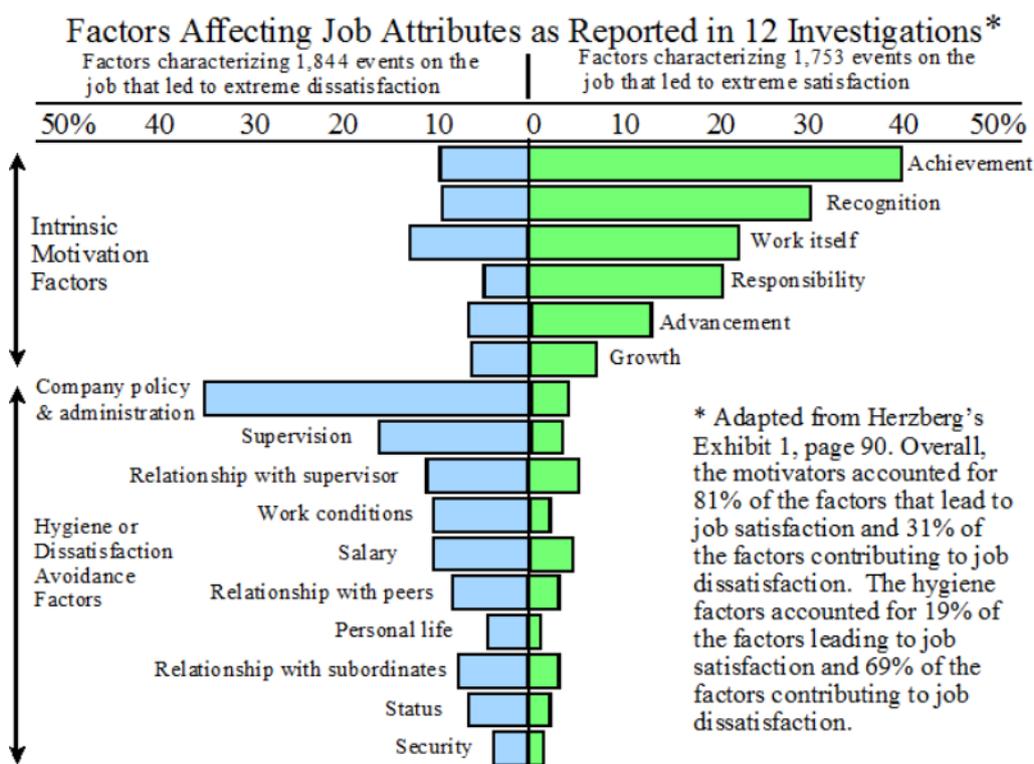
Figure 8-1: Herzberg's Two-Factor Theory
This figure shows different motivators and hygiene factors of Herzberg's Two-Factor Theory *(MAAW, 2017)*.

When comparing other motivation theories [like Vroom's (1964) expectancy-valence approach, Locke and Latham's (1990) goal-setting theory or Porter and Lawler's Model of Motivation (1968)] despite taking diverse approaches, they all agree that the total motivation

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of a person is made up of various factors, but that in the end only the total amount of motivation counts. Even the last-mentioned Model of Motivation (Porter & Lawler, 1968), which explicitly differentiates between intrinsic and extrinsic motivation, still considers the two types of motivation to be additive, with total motivation being the most important part. Other studies contradict that view of a purely additive motivational system, like Eden's study (1975), which reported a negative relation between the perception of extrinsic rewards and the amount of intrinsic motivation.

Gagné & Deci (2005) do not take the view of total motivation as the prime indicator of outcome predictions either. They see different types of motivation correlated with different behavior or performance on certain tasks and make a distinction between autonomous and controlled motivation. Something that is done with autonomy is done with a sense of volition and evokes a feeling of choice. Intrinsic motivation is an example of such motivation. Acting with a sense of pressure or a sense of having to engage in actions refers to controlled motivation. Gagné & Deci (2005) argue that extrinsic motivation can vary in the degree in which it is autonomous versus controlled, depending on the degree of self-determination or internalization[12], ranging from external to integrated regulation. Consequently, external regulation refers to behavior that is "*initiated and maintained by contingency external to the person*" [13], reaching from external to integrated regulation. Whereby external regulation refers to behavior that is "*initiated and maintained by contingency external to the person*" (Gagné & Deci, 2005, p. 334) and integrated regulation is associated with people having "*a full sense that the behavior is an integral part of who they are, that it emanates from their sense of self and is thus self-determined*" (Gagné & Deci, 2005, p. 335). An example for that would be a nurse, who not only identifies with the importance of her activities for maintaining her patients' comfort and health, but also integrates these activities with other aspects of her job and life. Therefore, the profession of being a nurse would be more central to her identity.

Gagné and Deci's (2005) view is based on many field studies and laboratory experiments, which showed different work outcomes when people were either autonomously motivated or motivated in a controlled manner. Autonomous motivation is associated with better performance on tasks that are rather complex and interesting and fewer complex tasks that require discipline. As far as mundane tasks are concerned, controlled motivation does either not yield differences or is just responsible for a short-term advantage (Amabile, 1982; Grolnick & Ryan, 1987; McGraw & McCullers, 1979).

Gagné and Deci (2005) argue in more detail that enhanced intrinsic and fully internalized extrinsic motivation will yield the following work outcomes:

1. *"persistence and maintained behavior change;*
2. *effective performance, particularly on tasks requiring creativity, cognitive flexibility, and conceptual understanding;*
3. *job satisfaction;*
4. *positive work-related attitudes;*
5. *organizational citizenship behaviors; and*
6. *psychological adjustment and well-being" (p. 337).*

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[12] Internalization refers to „*'taking in' a behavioral regulation and the value that underlies it*" (Gagné & Deci, 2005, p. 333).

[13] Internalization refers to „*'taking in' a behavioral regulation and the value that underlies it*" (Gagné & Deci, 2005, p. 333).

As working in the humanitarian field is associated with a high personal identification and ideology factors and the desire to do something good and help people, the boundary conditions for fostering (autonomous) motivation are very promising. This was also confirmed in the interviews conducted.

In conclusion, when analyzing the effects of work motivation, one sees that it leads to enhanced performance and higher job satisfaction. Therefore, an organization's ability to foster motivation in employees, more specifically autonomous motivation according to Gagné and Deci (2005), will lead to better results when employees are confronted with complex tasks, like supply chain disruptions or uncertainty issues. As a result, "fostering" motivation is identified as a cross-learning potential and should be added to the SCRAM framework.

8.2   Collaboration

In the interviews conducted, collaboration was mentioned numerous times. Humanitarian organizations engage in intra-organizational collaboration, thus teaming up with other organizations from their own supply chain. This is often done to benefit from price reductions when ordering bigger quantities, to share costs of delivery resources, exchange information, and plan projects together.

Humanitarian organizations also participate in inter-organizational collaboration, which in this case refers to the partnership between different humanitarian organizations that do not belong to the same supply chain. This type of collaboration is usually also done for cost-saving or cost-reducing reasons or to be able to provide a better and more efficient response. Although humanitarian organizations have the same donor base and are therefore actually competing for money, they join efforts to achieve the best possible result for all parties involved. The cluster approach would be an example of a collaboration where the goal is to achieve a better response without duplication efforts.

The third kind of collaboration that humanitarian organizations take part in is collaboration with governments or governmental agencies. Here, mainly information is exchanged, many organizations try to stay on good terms with governmental agencies to get preferential treatment when a disaster happens, security support (armed guards etc.) can be provided by the government, resources can be donated to HO to help their relief missions, and projects or relief missions can be done together.

Collaboration with the private sector is also of great importance. Through framework agreements, partnership agreements (like the IFRC/Airbus partnership) and other measurements, a fast response is made possible.

All in all, collaboration and forging partnerships are vital parts of humanitarian response. These are factors which are not yet included in the SCRAM framework, where collaboration is addressed only within the own supply chain network. Collaborating with competing organizations for global benefit is not the focus. Nevertheless, especially in critical situations such as supply chain disruptions, inter-supply-chain collaboration can be an important tool to fasten recovery and the return to business continuity. The question if this type of collaboration can be applied in the commercial world can therefore be answered with yes, as there are already companies doing so with success. For example, in 2012, a tank filled with highly flammable butadiene of Evonik Industries' cyclododecatriene (CTD) plant in Germany exploded. This explosion and the ensuing fire destroyed half the world's production capacity of CTD. As CTD is used in fuel lines, brake lines and plastic housing of cars, solar panels, athletic

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shoes, ski boots and optical fibers among others, the loss of that CTD affected quite a number of companies. Especially auto companies were under high pressure since every vehicle they made depended on CTD. After news of the destroyed CTD reached the automotive industry, the industry sprang into action and convened an emergency summit on how to deal with the crisis. All affected tiers of the automotive supply chain were at the summit, which had an attendance of 200 people, representing 8 automakers and 50 suppliers. Through their horizontal collaboration, the tiers managed to keep production from stopping, even though the damaged plant was not back in business until 9 months after the incident (BBC, 2012; Sheffi, 2015).

Another example would be North American utilities, which are based on semi-formal mutual aid agreements and will help by sharing workforce when one of them is hit by a disaster. After a number of destructive thunderstorms had left more than 4.2 million people in Midwest and Mid-Atlantic states without power, nearly 25,000 utility workers from all over the United States and even Canada helped in restoring power (North Atlantic Mutual Assistance Group, 2013; Sheffi, 2015).

Even fierce competitors in the transportation marketplace, such as railroad companies, sometimes have mutual aid agreements. This means that when interruptions due to floods or other issues affect track or train operations, competitors negotiate temporary alternate routing options to maintain a steady flow of freight or passengers (Sheffi, 2015).

As was seen in the aforementioned examples and the interviews conducted, inter-organizational collaboration can be of enormous help in risky and possibly devastating situations that supply chain disruptions may present to organizations. Therefore, it is argued that horizontal collaboration should be included in the SCRAM framework.

8.3 IT integration

As already mentioned, most of the SCRAM capabilities are also present in humanitarian supply chains, although the range of their implementation level differs. This is very evident when looking at IT integration of the supply chain.

To illustrate this point, Dell serves as a reference of a digital supply chain and how supply chain visibility may influence selling strategy, especially when confronted with supply chain disruptions. Generally speaking, Dell follows a "sell-what-you-have" strategy, which is feasible because customers either buy online or via telephone "build-to-order products" and can therefore be steered to solutions that are supplied easily and profitably. When a product part is in short supply, Dell simply raises its price and lowers the price of other products which are stocked abundantly. This happens on a daily (sometimes even hourly) basis, with the algorithms always taking into account what components are available on the market and their prices, competitors' pricing and expected market conditions. Without thorough supply chain visibility, fast forecasting technologies and other IT-related capabilities, this could not be possible (Sheffi, 2005b).

The same level of IT integration could not be found in the humanitarian world. Nevertheless, organizations like the WFP already show a high level of IT usage which is very similar to the commercial world. WFP also uses the Nexus solution, a well-known commercial software, to enhance supply chain visibility (GT Nexus, 2010). Apart from the aforementioned organization, a lack of state-of-the-art IT systems can be observed, which not only impacts supply chain visibility, but also demand forecasts and procurement. Most forecasts are based on

experience and there is no central point of information where information is collected and accessible throughout the network. Information is usually spread rather decentrally and lies with the respective subdivisions or warehouses. The range of this depends highly on the general organizational structure. Pool procurement or postponement, which are both already carried out in the humanitarian world, could be further enlarged through better supply chain visibility, by increasing pool procurement through knowledge about demand in different divisions of an organization.

9 Discussion and Conclusion

This thesis focused on supply chain resilience and how humanitarian and commercial organizations approach this topic. Therefore, first the commercial world's view on supply chain management was described and was then contrasted with the humanitarian world's view on it. The comparison showed that there exist differences between those two views, such as different interests and main shareholders, but that there are also many similarities. The conclusion was thus made that although these differences exist, when concerning supply chain resilience, they do not hinder comparison, since the differences do not change the general setting of the supply chains and the problems with which they are faced (time pressure, demand forecasting difficulties, etc.). As stakes in humanitarian supply chains are often related to people's survival and disasters are often very difficult to predict, managing the supply chains might be seen as even more challenging. Thus, research question one was answered.

When now considering how those two organization types are tackling the resilience problem, one sees that on the commercial side, many researchers have dealt with that problem already and that over time, quite a number of frameworks have been developed. In a literature research these frameworks were studied and compared. Through that review research question two could be answered, which focused on commercial supply chain resilience strategies.

A recent, very extensive and detailed framework is the SCRAM framework by Pettit et al. (2010), which was taken as further reference for commercial SCs. From the humanitarian point of view, supply chain resilience has hardly been studied so far. To answer research question three and to understand the approach of humanitarian organizations, interviews were conducted with five of the world's largest humanitarian organizations, including WFP, IFRC and IOM. Additionally, the Austrian Armed forces were interviewed, since the military is often active in disaster responses and works closely with humanitarian organizations. When analyzing the results of the interviews, it was evident that most of the interviewed organizations are trying to turn away from solely basing their response on warehouses and other redundancy measures, and are instead investing more in good relationships with suppliers all over the world and local or regional procurement strategies. Nevertheless, for the first response, huge warehouses are still of major importance. Collaboration and information exchange are practiced frequently, often facilitated by the cluster approach. All in all, it was apparent that humanitarian organizations have strategies and capabilities similar to those of commercial organizations.

One very evident difference lies in the integration and usage of IT software in the supply chain, which for many humanitarian organizations is still rather basic. The digital lack impacts many aspects of the supply chain, ranging from forecasting to visibility and fast information exchange issues. This marks the most important cross-learning aspect of humanitarian organizations. Intra-organizational and especially horizontal collaboration is something that HOs practice frequently and which helps them to react faster and more efficiently. Also, high motivation of employees was mentioned by the interviewees as an important part of an effective response, since people are more creative in problem solving and willing to go the extra mile to achieve a goal. Those two capabilities are not yet included in the aforementioned SCRAM framework, but as seen in the humanitarian world, in organizational psychology literature and in some examples from the commercial world, those capabilities are of

importance. Identifying these cross-learning potentials was the task of the final research question.

In summary, it can be stated that commercial and humanitarian organizations do not approach supply chain resilience very differently. The majority of SCRAM capabilities can also be found in the humanitarian sector. Nevertheless, there are some differences and it is believed that adding those to the framework or focusing more on their implementation in the humanitarian sector will benefit the response to supply chain disruptions.

9.1 Limitations

Like all types of research, this study suffers from a number of limitations. Although those limitations do not undermine the general findings and the significance of these findings, not commenting on them at some stage in the final reporting process would be neglectful.

Research boundary is a very important limitation to be touched upon. The focus of this thesis was to understand the different approaches of humanitarian and commercial organizations to supply chain resilience as a whole. Therefore, a very broad approach was taken, focusing not on details, but on basic strategies. Whilst this may be viewed by some as too big a topic to tackle, it was seen as inevitable to establish a common ground, considering so little is yet known about the subject in the humanitarian world and what generally speaking the cross-learning potentials could be, before immediately diving into detailed aspects of it.

Certain organizations and frameworks had to be taken as a reference. As there is much literature on supply chain resilience in the commercial world, it was used as a reference point. It could be said that using the SCRAM framework to represent commercial supply chain resilience capabilities was too restricting. However, as the literature study showed (see section 6.5), this framework includes all of the capabilities mentioned in other literature and even introduces new aspects. Furthermore, through its detailed description of those capabilities, the SCRAM framework proved to be perfect for further investigations.

Concerning the chosen interview partners, this thesis focused on the key players in the field. Small or medium sized-organizations were not considered. This was done because of the reasoning that key players are the most important ones, since they are responsible for the majority of humanitarian aid activities. It is said that approximately a dozen organizations are responsible for the delivery of more than 90% of the funds mobilized by humanitarian actors (Ferris, 2007; Tatham & Pettit, 2010). Nevertheless, analyzing small and medium-sized organizations is considered an interesting task for-follow up studies in order to understand the level of professionalization of those organizations.

9.2 Outlook

This thesis can be seen as a starting point for further investigations in humanitarian supply chain resilience research, as it has shown basic resilience approaches. In following studies, those should be investigated more thoroughly. Especially interesting would be investigations on the strengths of humanitarian organizations that were discovered – collaboration and employee motivation – and also their major weakness, only little IT integration. In this area, a contrast study between a humanitarian "IT pioneer" (like WFP) in comparison with an organization with limited IT usage would be highly intriguing.

Furthermore, research on how the capabilities discovered can be introduced to already existing supply systems would be the next step. What are the challenges organizations would

have to face when introducing new resilience strategies and what are the outcomes in relation to different goals, environments and backgrounds? Essentially, one of the most interesting outlook research topics to be tackled would be the creation of a supply chain resilience framework which not only states the different possible capabilities, but also maps out a path to find the fitting mix of it for one's own organization. Thus, it would be crucial/important to take into account the different settings in which organizations are working, customer expectations and also the prevailing culture. To do this, supply chain resilience metrics would have to be developed, which might also pose a challenge, since many of the most devastating disruptions are not or only hardly predictable.

As can be seen, a plethora of future research topics can be identified, for which this thesis formed the basis.

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Abidi, H., Leeuw, S. de, & Klumpp, M. (2015). The value of fourth-party logistics services in the humanitarian supply chain. *Journal of Humanitarian Logistics and Supply Chain Management*, *5*(1), 35–60. https://doi.org/10.1108/JHLSCM-02-2014-0010

Aitken, J. M. (1998). *Supply Chain Integration Within the Context of a Supplier Association: Case Studies of Four Supplier Associations*. Cranfield University. Retrieved from http://dspace.lib.cranfield.ac.uk/handle/1826/9990

Ali, A., Mahfouz, A., & Arisha, A. (2017). Analysing supply chain resilience: integrating the constructs in a concept mapping framework via a systematic literature review. *Supply Chain Management: An International Journal*, *22*(1), 16–39. https://doi.org/10.1108/SCM-06-2016-0197

Amabile, T. M. (1982). The Social Psychology of Creativity: A Consensual Assessment Technique. *Journal of Personality and Social Psychology*, *43*(5), 997–1013.

American Production and Inventory Control Society. (2017). APICS. Retrieved February 1, 2017, from http://www.apics.org/

Antai, I., & Owusu, R. (2015). A 3-R principle for characterizing failure in relief supply chains' response to natural disasters. https://doi.org/10.1108/JHLSCM-07-2014-0028

Arminas, D. (2005). Supply Lessons of Tsunami Aid. *Supply Management*, *10*(2), 14.

Asian Development Bank. (2004). Disaster and Emergency Policy. Retrieved August 16, 2017, from https://www.adb.org/sites/default/files/institutional-document/32118/disaster-emergency.pdf

Bakshi, N., & Kleindorfer, P. (2009). Co-opetition and Investment for Supply-Chain Resilience. *Production and Operations Management*, *18*(6), 583–603. https://doi.org/10.1111/j.1937-5956.2009.01031.x

Balcik, B., & Beamon, B. M. (2008). Facility location in humanitarian relief. *International Journal of Logistics: Research and Applications*, *11*(2), 101–121. https://doi.org/10.1080/13675560701561789

Balcik, B., Beamon, B. M., Krejci, C. C., Muramatsu, K. M., & Ramirez, M. (2010). Coordination in humanitarian relief chains: Practices, challenges and opportunities. *International Journal of Production Economics*, *126*(1), 22–34. https://doi.org/10.1016/j.ijpe.2009.09.008

Barber, E. (2012). Military Involvement in Humanitarian Supply Chains. In G. Kovács & K. Spens (Eds.), *Relief Supply Chain Management for Disasters: Humanitarian Aid and Emergency Logistics* (pp. 123–146). Business Science Reference. https://doi.org/10.4018/978-1-60960-824-8.ch008

Barroso, A. P., Machado, V. H., & Cruz, V. (2011). Supply Chain Resilience Using the Mapping Approach. In *Supply Chain Management*. InTech. https://doi.org/10.5772/15006

BBC. (2012). Fire in small German town could curb world car production - BBC News. Retrieved November 14, 2017, from http://www.bbc.com/news/business-17769466

Beamon, B. M. (2004). Humanitarian Relief Chains: Issues and Challenges. In *Proceedings of the 34th International Conference on Computers and Industrial Engineering*. San

Francisco CA.

Beamon, B. M., & Balcik, B. (2008). Performance measurement in humanitarian relief chains. *International Journal of Public Sector Management*, *21*(1), 4–25. https://doi.org/10.1108/09513550810846087

Ben Naylor, J., Naim, M. M., & Berry, D. (1999). Leagility: Integrating the lean and agile manufacturing paradigms in the total supply chain. *International Journal of Production Economics*, *62*(1–2), 107–118. https://doi.org/10.1016/S0925-5273(98)00223-0

Berehulak, D. (2015). Nepal Slide. Retrieved December 7, 2015, from http://graphics8.nytimes.com/images/2015/04/29/world/20150430-NEPAL-slide-MZDU/20150430-NEPAL-slide-MZDU-jumbo.jpg

Bernardes, E. S., & Hanna, M. D. (2009). A theoretical review of flexibility, agility and responsiveness in the operations management literature. *International Journal of Operations & Production Management*, *29*(1), 30–53. https://doi.org/10.1108/01443570910925352

Besiou, M., Stapleton, O., & Van Wassenhove, L. N. (2011). System dynamics for humanitarian operations. *Journal of Humanitarian Logistics and Supply Chain Management*, *1*(1), 78–103. https://doi.org/10.1108/20426741111122420

Blackhurst, J., Craighead, C. W., Elkins, D., & Handfield, R. B. (2005). An empirically derived agenda of critical research issues for managing supply-chain disruptions. *International Journal of Production Research*, *43*(19), 4067–4081. https://doi.org/10.1080/00207540500151549

Blackhurst, J., Dunn, K., & Craighead, C. W. (2011). An Empirically Derived Framework of Global Supply Resiliency. *Journal of Business Logistics*, *32*(4), 374–391.

Blaikie, N. (2010). *Designing Social Research*. *Designing social research*. Polity Press.

BMLVS. (2015). *Das humanitäre Experiment: die Internationale Humanitäre und Katastrophenhilfe (IHKH) aus Sicht des Österreichischen Bundesheeres (ÖBH)*. Korneuburg: BMLVS.

Bölsche, D. (2012). Performance measurement in humanitarian logistics - a process-oriented perspective. In *Proceedings from the 2nd International HumLog Workshop, Essen, September 24*. Essen.

Bozarth, C. C., & Handfield, R. B. (2008). *Introduction to Operation and Supply Chain Management* (2nd ed.). New jersey: Pearson Education Inc.

Braunscheidel, M. J., & Suresh, N. C. (2009). The organizational antecedents of a firm's supply chain agility for risk mitigation and response. *Journal of Operations Management*, *27*(2), 119–140. https://doi.org/10.1016/j.jom.2008.09.006

Brown, R. B. (2006). *Doing your dissertation in business and management : the reality of researching and writing*. SAGE.

Bryman, A., & Bell, E. (2007). *Business Research Methods*. *Social Research*. https://doi.org/10.4135/9780857028044

Bryman, A., & Bell, E. (2015). *Business Research Methods*. *4th edition*. Oxford University Press.

Burrell, G., & Morgan, G. (1979). *Sociological Paradigms and organisational Analysis - Elements of the Sociology of Corporate Life*. *Sociological Paradigms and organisational*

analysis. Routledge Taylor & Francis Group. https://doi.org/10.1177/003803858001400219

Business Continuity Institute. (2016). *Supply Chain Resilience Report 2016. Business Continuity Institute*. Retrieved from https://www.riskmethods.net/resources/research/bci-supply-chain-resilience-2016.pdf

Cameron, S., & Price, D. (2009). *Business research methods : a practical approach*. Chartered Institute of Personnel and Development.

CARAUT. (2016). Interview with Caritas Austria on 04.07.2016.

CARGER. (2016). Interview with Caritas International (Germany) on 16.11.2016.

Caritas. (2017). Caritas. Retrieved July 25, 2017, from http://www.caritas.org/

Caritas Deutschland. (2017). Caritas Germany. Retrieved November 21, 2017, from http://www.caritas-germany.org/germancaritasassociation/finances/finances

Caritas International. (2017). Caritas International. Retrieved July 26, 2017, from http://www.caritasinternational.be/

Caritas International Germany. (2017). Caritas International Germany. Retrieved March 12, 2017, from http://www.caritas-international.de/

Carroll, A., & Neu, J. (2009). Volatility, unpredictability and asymmetry: An organising framework for humanitarian logistics operations? *Management Research News*, *32*(11), 1024–1037. https://doi.org/10.1108/01409170910998264

Centre of Research on the Epidemiology of Disasters. (2017). EM-DAT - The International Disaster Database. Retrieved January 16, 2017, from http://emdat.be/

Charles, A., Gatignon, A., & Van Wassenhove, L. N. Social Innovation Centre The Yogyakarta Earthquake : IFRC's Experiences with the Regionalized Supply Chain (2011).

Charles, A., Lauras, M., & Van Wassenhove, L. N. (2010). A model to define and assess the agility of supply chains: building on humanitarian experience. *International Journal of Physical Distribution & Logistics Management*, *40*(8/9), 722–741. https://doi.org/10.1108/09600031011079355

Chomilier, B., Samii, R., & Van Wassenhove, L. N. (2003). The central role of supply chain management at IFRC. *Forced Migration Review*, *18*(September), 15–16.

Chopra, S., & Meindl, P. (2007). *Supply Chain Management Strategy, Planning, and Operation* (3rd ed.). New Jersey: Pearson Education Inc. https://doi.org/10.1007/s13398-014-0173-7.2

Christopher, M. (2000). The Agile Supply Chain. *Industrial Marketing Management*, *29*(1), 37–44. https://doi.org/10.1016/S0019-8501(99)00110-8

Christopher, M. (2005). *Logistics and Supply Chain Management - Creating Value-Adding Networks*. *Supply Chain Management* (3rd ed.). Pearson Education Limited.

Christopher, M., & Holweg, M. (2011). "Supply Chain 2.0": managing supply chains in the era of turbulence. *International Journal of Physical Distribution & Logistics Management*, *41*(1), 63–82. https://doi.org/10.1108/09600031111101439

Christopher, M., & Peck, H. (2004). Building the resilient supply chain. *International Journal of Logistics Management*, *15*(2), 1–13. https://doi.org/10.1108/09574090410700275

Christopher, M., & Tatham, P. (2011). *Humanitarian logistics : meeting the challenge of preparing for and responding to disasters*. Kogan Page. Retrieved from https://books.google.at/books?id=5dmskurg0ZAC&pg=PT41&dq=European+Supply+Chain+Excellence+Award+ifrc+2006&source=gbs_toc_r&cad=4#v=onepage&q=European Supply Chain Excellence Award ifrc 2006&f=false

Conboy, K., & Fitzgerald, B. (2004). Toward a conceptual framework of agile methods: a study of agility in different disciplines. *Proceedings of the 2004 ACM Workshop on Interdisciplinary Software Engineering Research*, 37–44. https://doi.org/10.1145/1029997.1030005

Cooper, Martha C. Lambert, Douglas M. Pagh, J. D. (1997). Supply Chain Management: More Than a New Name for Logistics. *The International Journal of Logistics Management*, *8*(1), 1–14. https://doi.org/http://dx.doi.org/10.1108/09574099710805556

Council of Supply Chain Management Professionals. (2017). CSCMP. Retrieved February 1, 2017, from http://cscmp.org/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms.aspx?hkey=60879588-f65f-4ab5-8c4b-6878815ef921

Cozzolino, A. (2009). *Humanitarian Logistics*. https://doi.org/10.1080/09614520903564322

Cozzolino, A. (2012). *Humanitarian Logistics Cross-Sector Cooperation in Disaster Relief Management*. *SpringerBriefs in Business*. Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-30186-5

Cozzolino, A., Rossi, S., & Conforti, A. (2012). Agile and lean principles in the humanitarian supply chain: The case of the United Nations World Food Programme. *Journal of Humanitarian Logistics and Supply Chain Management*, *2*(1), 16–33. https://doi.org/10.1108/20426741211225984

Craighead, C. W., Blackhurst, J., Rungtusanatham, M. J., & Handfield, R. B. (2007). The severity of supply chain disruptions: Design characteristics and mitigation capabilities. *Decision Sciences*, *38*(1), 131–156. https://doi.org/10.1111/j.1540-5915.2007.00151.x

Crandall, R. E., & Crandall, W. (2015). *How management programs can improve performance : selecting and implementing the best program for your organization*. Retrieved from https://books.google.at/books?id=NAYoDwAAQBAJ&source=gbs_navlinks_s

Cranfield University - School of Management. (2002). *Supply Chain Vulnerability: Executive Report*. https://doi.org/10.1108/eb016623

Crotty, M. (1998). *The foundations of social research: Meaning and perspective in the research process*. London: Sage.

CRS. (2017a). CRS. Retrieved July 25, 2017, from https://www.crs.org/

CRS. (2017b). CRS Financial Summary. Retrieved November 21, 2017, from https://annualreport.crs.org/financials/

D'Haene, C., Verlinde, S., & Macharis, C. (2015). Measuring while moving (humanitarian supply chain performance measurement – status of research and current practice). *Journal of Humanitarian Logistics and Supply Chain Management*, *5*(2), 146–161. https://doi.org/10.1108/JHLSCM-04-2013-0016

Dash, S. R., Mishra, U. S., & Mishra, P. (2013). Emerging Issues and Opportunities in Disaster

Response Supply Chain Management. *International Journal of Supply Chain Management*, *2*(1), 55–61.

Davidson, A. L. (2006). *Key Performance Indicators in Humanitarian Logistics*. MIT.

Demmer, W. A., Vickery, S. K., & Calantone, R. (2011). Engendering resilience in small- and medium-sized enterprises (SMEs): a case study of Demmer Corporation. *International Journal of Production Research*, *49*(18), 5395–5413. https://doi.org/10.1080/00207543.2011.563903

Denzin, N. K., & Lincoln, Y. S. (2011). *The Sage Handbook of Qualitative Research*. Thousand Oaks, Calif. ; London : Sage. https://doi.org/Doi 10.1177/1354067x07080505

Development and Peace. (2016). *Annual Report 2015-2016*. Retrieved from https://www.devp.org/sites/www.devp.org/files/documents/materials/devpeace_arep ort_web_2015-2016_en.pdf

Development Initiatives. (2017). Definition of humanitarian assistance & aid. Retrieved October 3, 2017, from http://devinit.org/defining-humanitarian-assistance/

Development Initiatives Ltd. (2017). *Global Humanitarian Assistance Report 2017*. Retrieved from http://devinit.org/wp-content/uploads/2017/06/GHA-Report-2017-Full-report.pdf

DiePresse.com. (2017). Budget: Was das Heer wert ist. Retrieved December 19, 2017, from https://diepresse.com/home/innenpolitik/5288445/Budget_Was-das-Heer-wert-ist

Dionne, G. (2013). Risk management: History, definition, and critique. *Risk Management and Insurance Review*, *16*(2), 147–166. https://doi.org/10.1111/rmir.12016

Eden, D. (1975). Intrinsic and Extrinsic Rewards and Motives: Replication and Extension with Kibbutz Workers. *Journal of Applied Social Psychology*, *5*(4), 348–361. https://doi.org/10.1111/j.1559-1816.1975.tb00687.x

Eisenhardt, K. M. (1989). Building Theories from Case Study. *The Academy of Management Review*, *14*(4), 532–550.

Encyclopedia Britannica. (2017). Encyclopaedia Britannica. Retrieved October 12, 2017, from https://www.britannica.com/

Ernst, R. (2003). The academic side of commercial logistics and the importance of this special issue. *Forced Migration Review*, (18), 5.

Ertem, M. A., & Buyurgan, N. (2011). An auction-based framework for resource allocation in disaster relief. *Journal of Humanitarian Logistics and Supply Chain Management*, *1*(2), 170–188. https://doi.org/10.1108/20426741111158412

Ertem, M. A., Buyurgan, N., & Rossetti, M. D. (2010). Multiple-buyer procurement auctions framework for humanitarian supply chain management. *International Journal of Physical Distribution & Logistics Management*, *40*(3), 202–227. https://doi.org/10.1108/09600031011035092

Faisal, M. N., Banwet, D. K., & Shankar, R. (2007). Information risks management in supply chains: an assessment and mitigation framework. *Journal of Enterprise Information Management*, *20*(6), 677–699. https://doi.org/10.1108/17410390710830727

Falasca, M., & Zobel, C. W. (2011). A two-stage procurement model for humanitarian relief supply chains. *Journal of Humanitarian Logistics and Supply Chain Management*, *1*(2), 151–169. https://doi.org/10.1108/20426741111188329

Farahani, R. Z., Rezapour, S., Kardar, L., & Daneshzand, F. (2011). *Logistics Operations and Management - Concepts and Models* (1st ed.). Elsevier.

Fawcett, S. E., & Waller, M. A. (2013). Considering Supply Chain Management' s Professional Identity: The Beautiful Discipline (Or , "We Don"t Cure Cancer , But We Do Make a Big Difference'). *Journal of Business Logistics*, *34*(3), 183–188. https://doi.org/10.1111/jbl.12018

Ferris, E. (2007). The global Humanitarian Platform: opportunity for NGOs? *Forced Migration Review*, *29*, 6–8. Retrieved from http://www.brookings.edu/~/media/research/files/articles/2007/12/humanitarian-platform-ferris/12_humanitarian_platform_ferris_en.pdf

Fiksel, J. (2006). Sustainability and Resilience: Toward a Systems Approach. *Sustainability: Science, Practice, & Policy*, *2*(2), 2006.

Fiksel, J., Polyviou, M., Croxton, K. L., & Pettit, T. J. (2015). From risk to resilience: Learning to deal with disruption. *Sloan Management Review*, *56*(2), 79–86. Retrieved from http://mitsmr.com/1uOW55d

Flyvbjerg, B. (2011). Case study. In *The Sage Handbook of Qualitative Research* (pp. 301–316). Thousand Oaks, CA: Sage. https://doi.org/10.1016/S1360-8592(98)80013-2

Folke, C., Carpenter, S., Walker, B., Scheffer, M., Elmqvist, T., Gunderson, L., & Holling, C. S. (2004). Regime Shifts, Resilience, and Biodiversity in Ecosystem Management. *Annual Review of Ecology, Evolution, and Systematics*, *35*(1), 557–581. https://doi.org/10.1146/annurev.ecolsys.35.021103.105711

Fondation Caritas France. (2017). Fondation Caritas France. Retrieved November 21, 2017, from https://www.fondationcaritasfrance.org/financements/

Frisch, M. (1998). Der Mensch erscheint im Holozän. In *Gesammelte Werke Band 7 1976-1985* (pp. 205–300). Frankfurt: Suhrkamp.

Fritz, C. (1961). Disasters. In R. Merton & R. Nisbet (Eds.), *Contemporary Social Problems* (pp. 651–694). New York: Harcourt Press.

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, *26*(4), 331–362. https://doi.org/10.1002/job.322

Gatignon, A., Van Wassenhove, L. N., & Charles, A. (2010). The Yogyakarta earthquake: Humanitarian relief through IFRC's decentralized supply chain. *International Journal of Production Economics*, *126*(1), 102–110. https://doi.org/10.1016/j.ijpe.2010.01.003

Gattorna, J. (2010). *Dynamic Supply Chains* (2nd ed.). Prentice Hall.

GCPS. (2016). Inteview with Global CCCM Civil Protection Specialist on 08.09.2016.

GDACS. (2017). Global Disaster Alert and Coordination System. Retrieved August 1, 2017, from http://www.gdacs.org/

GEN. (2017). Interview with IFRC Geneve on 24.11.2017.

Gilliland, M., Sglavo, U., & Tashman, L. (2015). *Business forecasting : practical problems and solutions* (reprint). John Wiley & Sons.

Glaser, B. G., & Strauss, A. L. (1967). The discovery of grounded theory. *International Journal of Qualitative Methods*, *5*, 1–10. https://doi.org/10.2307/588533

GLCC. (2016). Interview with Global Logistics Cluster Coordinator on 30.08.2016.

GLCFP. (2016). Interview with Global Logistic Cluster Focal Point on 30.08.2016.

Golgeci, I., & Ponomarov, S. Y. (2013). Does firm innovativeness enable effective responses to supply chain disruptions? An empirical study. *Supply Chain Management: An International Journal*, *18*(6), 604–617. https://doi.org/10.1108/SCM-10-2012-0331

Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children's learning: An experimental and individual difference investigation. *Journal of Personality and Social Psychology*, *52*(5), 890–898. https://doi.org/10.1037/0022-3514.52.5.890

Group, B. C. (2015). *UNICEF/WFP Return on Investment for Emergency Preparedness Study - Final Report*. Retrieved from http://www.unicef.org/publications/index_81164.html

GT Nexus. (2010). World Food Programme Turns to GT Nexus for Logistics Visibility and Supply Network Agility. Retrieved July 27, 2017, from http://www.gtnexus.com/newsroom/press-release/world-food-programme-turns-gt-nexus-logistics-visibility-and-supply-network

Guerrero-Garcia, S., Lamarche, J.-B., Vince, R., Cahill, S., & Besiou, M. (2016). *Delivering in a Moving World*. Retrieved from http://www.logcluster.org/sites/default/files/whs_humanitarian_supply_chain_paper_final_24_may.pdf

Gürtlich, G. H., & Lampl, S. (2013). *Grundfragen der Militärlogistik und der Logistik von Einsatzorganisationen* (1.). Wien: Republik Österreich / Bundesministerium für Landesverteidigung und Sport. https://doi.org/10.1002/9781119244592

Haavisto, I., & Goentzel, J. (2015). Measuring humanitarian supply chain performance in a multi-goal context. *Journal of Humanitarian Logistics and Supply Chain Management*, *5*(3), 300–324. https://doi.org/10.1108/JHLSCM-07-2015-0028

HALA. (2016). Interview with Humanitarian Affairs and Legal Advisor to AAF on 26.09.2016.

Hamel, G., & Välikangas, L. (2003). The Quest for Resilience. *Harvard Business Review*, *81*(9), 52–65. https://doi.org/10.1225/R0309C

Harteveld, C., & Suarez, P. (2015). Guest editorial: games for learning and dialogue on humanitarian work. *Journal of Humanitarian Logistics and Supply Chain Management*, *5*(1), 61–72. https://doi.org/10.1108/JHLSCM-01-2015-0005

HCMSF. (2016). Interview with MSF Humanitarian Coordinator on 01.04.2016.

Heaslip, G. (2012). Improving the civil military dimension in humanitarian logistics: The challenges. In *Poms 23rd Annual Conference*. Chicago. https://doi.org/10.1017/CBO9781107415324.004

Heaslip, G. (2013). Services operations management and humanitarian logistics. *Journal of Humanitarian Logistics and Supply Chain Management*, *3*(1), 37–51. https://doi.org/10.1108/20426741311328501

Heaslip, G. (2015). Guest editorial: humanitarian logistics - an opportunity for service research. *Journal of Humanitarian Logistics and Supply Chain Management*, *5*(1), 2–11. https://doi.org/10.1108/JHLSCM-01-2015-0004

Heaslip, G., & Barber, E. (2014). Using the military in disaster relief: systemising challenges and opportunities. *Journal of Humanitarian Logistics and Supply Chain Management*, *4*(1),

60–81. https://doi.org/10.1108/JHLSCM-03-2013-0013

Heckmann, P., Shorten, D., & Engel, H. (2003). Supply Chain Management at 21, 1–12.

Hendricks, K. B., & Singhal, V. R. (2003). The effect of supply chain glitches on shareholder wealth. *Journal of Operations Management*, *21*(5), 501–522. https://doi.org/10.1016/j.jom.2003.02.003

Hendricks, K. B., & Singhal, V. R. (2005a). An Empirical Analysis of the Effect of Supply Chain Disruptions on Long-Run Stock Price Performance and Equity Risk of the Firm. *Production and Operations Management*, *14*(1), 35–52.

Hendricks, K. B., & Singhal, V. R. (2005b). Association Between Supply Chain Glitches and Operating Performance. *Management Science*, *51*(5), 695–711. https://doi.org/10.1287/mnsc.1040.0353

Hendricks, K. B., Singhal, V. R., & Zhang, R. (2009). The effect of operational slack, diversification, and vertical relatedness on the stock market reaction to supply chain disruptions. *Journal of Operations Management*, *27*(3), 233–246. https://doi.org/10.1016/j.jom.2008.09.001

Herzberg, F. (1968). One more time: How do you motivate employees? *Harvard Business Review*, *46*, 53–62.

HLD. (2017). Interview with Head of Logistics Division on 24.03.2017.

Hohenstein, N.-O., Feisel, E., Hartmann, E., & Giunipero, L. (2015). Research on the phenomenon of supply chain resilience. *International Journal of Physical Distribution & Logistics Management*, *45*(1/2), 90–117. https://doi.org/10.1108/IJPDLM-05-2013-0128

Holling, C. S. (1973). Resilience and Stability of Ecological Systems. *Annual Review of Ecology and Systematics*, *4*(1), 1–23. https://doi.org/10.1146/annurev.es.04.110173.000245

Howden, M. (2009). How Humanitarian Logistics Information Systems Can Improve Humanitarian Supply Chains : A View from the Field. *6th International ISCRAM Conference*, (May), 1–10.

Huan, S. H., Sheoran, S. K., & Wang, G. (2004). A review and analysis of supply chain operations reference (SCOR) model. *Supply Chain Management: An International Journal*, *9*(1), 23–29. https://doi.org/10.1108/13598540410517557

Huang, M., Smilowitz, K., & Balcik, B. (2012). Models for relief routing: Equity, efficiency and efficacy. *Transportation Research Part E: Logistics and Transportation Review*, *48*(1), 2–18. https://doi.org/10.1016/j.tre.2011.05.004

Husdal, J. (2010). A Conceptual Framework for Risk and Vulnerability in Virtual Enterprise Networks. *Managing Risk in Virtual Enterprise Networks: Implementing Supply Chain Principles*, (August), 1–27. https://doi.org/10.4018/978-1-61520-607-0.ch001

IASC. (2006). IASC Guidance Note on Using the Cluster Approach to Strengthen Humanitarian Response.

IASC. Cluster Coordination Reference Module (2015). Retrieved from http://sheltercluster.org/sites/default/files/docs/cluster_coordination_reference_mod ule_2015_final.pdf

IFRC. Risk Reduction in Practice: a Philippines case study (2003). Retrieved from http://www.ifrc.org/Global/Case studies/Disasters/cs-philippines.pdf

IFRC. The IFRC Regional Logistics Concept - Efficiency of Relief Item Delivery for the Myanmar Population Affected By Cyclone Nargis (2008). Retrieved from http://www.ifrc.org/PageFiles/91193/Myanmar Case Study v3.pdf?epslanguage=en

IFRC. IFRC Secretariat Standard Operating Procedures for Disaster Response and Early Recovery in Asia Pacific (2011). Retrieved from http://www.rcrc-resilience-southeastasia.org/wp-content/uploads/2016/02/Asia-Pacific-SOP.pdf

IFRC. Principles and Rules for Red Cross and Red Crescent Humanitarian Assistance (2013). Retrieved from http://www.ifrc.org/Global/Documents/Secretariat/Accountability/Principles Rules for Red Cross Red Crescent Humanitarian Assistance.pdf

IFRC. (2015). *Annual Report 2015*. Retrieved from http://media.ifrc.org/ifrc/wp-content/uploads/sites/5/2016/11/IFRC-Annual-Report-2015-EN_LR.pdf

IFRC. Disaster preparedness and response : building up from the ground up (2016). Retrieved from http://www.ifrc.org/Global/Case studies/Disasters/cs-asia-ndrt-bdrt-en.pdf

IFRC. (2016b). Global management and presence. Retrieved July 27, 2017, from http://media.ifrc.org/ifrc/wp-content/uploads/sites/5/2017/03/IFRC-Global-Management-and-Presence-EN_LR.pdf

IFRC. (2017a). Data IFRC. Retrieved July 26, 2017, from http://data.ifrc.org/

IFRC. (2017b). History - IFRC. Retrieved July 21, 2017, from http://www.ifrc.org/en/who-we-are/history/

IFRC. (2017c). Humanitarian logistics. Retrieved October 2, 2017, from http://www.ifrc.org/en/what-we-do/logistics/

IFRC. (2017d). IFRC. Retrieved July 21, 2017, from http://www.ifrc.org/

IFRC. (2017e). Our objectives - IFRC. Retrieved October 2, 2017, from http://www.ifrc.org/en/what-we-do/logistics/procurement/who-we-are/our-objectives-/

International Federation of Red Cross and Red Crescent Societies. (2014). *Annual Report 2014*. *Annual Report*. https://doi.org/10.1016/j.parkreldis.2015.02.017

International Organization for Migration. (2016). *Financial Report 2015*.

IOM. (2016). *Summary of IOM Statistics 2011 – 2015*. Retrieved from https://gmdac.iom.int/summary-of-IOM-statistics-2011-2015

IOM. (2017a). International Organization for Migration. Retrieved July 25, 2017, from https://www.iom.int/

IOM. (2017b). International Organization for Migration. Retrieved July 27, 2017, from https://www.iom.int/

IOM Tanzania. (2017). IOM. Retrieved July 25, 2017, from https://tanzania.iom.int/sites/default/files/Logos/IOM-Logo.png

Jackson, S. L. (2011). *Research Methods and Statistics: A Critical Thinking Approach* (Vol. Third).

Jahre, M. (2017). Humanitarian supply chain strategies – a review of how actors mitigate supply chain risks. *Journal of Humanitarian Logistics and Supply Chain Management*, *7*(2),

82–101. https://doi.org/10.1108/JHLSCM-12-2016-0043

Jahre, M., & Heigh, I. (2008). Does the Current Constraints in Funding Promote Failure in Humanitarian Supply Chains ? *Supply Chain Forum: An International Journal*, *9*(2), 44–54. https://doi.org/10.1080/16258312.2008.11517198

Jahre, M., Jensen, L.-M., & Listou, T. (2009). Theory development in humanitarian logistics: a framework and three cases. *Management Research News*, *32*(11), 1008–1023. https://doi.org/10.1108/01409170910998255

Jüttner, U., & Maklan, S. (2011). Supply chain resilience in the global financial crisis: an empirical study. *Supply Chain Management: An International Journal*, *16*(4), 246–259. https://doi.org/10.1108/13598541111139062

Kamalahmadi, M., & Parast, M. M. (2016). A review of the literature on the principles of enterprise and supply chain resilience: Major findings and directions for future research. *International Journal of Production Economics*, *171*, 116–133. https://doi.org/10.1016/j.ijpe.2015.10.023

Kaur, H., & Prakash, S. (2016). Sustainable procurement and logistics for disaster resilient supply chain. *Annals of Operations Research*. https://doi.org/10.1007/s10479-016-2374-2

Kent, J. L. J., & Flint, D. J. (1997). Perspectives on the evolution of logistics thought. *Journal of Business Logistics*, *18*(2), 15–29.

Ketchen, D. J., & Hult, G. T. M. (2007). Bridging organization theory and supply chain management: The case of best value supply chains. *Journal of Operations Management*, *25*(2), 573–580. https://doi.org/10.1016/j.jom.2006.05.010

Kleindorfer, P. R., & Saad, G. H. (2005). Managing Disruption Risks in Supply Chains, *14*(1), 53–68. https://doi.org/10.1111/j.1937-5956.2005.tb00009.x

Kovács, G., & Spens, K. (2009). Identifying challenges in humanitarian logistics. *International Journal of Physical Distribution & Logistics Management*, *39*(6), 506–528. https://doi.org/10.1108/09600030910985848

Kovács, G., & Spens, K. (2011a). Humanitarian logistics and supply chain management: the start of a new journal. *Journal of Humanitarian Logistics and Supply Chain Management*, *1*(1), 5–14. https://doi.org/10.1108/20426741111123041

Kovács, G., & Spens, K. (2011b). Trends and developments in humanitarian logistics – a gap analysis. *International Journal of Physical Distribution & Logistics Management*, *41*(1), 32–45. https://doi.org/10.1108/09600031111101411

Kovács, G., & Spens, K. (2012). *Relief supply chain management for disasters: humanitarian aid and emergency logistics*. Business Science Reference. https://doi.org/10.4018/978-1-60960-824-8.ch008

Kovács, G., & Spens, K. M. (2007). Humanitarian logistics in disaster relief operations. *International Journal of Physical Distribution & Logistics Management*, *37*(2), 99–114. https://doi.org/10.1108/09600030710734820

Kovács, G., & Tatham, P. (2009). Responding To Disruptions in the Supply Network-From Dormant To Action. *Journal of Business Logistics*, *30*(2), 215–229. https://doi.org/10.1002/j.2158-1592.2009.tb00121.x

Krejci, C. C. (2015). Hybrid simulation modeling for humanitarian relief chain coordination. *Journal of Humanitarian Logistics and Supply Chain Management*, 5(3), 325–347. https://doi.org/10.1108/JHLSCM-07-2015-0033

Kunz, N., & Reiner, G. (2012). A meta-analysis of humanitarian logistics research. *Journal of Humanitarian Logistics and Supply Chain Management*, 2(2), 116–147. https://doi.org/10.1108/20426741211260723

Kurier. (2016). Bundesheer bekommt beträchtliche Finanzspritze - kurier.at. Retrieved July 26, 2017, from https://kurier.at/politik/inland/bundesheer-bekommt-betraechtliche-finanzspritze/194.481.019

Kurier. (2017). Der Konzern Caritas. Retrieved November 21, 2017, from https://kurier.at/wirtschaft/der-konzern-caritas/108.680.067

L'Hermitte, C., Bowles, M., Tatham, P., Brooks, B., Peretti, U., Wu, Y., … Macharis, C. (2015). An integrated approach to agility in humanitarian logistics. *Journal of Humanitarian Logistics and Supply Chain Management*, 5(2), 209–233. https://doi.org/10.1108/JHLSCM-04-2014-0016

Lambert, D. M., Cooper, M. C., & Pagh, J. D. (1998). Supply Chain Management: Implementation Issues and Research Opportunities. *The International Journal of Logistics Management*, 9(2), 1–20. https://doi.org/10.1108/09574099810805807

Larson, P., & Halldórsson, Á. (2004). Logistics versus supply chain management: An international survey. *International Journal of Logistics Research and Applications*, 7(1), 17–31. https://doi.org/10.1080/13675560310001619240

Lee, H. L. (2002). Aligning Supply Chain Strategies with Product Uncertainties. *California Management Review*, 44(3), 105–110.

Lee, H. L. (2004). The triple-A supply chain. *Harvard Business Review*, 82(10), 2–12.

Lee, N., & Lings, I. (2008). *Doing Business Research: A Guide to Theory and Practice*. SAGE Publications.

Leiras, A., de Brito Jr, I., Queiroz Peres, E., Rejane Bertazzo, T., & Tsugunobu Yoshida Yoshizaki, H. (2014). Literature review of humanitarian logistics research: trends and challenges. *Journal of Humanitarian Logistics and Supply Chain Management*, 4(1), 95–130. https://doi.org/10.1108/JHLSCM-04-2012-0008

Lengnick-Hall, C. A., & Beck, T. E. (2005). Adaptive Fit Versus Robust Transformation: How Organizations Respond to Environmental Change. *Journal of Management*, 31(5), 738–757. https://doi.org/10.1177/0149206305279367

Lenort, R., & Wicher, P. (2012). Agile Versus Resilient Supply Chains : Commonalities and Differences. In *Carpathian Logistics Congress* (pp. 7–12).

Leveson, N. G. (2011). *Engineering a Safer World: Systems Thinking Applied to Safety*. *Vasa*. The MIT Press. https://doi.org/10.1017/CBO9781107415324.004

Locke, E. A., & Latham, G. P. (1990). *A Theory of Goal Setting & Task Performance*. Englewood Cliffs, NJ: Prentice Hall.

Logistics Cluster. (2017). Logistics Operational Guide (LOG). Retrieved August 31, 2017, from http://dlca.logcluster.org/display/LOG/Logistics

Long, D. (1997). Logistics for disaster relief: engineering on the run. *IIE Solutions*, 29(6), 26–

29.

Long, D., & Wood, D. (1995). The Logistics of Famine Relief. *Journal of Business Logistics*, *16*(1), 213–229.

Lu, D. (2011). *Fundamentals of Supply Chain Management*. Dr. Dawei Lu & Ventus Publishing ApS. https://doi.org/10.1007/978-3-540-24816-3_1

Luke, M., Stamm, J. L. H., Muggy, L., & Stamm, J. L. H. (2014). Game theory applications in humanitarian operations: a review. *Journal of Humanitarian Logistics and Supply Chain Management*, *4*(1), 4–23. https://doi.org/10.1108/JHLSCM-07-2013-0026

Lummus, R. R., Krumwiede, D. W., & Vokurka, R. J. (2001). The relationship of logistics to supply chain management : developing a common industry definition The relationship of logistics to supply chain management : developing a common industry definition. *Industrial Management & Data Systems*, *101*(8), 426–432. https://doi.org/http://dx.doi.org/10.1108/02635570110406730

MAAW. (2017). One more time: How do you motivate employees? Retrieved November 29, 2017, from http://maaw.info/ArticleSummaries/ArtSumHerzberg6803.htm

Mangan, J., Lalwani, C., & Butcher, T. (2008). *Global logistics and supply chain management*. John Wiley & Sons.

Manuj, I., & Mentzer, J. T. (2008). Global supply chain risk management strategies. *International Journal of Physical Distribution and Logistics Management*, *38*(3), 192–223. https://doi.org/doi:10.1108/09600030810866986

Mari Ainikki Anttila, U. (2014). Human security and learning in crisis management. *Journal of Humanitarian Logistics and Supply Chain Management*, *4*(1), 82–94. https://doi.org/10.1108/JHLSCM-04-2013-0014

Martinez, A. J. P., & Van Wassenhove, L. N. (2010). Using OR to Support Humanitarian Operations: Learning from the Haiti Earthquake. *INSEAD Working Paper Series*. https://doi.org/10.2139/ssrn.1634942

Maslow, A. H. (1954). The Instinctoid Nature of Basic Needs. *Journal of Personality*, *22*(3), 326–347. https://doi.org/10.1111/j.1467-6494.1954.tb01136.x

Mason-Jones, R., Naylor, B., & Towill, D. R. (2000). Lean, agile or leagile? Matching your supply chain to the marketplace. *International Journal of Production Research*, *38*(17), 4061–4070. https://doi.org/10.1080/00207540050204920

Matas, J. (2014). UNICEF WeShare. Retrieved December 7, 2015, from http://weshare.unicef.org/archive/-2AM408032V1E.html

McGraw, K. O., & McCullers, J. C. (1979). Evidence of a detrimental effect of extrinsic incentives on breaking a mental set. *Journal of Experimental Social Psychology*, *15*(3), 285–294. https://doi.org/10.1016/0022-1031(79)90039-8

McKinsey. (2002). Supply Chain Quick Diagnostics.

McLachlin, R., & Larson, P. (2011). Building humanitarian supply chain relationships: lessons from leading practitioners. *Journal of Humanitarian Logistics and Supply Chain Management*, *1*(1), 32–49. https://doi.org/10.1108/20426741111122402

Médecins Sans Frontières. (2015a). *MSF Financial Report 2015*. Retrieved from http://www.msf.org/sites/msf.org/files/msf_financial_report_2015_final_0.pdf

Médecins Sans Frontières. (2015b). Pushed to the Limit and Beyond - A year into the largest ever Ebola outbreak. Retrieved July 26, 2016, from http://www.msf.org.uk/sites/uk/files/ebola_-_pushed_to_the_limit_and_beyond.pdf

Médecins Sans Frontières. (2017). MSF. Retrieved July 27, 2017, from http://www.msf.org/

Meepetchdee, Y., & Shah, N. (2007). Logistical network design with robustness and complexity considerations. *International Journal of Physical Distribution & Logistics Management*, *37*(3), 201–222. https://doi.org/10.1108/09600030710742425

Melnyk, S. A., Closs, D. J., Griffis, S. E., Zobel, C. W., & Macdonald, J. R. (2014). Understanding Supply Chain Resilience. *Supply Chain Management Review*, *18*(1), 34–41.

Melnyk, S. A., Davis, E. W., Spekman, R. E., & Sandor, J. (2010). Outcome-Driven Supply Chains. *MIT Sloan Management Review*, *51*(2), 33–38.

Mentzer, J. T., Dewitt, W., Keebler, J. S., Min, S., Nix, N. W., Smith, C. D., & Zacharia, Z. G. (2001). Defining supply chain management. *Journal of Business Logistics*, *22*(2), 1–25. https://doi.org/10.1002/j.2158-1592.2001.tb00001.x

Merriam-Webster. (2017a). Customer | Definition of Customer by Merriam-Webster. Retrieved August 7, 2017, from https://www.merriam-webster.com/dictionary/customer

Merriam-Webster. (2017b). Resilience | Definition of Resilience by Merriam-Webster. Retrieved September 2, 2017, from https://www.merriam-webster.com/dictionary/resilience

Meyer, J. P., Becker, T. E., & Vandenberghe, C. (2004). Employee Commitment and Motivation: A Conceptual Analysis and Integrative Model. *Journal of Applied Psychology*, *89*(6), 991–1007. https://doi.org/10.1037/0021-9010.89.6.991

Miles, M. ., Huberman, A. ., & Saldaña, J. (2014). *Qualitative Data Analysis: A Methods Sourcebook*. *Qualitative data analysis: A methods sourcebook (3nd ed.).* London: Sage.

Ministry of Defense and Sports. (2017). Austrian Armed Forces. Retrieved July 25, 2017, from http://www.bundesheer.at/english/index.shtml

Missing Maps. (2017). Missing Maps. Retrieved July 31, 2017, from http://www.missingmaps.org/

MIT Center for Transportation and Logistics. (2017). CTL.SC1x Supply Chain Fundamentals. Retrieved October 12, 2017, from https://courses.edx.org/courses/course-v1:MITx+CTL.SC1x_2+1T2016/courseware/eb6a807af0324d9caaaab908133f3e7c/d05755d771d9486aa78ba888fdcc4125/?activate_block_id=block-v1%3AMITx%2BCTL.SC1x_2%2B1T2016%2Btype%40sequential%2Bblock%40d05755d771d9486aa78ba888fd

Morales, M., & Sandlin, D. E. (2015). Managing airborne relief during international disasters. *Journal of Humanitarian Logistics and Supply Chain Management*, *5*(1), 12–34. https://doi.org/10.1108/JHLSCM-01-2014-0008

MSF Logistique. (2015). *Rapport Annuel 2015*. Retrieved from http://www.msflogistique.org/index.php/en/hierarchical-document-list/rapport-annuel/102-rapport-annuel-2015

MSFLOG. (2016). Interview with MSF Logistique Project Coordinator on 20.04.2016.

Murray, S. (2005). How to deliver on the promises. *Financial Times*, p. 9. Retrieved from https://www.ft.com/content/79ae9810-6012-11d9-bd2f-00000e2511c8

Natarajarathinam, M., Capar, I., & Narayanan, A. (2009). Managing supply chains in times of crisis: a review of literature and insights. *International Journal of Physical Distribution & Logistics Management*, *39*(7), 535–573. https://doi.org/10.1108/09600030910996251

Nisha de Silva, F. (2001a). Providing spatial decision support for evacuation planning: a challenge in integrating technologies. *Disaster Prevention and Management: An International Journal*, *10*(1), 11–20. https://doi.org/10.1108/09653560110381787

Nisha de Silva, F. (2001b). Providing spatial decision support for evacuation planning: a challenge in integrating technologies. *Disaster Prevention and Management: An International Journal*, *10*(1), 11–20. https://doi.org/10.1108/09653560110381787

nobelprize.org. (2017). The Nobel Peace Prize. Retrieved April 25, 2017, from http://www.nobelprize.org/nobel_prizes/peace/laureates/

North Atlantic Mutual Assistance Group. (2013). North Atlantic Mutual Assistance Group Guidelines North Atlantic. Retrieved from http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7BC47D7F7E-3A9C-4C7E-B173-302E017E270A%7D

O'Brien, S., & UN OCHA. (2015, August). Interoperability in Humanitarian Response: from coexistence to cooperation. *Presentation at the UN Retreat at the European Forum Alpbach 2015*. Alpbach, Austria.

OCHA. (2017). Cluster Coordination | OCHA. Retrieved July 24, 2017, from https://www.unocha.org/legacy/what-we-do/coordination-tools/cluster-coordination

Oloruntoba, R., & Gray, R. (2006). Humanitarian aid : an agile supply chain ? *Supply Chain Management: An International Journal*, *11*(2), 115–120. https://doi.org/10.1108/13598540610652492

Oloruntoba, R., & Kovács, G. (2015). A commentary on agility in humanitarian aid supply chains. *Supply Chain Management: An International Journal*, *20*(6), 708–716. https://doi.org/10.1108/SCM-06-2015-0244

Oxford University Press. (2017). Oxford Learner's Dictionaries. Retrieved October 5, 2017, from http://www.oxfordlearnersdictionaries.com/

Pedraza Martinez, A. J., Hasija, S., & Van Wassenhove, L. N. (2010). An Operational Mechanism Design for Fleet Management Coordination in Humanitarian Operations. *SSRN Electronic Journal*, 1–41. https://doi.org/10.2139/ssrn.1698186

Peretti, U., Tatham, P., Wu, Y., & Sgarbossa, F. (2015). Reverse logistics in humanitarian operations: challenges and opportunities. *Journal of Humanitarian Logistics and Supply Chain Management*, *5*(2), 253–274. https://doi.org/10.1108/JHLSCM-07-2014-0026

Perry, R. W. (2007). What is a Disaster? In *Handbook of Disaster Research* (pp. 1–15). Springer. https://doi.org/10.1007/978-0-387-32353-4_1

Pettit, S. J., & Beresford, A. (2005). Emergency relief logistics: an evaluation of military, non-military and composite response models. *International Journal of Logistics: Research and Application*, *8*(4), 313–331. https://doi.org/10.1080/13675560500407325

Pettit, S. J., & Beresford, A. (2009). Critical success factors in the context of humanitarian aid

supply chains. *International Journal of Physical Distribution & Logistics Management*, *39*(6), 450–468. https://doi.org/10.1108/09600030910985811

Pettit, S. J., Beresford, A., Whiting, M., Banomyong, R., & Sylvie, B. (2014). The 2004 Thailand tsunami and the April 2012 tsunami warning: were lessons learned? In P. Tatham & M. Christopher (Eds.), *Humanitarian Logistics* (2nd ed., pp. 129–150). Kogan Page.

Pettit, T. J. (2008). *Supply Chain Resilience : Development of a Conceptual Framework, an Assessment Tool and an Implementation Process*. Ohio State University.

Pettit, T. J., Fiksel, J., & Croxton, K. L. (2010). Ensuring Supply Chain Resilience: Development of a Conceptual Framework. *Journal of Business Logistics*, *31*(No. 1), 1–22. https://doi.org/10.1002/j.2158-1592.2010.tb00125.x

Philliber, S. G., Schwab, M. R., & Sloss, G. S. (1980). *Social research*. Itasca: F E Peacock Publisher.

Pinder, C. C. (1998). *Motivation in work organizations*. Upper Saddle River, NJ: Prentice Hall.

Ponomarov, S. Y., & Holcomb, M. C. (2009). Understanding the concept of supply chain resilience. *The International Journal of Logistics Management*, *20*(1), 124–143. https://doi.org/10.1108/09574090910954873

Porter, L. W., & Lawler, E. E. (1968). *Managerial Attitudes and Performance - Lyman W. Porter, Edward E. Lawler - Google Books*. Homewood, IL: Richard D. Irwin.

Prater, E., Biehl, M., & Smith, M. A. (2001). International supply chain agility - Tradeoffs between flexibility and uncertainty. *International Journal of Operations & Production Management*, *21*(5/6), 823–839. https://doi.org/10.1108/01443570110390507

Ramsden, G. (2014). *Managing the Humanitarian Supply Chain - a Collaborative Approach?* University of Lincoln.

RCA. (2017). Interview with Red Cross Austria on 26.09.2017.

Reed, M. (2005). Reflections on the "realist turn" in organization and management studies. *Journal of Management Studies*, *42*(8), 1621–1644. https://doi.org/10.1111/j.1467-6486.2005.00559.x

Revilla, E., & Sáenz, M. J. (2014). Supply chain disruption management: Global convergence vs national specificity. *Journal of Business Research*, *67*(6), 1123–1135. https://doi.org/10.1016/j.jbusres.2013.05.021

Rice, J. B. J., & Caniato, F. (2003). Building a Secure and Resilient Supply Network. *Supply Chain Management Review*, *7*(5), 22–30.

Rice, J. B. J., Caniato, F., Fleck, J., Disraelly, D., Lowtan, D., Lensing, R., & Pickett, C. (2003). *Supply chain response to terrorism: Creating resilient and secure supply chains*. *MIT Center for Transportation and Logistics*. Retrieved from http://web.mit.edu/scresponse/repository/SC_Resp_Report_Interim_Final_8803.pdf

Rietjens, S. J. H., Voordijk, H., & Boer, S. J. De. (2007). Co-ordinating humanitarian operations in peace support missions. *Disaster Prevention and Management*, *16*(1), 56–69. https://doi.org/10.1108/09653560710729811

Rigby, A. (2001). Humanitarian assistance and conflict management: the view from the non-governmental sector. *International Affairs*, *77*(4), 957–966. https://doi.org/10.1111/1468-2346.00229

Rutherford, K., Brem, S., & Matthew, R. A. (2003). *Reframing the agenda : the impact of NGO and middle power cooperation in international security policy*. Praeger.

Sáenz, M. J., & Revilla, E. (2014). Creating More Resilient Supply Chains. *MIT Sloan Management Review*, *55*(4).

Samii, R., Van Wassenhove, L. N., Kumar, K., & Becerra-Fernandez, I. IFRC * Choreographer of Disaster Management Preparing for tomorrow's disasters (2002).

Samii, R., Van Wassenhove, L. N., Kumar, K., & Becerra-Fernandez, I. IFRC * Choreographer of Disaster Management The Gujarat Earthquake (2002).

Santos-Vijande, M. L., & Álvarez-González, L. I. (2007). Innovativeness and organizational innovation in total quality oriented firms: The moderating role of market turbulence. *Technovation*, *27*(9), 514–532. https://doi.org/10.1016/j.technovation.2007.05.014

Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research Methods for Business Students*. *Business* (Vol. 7th). Financial Times. Retrieved from http://books.google.com/books?id=u-txtfaCFiEC&pgis=1

SCCMSF. (2016). Interview with MSF Supply Chain Coordinator on 06.04.2016.

SCFP. (2016). Interview with Shelter Coordination Focal Point on 19.12.2016.

Scholten, K., Scott, P. S., & Fynes, B. (2010). (Le)agility in humanitarian aid (NGO) supply chains. *International Journal of Physical Distribution & Logistics Management*, *40*(8/9), 623–635. https://doi.org/10.1108/09600031011079292

Scholten, K., Scott, P. S., & Fynes, B. (2014). Mitigation processes – antecedents for building supply chain resilience. *Supply Chain Management: An International Journal*, *19*(2), 211–228. https://doi.org/10.1108/SCM-06-2013-0191

Schulz, S. F. (2008). *Disaster Relief Logistics : Benefits of and Impediments to Horizontal Cooperation between Humanitarian Organizations*.

Seville, E., Brunsdon, D., Dantas, A., Le Masurier, J., Wilkinson, S., & Vargo, J. (2006). *Building Organisational Resilience : A New Zealand Approach. Resilient Organisations Research Programme*. Christchurch, New Zealand. Retrieved from http://ir.canterbury.ac.nz/handle/10092/649

Sheffi, Y. (2005a). Preparing for the Big One. *IEE Manufacturing Engineer*, *84*(5), 12–15.

Sheffi, Y. (2005b). *The Resilient Enterprise: Overcoming Vulnerability for Competitive Advantage* (Vol. 1). MIT Press Books.

Sheffi, Y. (2015). *The Power of Resilience: How the Best Companies Manage the Unexpected*. MIT Press Books.

Sheffi, Y., & Rice, J. B. J. (2005). A Supply Chain View of the Resilient Enterprise. *MIT Sloan Management Review*, *47*(1), 41–48. https://doi.org/10.1007/978-0-387-79933-9

Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2008). *Designing and managing the supply chain: concepts, strategies, and case studies* (Vol. 3). McGraw-Hill.

Smith, R. (2004). Operational capabilities for the resilient supply chain. *Supply Chain Practice*, *6*(2), 24–35. Retrieved from https://www.scopus.com/record/display.uri?eid=2-s2.0-79959613009&origin=inward&txGid=c2496a97f44828d359f72db77f843b38

Southwest Wisconsin Technical College. (2017). Supply Chain Inforgraphic. Retrieved October

12, 2017, from https://www.swtc.edu/uploadedimages/academics/programs/business/supply-chain-infographic.jpg

Supply Chain Council. (2012). *Supply Chain Operations Reference Model*. Retrieved from http://www.apics.org/docs/default-source/scc-non-research/scor11pdf.pdf

Svensson, G. (2000). A conceptual framework for the analysis of vulnerability in supply chains. *International Journal of Physical Distribution & Logistics Management*, *30*(9), 731–750. https://doi.org/10.1108/09600030010351444

Swafford, P., Ghosh, S., & Murthy, N. (2006). The antecedents of supply chain agility of a firm: Scale development and model testing. *Journal of Operations Management*, *24*(2), 170–188. https://doi.org/10.1016/j.jom.2005.05.002

Swiss Re. (2013). *Overview of Top Topics at Swiss Re*.

Tabaklar, T., Halldórsson, Á., Kovács, G., & Spens, K. (2015). Borrowing theories in humanitarian supply chain management. *Journal of Humanitarian Logistics and Supply Chain Management*, *5*(3), 281–299. https://doi.org/10.1108/JHLSCM-07-2015-0029

Taleb, N. N. (2007). *The black swan : the impact of the highly improbable*. Random house.

Tatham, P. (2012). Some reflections on the breadth and depth of the field of humanitarian logistics and supply chain management. *Journal of Humanitarian Logistics and Supply Chain Management*, *2*(2), 108–111. https://doi.org/10.1108/20426741211260714

Tatham, P., & Christopher, M. (2014). *Humanitarian logistics : meeting the challenge of preparing for and responding to disasters* (2nd editio). Kogan Page.

Tatham, P., Loy, J., & Peretti, U. (2015). Three dimensional printing – a key tool for the humanitarian logistician? *Journal of Humanitarian Logistics and Supply Chain Management*, *5*(2), 188–208. https://doi.org/10.1108/JHLSCM-01-2014-0006

Tatham, P., & Pettit, S. J. (2010). Transforming humanitarian logistics: the journey to supply network management. *International Journal of Physical Distribution & Logistics Management*, *40*(8), 609–622. https://doi.org/10.1108/09600031011079283

Tatham, P., Spens, K., & Taylor, D. (2009). Development of the academic contribution to humanitarian logistics and supply chain management. *Management Research News*, *32*(11). https://doi.org/10.1108/mrn.2009.02132kaa.001

Taylor, D., & Pettit, S. J. (2009). A consideration of the relevance of lean supply chain concepts for humanitarian aid provision. *International Journal of Services Technology and Management*, *12*(4), 430–444. https://doi.org/10.1504/IJSTM.2009.025817

The Guardian. (2010). Red Cross gives first aid lessons to Taliban. Retrieved from https://www.theguardian.com/world/2010/may/25/red-cross-first-aid-taliban

Thomas, A. (2005). *Humanitarian Logistics : Enabling Disaster Response*. *Fritz Institute*. Retrieved from http://www.fritzinstitute.org/pdfs/whitepaper/enablingdisasterresponse.pdf

Thomas, A., & Kopczak, L. R. (2005). *From logistics to supply chain management: the path forward in the humanitarian sector*. *Fritz Institute*. Retrieved from http://www.fritzinstitute.org/PDFs/WhitePaper/FromLogisticsto.pdf/

Thomas, A., & Mizushima, M. (2005). Logistics training: necessity or luxury? *Forced Migration*

Review, *22*, 60–61.

Thomas, M. U. (2002). Supply chain reliability for contingency operations. In *Annual Reliability and Maintainability Symposium. 2002 Proceedings* (pp. 61–67). IEEE. https://doi.org/10.1109/RAMS.2002.981621

Tomasini, R. M., & Van Wassenhove, L. N. (2004). Pan-American Health Organization'S Humanitarian Supply Management System: De-Politicization of the Humanitarian Supply Chain By Creating Accountability. *Journal of Public Procurement*, *4*(3), 437–449.

Tomasini, R. M., & Van Wassenhove, L. N. (2009). *Humanitarian logistics*.

Trunick, P. A. (2005). Special report: Delivering relief to tsunami victims. *Logistics Today*, *46*(2), 1–3.

UN OCHA. UNDAC Field Handbook (2013). Retrieved from https://docs.unocha.org/sites/dms/Documents/UNDAC Handbook 2013_english_final.pdf

UN OCHA. (2017a). Cluster Coordination. Retrieved September 2, 2017, from https://www.unocha.org/legacy/what-we-do/coordination-tools/cluster-coordination

UN OCHA. (2017b). Humanitarian Response. Retrieved October 18, 2017, from https://www.humanitarianresponse.info/en/about-clusters/what-is-the-cluster-approach

UN OCHA. (2017c). UN OCHA. Retrieved October 18, 2017, from https://www.unocha.org/

UNDP. (2012). *Puttin Resilience at the Heart of Development: Investing in Prevention and Resilient Recovery*. Retrieved from http://www.undp.org/content/undp/en/home/librarypage/crisis-prevention-and-recovery/putting-resilicence-at-the-heart-of-development.html

UNHCR. (2017). UNHCR - Emergency Handbook. Retrieved October 18, 2017, from https://emergency.unhcr.org/

UNISDR. (2009). UNISDR Terminoology on Disaster Risk Reduction. *International Stratergy for Disaster Reduction (ISDR)*, 1–30. Retrieved from www.unisdr.org/publications

UNISDR. (2017). United Nations Office for Disaster Risk Reduction. Retrieved August 2, 2017, from https://www.unisdr.org/we/inform/disaster-statistics

United Nations. (2013). *Strengthening of the coordination of emergency humanitarian assistance of the United Nations*. Retrieved from http://www.un.org/en/ecosoc/docs/adv2013/sg_report-adv_strengthening_coordination_of_ humanitarian_assistance.pdf

United Nations Office for the Coordination of Humanitarian Affairs. (2007). Oslo Guidelines: Guideline on the Use of Foreign Military and Civil Defence Assets in Disaster Relief. *United Nations*, (November).

Van Wassenhove, L. N. (2006). Humanitarian aid logistics: supply chain management in high gear. *Journal of the Operational Research Society*, *57*(5), 475–489. https://doi.org/10.1057/palgrave.jors.2602125

Van Wassenhove, L. N., & Pedraza Martinez, A. J. (2012). Using OR to adapt supply chain management best practices to humanitarian logistics. *International Transactions in Operational Research*, *19*(1–2), 307–322. https://doi.org/10.1111/j.1475-

3995.2011.00792.x

Vega, D., & Roussat, C. (2015). Humanitarian logistics: the role of logistics service providers. *International Journal of Physical Distribution & Logistics Management*, *45*(4), 352–375. https://doi.org/10.1108/IJPDLM-12-2014-0309

Vitasek, K. (2013). Supply Chain Management. Retrieved October 12, 2017, from http://cscmp.org/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms.aspx?hkey=60879588-f65f-4ab5-8c4b-6878815ef921

VO. (2017). Interview with a volunteer of the Austrian Red Cross on 14.07.2017.

Vroom, V. H. (1964). *Work and Motivation*. New York: Wiley.

Waters, D. (2007). *Supply chain risk management : vulnerability and resilience in logistics*. *Business*. Kogan Page.

WFP. (2017a). Food Quality and Safety - Selecting a Food Supplier. Retrieved July 27, 2017, from http://foodqualityandsafety.wfp.org/selecting-a-food-supplier

WFP. (2017b). History | World Food Programme. Retrieved July 24, 2017, from http://www1.wfp.org/history

WFP. (2017c). WFP. Retrieved July 24, 2017, from http://www1.wfp.org/

WFP. (2017d). WFP. Retrieved July 24, 2017, from https://www.wfp.org/sites/default/themes/wfp/images/school_meals/wfp.jpg

WFP VAM. (2017). WFP VAM. Retrieved July 26, 2017, from http://vam.wfp.org/

Wieland, A. (2013). Selecting the right supply chain based on risks. *Journal of Manufacturing Technology Management*, *24*(5), 652–668. https://doi.org/10.1108/17410381311327954

Wieland, A., & Wallenburg, C. M. (2012). Dealing with supply chain risks. *International Journal of Physical Distribution & Logistics Management*, *42*(10), 887–905. https://doi.org/10.1108/09600031211281411

Wieland, A., & Wallenburg, C. M. (2013). The influence of relational competencies on supply chain resilience: a relational view. *International Journal of Physical Distribution & Logistics Management*, *43*(4), 300–320. https://doi.org/10.1108/IJPDLM-08-2012-0243

Wilding, R. (2013). Supply chain temple of resilience. *Logistics & Transport Focus*, *15*(11), 54–59.

Windle, M. (2002). Critical Conceptual and Measurement Issues in the Study of Resilience. In *Resilience and Development* (pp. 161–176). Boston: Kluwer Academic Publishers. https://doi.org/10.1007/0-306-47167-1_8

Winter, K. (2009). Humanitarian Supply Chains in Action. In *Dynamic supply chain alignment : a new business model for peak performance in enterprise supply chains across all geographies* (pp. 97–106). Gower.

World Economic Forum. (2012). New Models for Addressing Supply Chain and Transport Risk. *World Economic Forum*, 1–26. Retrieved from http://www3.weforum.org/docs/WEF_SCT_RRN_NewModelsAddressingSupplyChainTransportRisk_IndustryAgenda_2012.pdf

World Economic Forum. (2013). *Building Resilience in Supply Chain*. *World Economic Forum*. Retrieved from http://www3.weforum.org/docs/WEF_RRN_MO_BuildingResilienceSupplyChains_Exec utiveSummary_2013.pdf

World Food Programme. (2012). Annual Performace Report For 2012.

World Food Programme. (2013). WFP's Emergency Preparedness and Response Branch 2013. Retrieved July 27, 2017, from http://documents.wfp.org/stellent/groups/public/documents/resources/wfp257407.pd f

World Food Programme. (2016a). *Annual Performance Report for 2015*.

World Food Programme. (2016b). *Update on Collaboration Among the Rome-Based Agencies*. Retrieved from http://documents.wfp.org/stellent/groups/public/documents/eb/wfp286762.pdf

Yin, R. K. (2009). *Case study research : design and methods*. *Applied social research methods series: 5*. SAGE Publications.

Zhou, H., Benton, W. C., Schilling, D. a., & Milligan, G. W. (2011). Supply Chain Integration and the SCOR Model.: Business Source. *Journal of Business Logistics*, *32*(4), 332–344. https://doi.org/10.1111/j.0000-0000.2011.01029.x

Appendices

Appendix A – Semi Structured Interview Guide

Appendix B – Coding of Data

Appendix C – Quantitative Questionnaire

visibility / anticipation / collaboration:

When does your response start? Who is triggering the SC process?

Forecasts: how do you forecast? Do you forecast for all items at once or do you forecast the kits demand?

How often are demand (Emergency Response/Development Aid) forecasts created on average? (every week, every quarter)

What is on average the percentage of emergency response orders compared to planned/forecasted orders?

How are the goods tracked? From where can I access the information?

Efficiency:

How much time does the delivery process take? Minimum to average to max

Capacity:

How is the first response supplied? How is a long-term mission supplied?

Example: You don't have a certain item on stock anymore – how would you procure?

How much time do your suppliers usually have to fulfill your orders in a crisis response situation?

Flexibility in sourcing:

How do you procure the necessary items? (local/ global / warehouse)

If problems or bottlenecks arise in the procurement process, what methods do you use to change the procurement path?

Do you have framework agreements with your suppliers?

Do you have warehouses close to risk-prone regions?

How can your organization get sensitive items such with a very short lead time?

Do you have more suppliers for one item? How many on average? Is there a guideline?

Efficiency:

You organize your relief items into kits, how would you estimate the ratio of items which are used in more kits to items which are only used in one kit?

Why was the kit strategy chosen? Which other organizations do have that kit strategy as well?

With which countries are pre-arranged customs contracts already signed? For which products?

Is the supply chain team (operations center team) made up of people from different countries/cultures? What is the average length of people working at this job?

What are the requirements set by your organization to be able to work in the SC logistics department? What are the concepts and methods your organization uses to get people working efficiently who have come with different backgrounds? Language requirements/ standardized processes?

What are the similarities logistic /SC wise of the response missions?

Which SC processes are already standardized in your organization?

Does your organization have one IT system for all its SC locations? Are those systems connected?

Flexibility in order fulfillment:

How do you deliver the aid material? Does your organization own means of transport such as planes, helicopters etc.?

How does your organization handle tough delivery situations such as the absence of streets?

We have already talked about customs declarations, what happens if you have to deliver to a country with whom you do not have pre-arranged contracts when facing an emergency situation?

Does your organization collaborate with other organizations if delivery issues exist? For example, another organization has already customs clearance for its products and your organization does not.

Capacity:

Do you have emergency means of transportation which are held back such as a safety/emergency stock?

Financial Strength:

Does your organization have an emergency fund, which will finance the beginning of the first response?

Collaboration:

In what ways is your organization / division collaborating with the business world?

How is the collaboration with the cluster?

In what ways does your organization/division collaborate with other humanitarian organizations?

How are does collaborations coordinated?

How is the cluster included in the SC process of your organization?

Recovery / Adaptability / Organization:

How are your employees trained for an emergency situation? (Trainings, Simulation)

Are your employees trained in a way so that they could fulfill other jobs than what they were hired for? (cross-training)

How committed are the employees of your organization to the organization and its goals?

Why do you think is that?

How high is the motivation level of the employees of your organization?

Which extraordinary SC relevant problems did occur during a response mission and through which creative method could it be resolved?

Adaptability:

How is the 'lessons learned' process done?

Is the conclusion of the lessons learned process implemented when planning for the next mission?

Anticipation:

How do you make forecasts of the future demand?

Security:

How can you guarantee the safety of the relief unit in a country where war is raging or other dangers (terrorist attacks) are present?

What methods are used to protect the relief items against theft or robbery?

Dispersion:

How are the missions coordinated? central/ decentral

How many of your employees/colleagues are hired locally?

Product Stewardship:

How are you trying to establish a sustainable SC process?

Appendix B – Coding of Data

Adaptability		ADAP	
	Re-routing of requirements	ADAP	RERO
	Strategic gaming and simulation	ADAP	SIM
	Seizing advantages of disruptions	ADAP	ADVA
	Alternate technology development	ADAP	ALTT
	Lead time reduction	ADAP	LETI
	Learning from experience	ADAP	LEAR
Anticipation		ANTI	
	Demand forecasting	ANTI	DF
	Risk Identification and prioritization	ANTI	RISK
	Monitoring and communicating deviations and "near misses"	ANTI	NEAR
	Recognition of early warning signals	ANTI	EARL
	Contingency planning and preparedness	ANTI	CONT
	Recognition of opportunities	ANTI	RECO
Capacity		CAP	
	Reserve capacity	CAP	RES
	Redundant capacity	CAP	RED
	Backup capacity	CAP	BACK
Collaboration		COL	
	Collaborative forecasting	COL	COLF
	Transparency of information	COL	TRAI
	Postponement of orders	COL	POSO
	Shared product life cycle management	COL	SPLCM
	Risk sharing	COL	RS
Dispersion		DISP	

	Human workforce dispersion	DISP	HUMW
	Leadership dispersion	DISP	LEAD
	Downstream customer dispersion	DISP	DCDS
	Market dispersion	DISP	MDS
Efficiency		EFF	
	Labor, production, asset utilization	EFF	LPAU
	Waste elimination	EFF	WAST
	Production variability reduction	EFF	VARR
	Failure prevention	EFF	FAIP
Financial Strength		FINS	
	Financial reserves and liquidity	FINS	RELI
	Portfolio diversification	FINS	PODI
	Insurance Coverage	FINS	INCO
	Price margin	FINS	PRMA
Flexibility in Order Fulfillment		FLEXD	
	Multi-sourcing	FLEXD	MUSO
	Delayed commitment/production postponement	FLEXD	POST
	Demand pooling	FLEXD	POOL
	Inventory management	FLEXD	INVM
	Alternate distribution channels	FLEXD	ALTDC
	Fast re-routing of requirements	FLEXD	RERO
Flexibility in Sourcing		FLEXS	
	Product platforms	FLEXS	PLAT
	Product modularity	FLEXS	MODU
	Multiple pathways	FLEXS	PATH
	Supply contract flexibility	FLEXS	CONT
	Alternate suppliers	FLEXS	ALTS
Market Position		MP	

	Brand equity	MP	BREQ
	Customer loyalty	MP	CUSL
	Market share	MP	MASH
	Product differentiation	MP	PRDI
	Customer relationship	MP	CRM
	Customer communication	MP	CCM
Organisation		ORGA	
	Creative problem solving	ORGA	CRPS
	Accountability and empowerment	ORGA	ACEP
	Diversity of skills	ORGA	DIVS
	Substitute of leadership	ORGA	SUBL
	Learning and caring	ORGA	LEAC
Recovery		RECO	
	Ability to quickly mobilize resources	RECO	MR
	Communicate the recovery strategy	RECO	COMS
	Manage the crises	RECO	MANC
	Mitigate the consequences of the disruption	RECO	MITC
Security		SEC	
	Layered defense	SEC	LADE
	Access restrictions	SEC	ACRES
	Employee involvement	SEC	EMPI
	Collaboration with governments	SEC	COLG
	Cyber-security	SEC	CS
	Personnel security	SEC	PS
Visibility		VIS	
	Information technology	VIS	IT
	Knowledge of asset status	VIS	AS
	Information exchange	VIS	IE
	Business intelligence gathering	VIS	BI

Appendix C – Quantitative Questionnaire

Please mark with an x to what extend you believe this questions to be true for your organisation.	to a very great extent	to a great extend	to a moderate extent	to a limited extent	Not at all
Order Processing and Demand Planning					
Do clear principles for order processing (e.g. order sizes, lead times) exist?					
Do all employees which are involved in the order processing know these principles?					
Is it checked regularly whether these principles are met?					
Is the logistic planning performed on a regular basis (for example, every quarter, every month)?					
Does your planning process arrange resources and capacity correctly and largely automatically due to current demand?					
Is a formal planning model based on statistical methods (eg. for determining realistic lead times) used?					
Is the accuracy of the demand forecasts measured and evaluated?					
Is the planning model modified regularly in order to achieve a higher accuracy?					
Are orders for stock replenishment automatically created by an IT system based on parameters and methods for optimizing inventory management?					
Is the amount of safety stock calculated and updated regularly?					
Is it possible for all supply chain relevant people to access current inventory information throughout the supply chain?					
Is the number of unwanted warehouse stockouts tracked and are the causes investigated?					
Does your organization have electronic access to the MRP or stocks of your upstream or downstream supply chain partners and can it use this information directly as input variables for its own planning system?					
Is the availability of bottleneck capacities and materials checked during order processing to ensure correct delivery dates and order quantities?					
Is it possible to track information about orders and their statuses online?					
Are stability and reliability of your delivery times measured and depending on the results are corrective actions taken?					
Are there any known and current lead-time data for the individual steps in the supply chain process?					

Response Management

Does the physical stock correspond to the reported stock in the IT systems?					
Are there clear guidelines and priorities to use bottleneck resources and are those met?					
Is it possible to give reliable information on the delivery date on the day of the order receipt?					
Are improvement programs issued regularly which explicitly include network optimization and outsourcing options?					

Procurement Management

Do you have less than three suppliers for any material group?					
Have you set up cooperative relationships with your suppliers and do you maintain them?					
Are long-term framework agreements with preferred suppliers periodically renegotiated?					
Are performance indicators of deliveries such as delivery times or deadlines systematically measured for each supplier?					
Do your suppliers obtain feedback on their supply chain performance?					
Does your organization exchange business documents such as order or delivery notes and invoices electronically with its suppliers?					
Is the incoming material identified through machine-readable identification (eg bar codes, transponders)?					
Do your suppliers obtain information about your demand plans or inventory?					

Distribution Management

Do you look for and use synergies with other organizations in transport and warehousing (for example, collective transport, distribution traffic, common stock)?					
Was the decision of the locations of storage facilities and stocks made with the goal of an optimal performance (ie lead time, flexibility) and minimal costs for handling, storage and order picking?					
Is the material flow tracked automatically within the warehouse using barcodes or transponders?					
Is a cost-optimized mix of different means of transport used and regularly updated due to changing distribution requirements and capabilities of logistics service providers?					
Is the transport capacity utilization checked systematically and are empty return journeys largely avoided by utilizing internal and external synergies?					
Does your organization use a few logistics service providers, which themselves have a comprehensive international logistics network?					

Service Level Management					
Are the main factors known which influence the donation decision?					
Is it measured how well your organization does in those factors in comparison to other humanitarian organizations (HO)?					
Do different pre-configured supply chains exist to supply certain missions with their respective service requests (eg lead times)?					
Are the missions you participate in split up between different organizations by strategic considerations?					
Do you know the current and the target service levels of other HO?					
Do you know the total costs of your supply chain for different service levels?					
Are the costs associated with the service level requirements considered, when a possible mission/project is planned?					
Are performance indicators of supply chain service levels clearly defined and are they calculated regularly?					
Is the donor satisfaction measured regularly, especially in regard to the performance of your supply chain?					
General Topics					
Does your organization have explicit service levels agreements within the supply chain and are those fulfilled?					
Is the responsibility for achieving holistic supply chain objectives clearly assigned to someone at the top management level?					
Is the performance of your supply chain measured holistically after every significant step from the starting point of the supply chain to the beneficiary?					
Is the information of the supply chain controlling put into a few but meaningful key performance indicators?					
Is the demand fulfillment part of the operational performance evaluation?					
Are clear goals and measures to achieve those goals defined on the basis of performance reports?					
Does your organization have a risk management?					
Does your organization monitor disaster occurrence risks for endangered regions?					
Are there strategies to protect aid material against criminal acts (for example, theft, robbery)?					
Are there strategies in your organization on how to protect employees against hazards when in a response mission?					

Statistics					
Please mark which goods your organization delivers (selecting more than one is possible):	YES	NO			
Food					
Medical goods					
Non-food items					
How large is your organization (donation volume)?					
Small (annual budget till €100 mio)					
Medium (annual budget from €101 mio to € 1 billion)					
Big (more than €1 billion annual budget)					
Where does your organization operate?					
International level					
National level					
At which organization are you working?					
What is your job title?					
For how long have you been working with your organisation?					
For how long have you been working in the humanitarian sector?					