Critical success factors’ impact on agility of humanitarian supply chains

A case study of the typhoon Haiyan in the Philippines 2013

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Master Thesis in Business Administration

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Abstract

Background The amount of catastrophes around the world are increasing and consequently also the need for humanitarian logistics. Humanitarian organizations are thus highly important to efficiently provide aid to those people in need. Therefore humanitarian supply chains are created to provide relief in a setting that is both complex and characterised by many uncertainties. It is further essential that resources and aid are managed efficiently. Moreover, there are critical success factors identified in the commercial setting that are possibly applicable to the humanitarian relief operations in order to optimise operations. Further, agility supply chain principles aim at high responsiveness which could enable humanitarian organizations to respond quickly to disasters.

Purpose The purpose of this thesis is to explore and analyse how agility is impacted by critical success factors in the immediate response phase during an emergency.

Methodology The study followed a qualitative and inductive approach and was based on a single case study, the typhoon Haiyan in the Philippines, 2013. Empirical data was collected through semi-structured interviews with respondents involved in the response of Haiyan, and secondary data. Template analysis was used to analyse the collected data.

Conclusion Our findings contribute to the theoretical knowledge in humanitarian logistics and provide insights in the area of agility and CSFs within a humanitarian relief context. Also to the understanding of CSFs influencing the process of strategic decision making.
Introduction

This chapter introduces the reader to the topic of this thesis by providing an explaining background. The background is followed by the problem discussion and purpose including the research question. It further provides the outline of the thesis and its delimitations.

1.1 Background

Humanitarian logistics and its supply chain management (SCM) is an area that has received increased focus and research during the last years (Kovács & Spens, 2011), also the field was vastly researched and had very few articles published before 2005 (Altay & Green, 2006). Hence, the topic is quite young and what is said to be a defining moment of humanitarian logistics and its development is the Indian Ocean Tsunami that occurred in 2004 (Kovács & Spens, 2007, 2011). That also demonstrated the effects of a disaster and its damages on the environment and infrastructure, the loss of human lives and economical loss (Altay & Green, 2006). The reason why it is said to be a turning point is due to the fact that logistics during the event received heavy criticism and has therefore developed greatly since then (Kovács & Spens, 2007, 2011). Since there is a high global level of inertia and an increased amount of catastrophes there is a great need of humanitarian logistics (Kovács & Spens, 2011). Further, it is a problem that humanitarian aid fails to meet the need of global demand, as there are many crises simultaneously. It is expressed that humanitarian aid has reached the limits and there is a need for new structures, planning and coordination (Bhimani & Song, 2016).

Humanitarian organizations are needed to efficiently provide aid to people in need. Humanitarian logistics can be explained as “the set of actions taken by organizations in an attempt to move information, goods, and services for the specific goal of aiding target beneficiaries, environments, and societies” (Bhimani & Song, 2016, p.12). The number of people in need of assistance is extensive and according to the United Nations (2016), last year the number of people needing aid exceeded 76 million in more than 31 countries. Also, there were more than 400 natural disasters and more than 51 million refugees (UN, 2016). Natural disasters and total people affected have shown an increase in the past 25 years however the total deaths have decreased (Em-dat, 2017a). It could also be added that the total damage because of disasters has increased (Em-dat, 2017a). Further, there are global challenges that also have to be taken into consideration, such as population growth,
climate change and unplanned urbanization (UN, 2016). These challenges imply the need of adaptation and development of strategies for countries and communities. One should also bear in mind that the effects of disasters impact the life of people, infrastructure and economies (Bhimani & Song, 2016). However, the aid does not develop as fast as the crises and disasters emerge. It is of great importance that the resources and aid are managed as efficient as possible (Bhimani & Song, 2016).

There are areas in humanitarian logistics that are in special need of research. Two areas are disaster response and capacity building (Bhimani & Song, 2016). Another issue in humanitarian logistics is the lack of established theories and concepts and what has been found in business logistics is in need of adaptation to humanitarian logistics (Kovács & Spens, 2011).

With the growing number of humanitarian issues, one should also be aware of the increase in actors involved in this area of concern (Kovács & Spens, 2007). There are organizations that work with these issues and providing aid both with volunteers and paid employees (Kovács & Spens, 2007). In addition, coordination in relief situations might be challenging due to the many and different organizations involved and further because the involved organizations are different in terms of size, abilities, authority, logistics capability, structure, IT systems and expertise (Dolinskaya, Shi, Smilowitz & Ross, 2011; Balcik, Beamon, Krejci, Muramatsu & Ramirez, 2009; Schulz & Blecken, 2010).

For supply chains to function with success there is a need for strategies to guide the operations. Since humanitarian organizations usually operate in unpredictable and volatile environments, flexibility of resources and coordination is essential, this to be able to deliver aid to the where it is needed and further as quick as possible (Mason-Jones, Naylor & Towill, 2000). There are numerous strategies for businesses to apply to their operations in order to be more effective and one example is subsequently the agile approach, where agility is concerned with high responsiveness (Mason-Jones et. al., 2000). It is particularly essential for humanitarian organizations with high responsiveness as it is concerned with timesaving, which in turn is related to saving lives (Cozzolino, Rossi & Conforti, 2012). Hence, for a quick response after a disaster occurs, the supply chain is adapted according to agile principles (Cozzolino et al., 2012).
A country that is highly exposed to disasters and predominantly storm related events is the Philippines (em-dat, 2017b). On the 8th of November 2013 the Philippines was hit by the typhoon Haiyan (reliefweb, n.d.), which was the deadliest event in Asia-Pacific in 2013 and further one of the most devastating cyclones ever reported (reliefweb, n.d.; OCHA, 2017). It caused enormous damages for the country and millions of people were affected and additionally thousands of people died (Logistics Cluster, 2014). Moreover, Haiyan is therefore the disaster chosen as a case study for the purpose of this thesis.

1.2 Problem

There has been extensive research on supply chains in various industries, their integration and coordination of partners and the value they may have in the supply chain (Morash & Clinton, 1998; Simatupang, Wright & Sridharan, 2002; Smith, 2011). As supply chains can vary quite tremendously in how complex and diverse they can be, there is no typically right way of handling supply chains (Cox, 1999). Cox (1999) also explains that one cannot simply replicate an existing successful supply chain to their own as this has its own specific circumstances and can therefore not be copied. It is highly important that a company understands the attributes and traits of the supply chain they are engaging in before taking any operational or innovative actions (Cox, 1999; Mason-Jones et. al, 2000).

A literature review conducted by the authors of this thesis has shown that a larger part of scientific research in the field of supply chains is within the commercial settings and therefore a gap can be identified within the humanitarian sector. Although a base of literature exists, there are still contradictory facts and incompatible research results in this field. Adding to this, there are more actors involved than before in humanitarian relief, and donors are highly demanding and putting more pressure on organizations to succeed (Pettit & Beresford, 2009). One can therefore conclude that this is an emerging phenomenon, where many actors are affected, which makes it even more important to research the humanitarian aid sector in depth. Disaster relief can be divided into different phases, preparation, immediate response and reconstruction, and the phase that has received the most focus in research, is the preparation phase (Kovács & Spens, 2007). The immediate response phase has been fairly overlooked as it is a difficult phase to investigate and thus a gap has been found in literature when it comes to the different phases (Kovács & Spens, 2007). Therefore it has been identified that research in the immediate response phase in a
humanitarian aid context is an important aspect to study. Further, the point of view of organizations has also been vastly emphasised in research and therefore this aspect could be interesting to explore.

Disaster relief operations tackle circumstances affected by uncertainty and constant change, which highlights quick and effective response as vital for success (Christopher & Towill, 2002; Mason-Jones, et. al., 2000; van Hoek, Harrison & Christopher, 2001). It is debated that an actor's skill to build agile capabilities to rapidly respond and conduct dynamic operations affects the operational performance of humanitarian supply chains (Christopher & Towill, 2002; Charles, Lauras & Van Wassenhove, 2010; Pettit & Beresford, 2009). However, it is in the context of commercial supply chains where the discussion of supply chain agility is the most dominant. To connect the agile principles, which can be identified in commercial supply chains, to humanitarian operations has slowly started to appear in research (Charles et. al., 2010; Cozzolino et. al., 2012; Pettit & Beresford, 2009). Additionally, it has been identified that research in supply chain agility in the context of humanitarian logistics is an important field to put future research on.

The definition of success differs depending on organization, although the motive for the operations of an organization is to succeed (Pettit & Beresford, 2009). In order to achieve success there is a need for specific critical factors to be defined (Pettit & Beresford, 2009). Such factors are greatly studied when it comes to the commercial supply chains, whereas the humanitarian aid sector has been overlooked (Kovács & Spens, 2011). The main reason for this could be the uncertainty and constant change when it comes to the settings of humanitarian relief. Pettit and Beresford (2009) suggest that additional research on critical success factors applied on humanitarian settings is highly relevant and should be tested through qualitative research.

Combining supply chain agility in the context of humanitarian logistics with critical success factors has not been researched previously and therefore a gap is identified.

1.3 Purpose

To sum up the above problem discussion, gaps have been found in literature when it comes to supply chain agility in the context of humanitarian logistics with critical success
factors in humanitarian relief operations. An additional gap has been found within the focus of the immediate response phase. Hence, this thesis aims at filling a gap in literature by contributing to the theory of agile supply chain strategies and critical success factors within humanitarian aid in the immediate response phase from the perspective of organizations.

The purpose of this thesis is to explore and analyse how agility is impacted by critical success factors in the immediate response phase during an emergency.

In order to fulfil the purpose of this thesis, a research question has been developed.

RQ: How do the critical success factors impact the agility of humanitarian supply chains in the immediate response phase during an emergency?

1.4 Outline of the thesis

This part provides an overview of the thesis. The background to the study and a problem discussion were presented in the introduction of the thesis, which led to the purpose and the research questions.

In the frame of reference, a comprehensive literature review has been conducted to deliver the essential theoretical background for the study. The following chapter describes the research methodology implemented in this thesis including research approach, research strategy, data collection and analysis. In the part including the empirical findings, the collected data will be presented in an organized manner. The following part is the analysis of the empirical data where a comparison of data is made using an inductive approach. The last part of the thesis is the conclusions, which will be drawn and discussed and further this part also includes theoretical contributions, limitations to the study and suggestions for further research.

1.5 Delimitations

This thesis aims to investigate how the critical success factors (CFS) impact agility of humanitarian supply chains in the immediate response phase during an emergency.
However, the study will not quantify the impact nor will the study rank the CSFs in any order of importance but rather identify whether there is an impact and further if the impact is positive or negative.

An additional delimitation is that we do not analyse strategic planning, which is one of the CSFs defined by Pettit and Beresford (2009). This due to the fact that it corresponds to the planning phase in order to prepare for emergency projects and is therefore not of value for this thesis. However, it is included in the frame of reference to gain an overview of the defined CSFs.

Further, due to time constraints we have not analysed continuous improvement in depth, even though it is part of the CSF “Collaboration and continuous improvement”. This part is more connected to linking the reconstruction phase and planning phase in order to improve operations for upcoming disasters. Further, it includes an extensive amount of aspects that could not be investigated during the time frame of this thesis.

Lastly, we do not include the aspects of regional and extra regional perspectives, as this would not make an impact on the study for the immediate response phase. However we do present these perspectives in the frame of reference to give the reader a better understanding of disaster relief operations.
2 Frame of Reference

The frame of reference presents an overview of the topic and also existing theories in different areas that will further be utilized to analyse the empirical findings.

The research in humanitarian logistics is rather limited, although there is documentation in regards to the mitigation and preparedness phases in humanitarian logistics (Altay & Green, 2006). There is a need of more research in the response phase planning and the combination of all phases to create a holistic overview of the topic (Zeimpekis, Ichoua & Minis, 2013). Humanitarian logistics is important for the development of logistics in general, since it shows how to manage unpredictable environments. Further, researchers have found that the humanitarian logistics could possibly learn from commercial logistics despite of the differentiated circumstances (Kovács & Spens, 2007). Humanitarian supply chains differ from business supply chains because humanitarian supply chains have short existence and is often more unstable (Oloruntoba & Gray, 2006) the chains also appears different depending on the different catastrophes (Kovács & Spens, 2007). When there is a crisis, the response to it is fairly short term and the conditions under which decisions for an effective supply chain are often very stressful (Pettit & Beresford, 2009). When referring to humanitarian organizations one can conclude that they are guided by the principles of humanity, neutrality and impartiality. Hence, in all situations the goal is to provide help, regardless of the circumstances (Van Wassenhove, 2006).

For the enhancement of understanding throughout the frame of reference we begin to clarify supply chain and supply chain management. The subject has received great attention and there are many definitions of it, as seen in Mentzer, DeWitt, Keebler, Min, Nix, Smith & Zachari (2001). For the matters of this paper we choose to look at supply chain management and the supply chain in accordance to Mentzer et. al.’s, (2001, p.4) definition of a supply chain, *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.* Supply chain management then handles flows such as information, cash and inventory, it also manages procurement, manufacturing, replenishment and order fulfilment, further it focuses on deliver value to consumers at an optimum cost and response time (Mentzer et. al., 2001).
2.1 Comparison of Humanitarian and Commercial Settings

There are many factors that separate humanitarian and commercial settings. However, the most considerable difference between the two is that humanitarian aid function in settings where there are voluntary contributions of finance and labour (Pettit & Beresford 2009). Other factors are the end consumer, the difference in infrastructure and logistics and also the involvement of military and government (Oloruntoba & Gray, 2006; Pettit, & Beresford, 2009).

When looking at supply chains one can see that they strive to match supply and demand in order to increase performance, this results in decreased costs and increased customer satisfaction (Mason-Jones et. al., 2000). Although, in order to achieve this, uncertainty needs to be low and in some cases, such as in humanitarian aid, this is unavoidable due to the unpredictable nature (Mason-Jones et. al., 2000).

Comparing the logistics in humanitarian aid and commercial settings, one can see that within business it is a planning framework for managing material, service information, communication and control systems (Van Wassenhove, 2006). Whereas in humanitarian logistics it covers the processes of mobilizing people, resources, skills and knowledge in order to help affected in the situation (Van Wassenhove, 2006). Further, there are also many similarities, which include planning and preparedness, design, procurement, transportation, inventory, warehousing, distribution and recipient satisfaction. So even though they differ, they are both designed to get the right goods to the right place to the right people at the right time (Van Wassenhove, 2006).

One can conclude that even though the settings and circumstances in which humanitarian aid and commercial business operate in are different, their basic factors are not that differentiated (Kovács & Spens, 2007; Pettit, & Beresford, 2009). This shows that analysing relevant basic factors critical for success within the commercial settings could be adapted to the humanitarian setting and thereby one could increase the effectiveness in humanitarian aid (Pettit & Beresford, 2009).

In terms of how the supply chain range the commercial ones goes from suppliers’ supplier to the customers’ customer compared to humanitarian supply chains which range from
donors and suppliers to beneficiaries (Charles et al., 2010). Therefore, the customer is consequently defined differently; the end user in a commercial supply chain is considered as the buyer whereas the beneficiary is seen as the end user in humanitarian supply chains (Oloruntoba & Gray, 2006). Further, the donors are seen as customers since the humanitarian organizations are dependent on them to be able to manage their operations (Oloruntoba & Gray, 2006).

2.2 Humanitarian Supply Chains

There is no certain supply chain when it comes to humanitarian logistics. It differs from time to time depending on the different disasters and actors involved (Balcik et al., 2009). When looking at humanitarian aid, one can see that there are vast amounts of waste due to the fact that developing continuous supply chains has been neglected. This is a result of not having a connection between the stages and activities in the delivering of aid (Pettit & Beresford, 2009). There is a massive challenge when looking at the transportation in humanitarian relief, which also is a main component within these operations (Balcik et al., 2009). Damaged infrastructure, limited transportation resources and large scale of supplies to transport create the most considerable challenges (Balcik et al., 2009). One of the most essential aims of humanitarian supply chains is high efficiency and not wasting the scarce resources, since this affects the aim of humanitarian organizations which is to save as many lives as possible (Oloruntoba & Gray, 2006).

2.2.1 Humanitarian Logistics

Humanitarian logistics can be 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 (Thomas & Kopczak 2005, p.2). Humanitarian logistics can be compared to commercial logistics (managing the flow of goods, information and finances) but humanitarian logistics goes beyond profitability (Thomas & Kopczak, 2005; Kovács & Spens, 2007; Zeimpekis, et. al., 2013). Further, it is a collective name for several different operations such as disaster relief and continuous support for developing regions (Kovács & Spens, 2007). Humanitarian logistics has many similar traits as business logistics, such as preparedness, planning, warehousing and tracking (Thomas & Kopczak, 2005). The aim of humanitarian
logistics is to minimize suffering and supply people to survive (Kovács & Spens, 2007). Although the operations of humanitarian logistics almost never look the same as they respond to different catastrophes (Kovács & Spens, 2007).

Logistics is an important part of humanitarian supply chains as it affects the performance of future but also current operations in terms of effectiveness as well as speed (Van Wassenhove, 2006). Moreover, logistics in humanitarian aid can be a bridge between disaster preparedness and response, procurement and distribution and between HQ and the field (Van Wassenhove, 2006). Additionally, logistics can be a source of data since a major part of logistics involves tracking goods (Van Wassenhove, 2006). Focusing on the logistics of humanitarian relief could be the difference whether an operation fails or succeeds, even though it is also one of the most expensive parts of a relief operation (Van Wassenhove, 2006).

2.3 Disaster Relief

There are different kinds of disasters and Van Wassenhove (2006, p. 476) describes them as a *disruption that physically affects a system as a whole and threatens its priorities and goals*. Further, Kovács and Spens (2007) define two main streams of humanitarian logistics; disaster relief and continuous aid work. When explaining disaster relief it is referred to as sudden catastrophes such as natural disasters and man-made disasters (Van Wassenhove, 2006; Kovács & Spens, 2007). Adding to this, one definition of relief is said to be *foreign intervention into a society with the intention of helping local citizens* (Kovács & Spens, 2007, p.101).

2.3.1 Phases

One can divide various relief operations in separate phases, and authors describe them differently, also the number of stages differs (Kovács & Spens, 2007, 2009; Altay & Green 2006, Van Wassenhove, 2006). Although, Kovács and Spens (2007) define them as the preparation phase, the immediate response phase and the reconstruction phase. This is displayed in figure 1. The same authors also state that the three phases require specific resources and skills in order to handle the particular aim of that phase.
The Preparation Phase

This phase includes the times prior to when a disaster hits (Kovács & Spens, 2007). This is when organizations can prepare for certain risks that could be identified when particular disasters have struck before (Kovács & Spens, 2007). One reason why preparedness is so important is due to the fact that it can prevent highly intense consequences when a disaster strikes (Cozzolino et al., 2012). In the preparation phase there is a development of measures and strategic plans, both to prevent disasters but also to put into action when a disaster is present (Kovács & Spens, 2007). Additionally, when referring to humanitarian aid and the preparation phase logistics plays a major role in the success of both being prepared and how to respond to a disaster (Kovács & Spens, 2007).

In order to optimize the planning in the preparation phase it is crucial to have accurate information to develop good arrangements (Van Wassenhove 2006; Kovács & Spens, 2007). Therefore it is highly important with information technology when it comes to humanitarian efforts and could be the determining factor of a failure or a success (Kovács & Spens, 2007). Information technology could create early warning signals, which could lead to a better outcome of a crisis (Van Wassenhove, 2006). This phase is also where various actors are able to build collaboration between each other in order to increase coordination and decrease inefficiencies, which although can be a challenging task (Kovács & Spens, 2007; Cozzolino et al., 2012). Additionally, building up a collaborative network could also lead to minimization of lead times (Cozzolino et al., 2012).

The Immediate Response Phase

This phase includes the time instantly after a disaster (Kovács & Spens, 2007). This is also the time when the plans from the previous phase become reality and immediate response is of great importance (Kovács & Spens, 2007). One major problem that often occurs when a disaster hits is knowledge in regards to the situation is inadequate and many times the infrastructure creates difficulties (Kovács & Spens, 2007; Cozzolino et al., 2012). Further, the lack of information also leads to decisions, in regards to needs, being made on
assumptions (Kovács & Spens, 2007). The same authors also state that these assumptions are important in the areas of supplies, times and location of demand and how to distribute the supplies to where demand is high (Kovács & Spens, 2007). One main concern when it comes to the response phase is in coordinating the supplies, the unpredictability of demand, transport and actors (Kovács & Spens, 2007; Cozzolino et. al., 2012).

The creation made in the first phase is activated in the response phase, such as connections to donors, supplies and other partners (Cozzolino et. al., 2012). There is a need for a team to create networks where the main focus should lie in creating channels for information and material flows (Cozzolino et. al., 2012). Having created a plan in the preparedness phase could enable a faster response in the response phase and reach beneficiaries earlier than without a proper plan (Van Wassenhove, 2006).

Reconstruction Phase
The last phase of relief operations is the reconstruction phase, which includes the aftermath of a disaster (Kovács & Spens, 2007). This phase aims at facilitating long term rehabilitation, which is important as disasters can have major effects and consequences on a region (Kovács & Spens, 2007; Cozzolino et al., 2012). In this phase it is important with continuity planning, where one can revise the plans made in the preparedness phase by learning from the current disaster (Kovács & Spens, 2007).

2.3.2 Actors
There are many actors involved in the process of humanitarian aid. According to Kovács and Spens (2007), they are donors, aid agencies, logistics providers, military, governments and other non-governmental organizations (NGOs). Van Wassenhove (2006) also adds media and public opinions to be potential influencers of the operations. It is also the involvement of the several different actors that contributes to the complexity of relief operations (Kovács & Spens, 2007; Oloruntoba & Gray, 2006). Additionally, contributing to the challenge of many actors involved is the disparity between them with regards to political agenda, religious beliefs and ideologies (Van Wassenhove, 2006). Below follows a short description of the different actors and their importance.
Humanitarian Organizations

Humanitarian organizations can be argued as fundamental as they work to mitigate suffering in disaster environments (Thomas & Kopczak, 2005). There are large global agencies and in addition to these many small national, regional and local NGOs can be found (Thomas & Kopczak, 2005).

Logistics Providers

Logistics providers also play an important role and their responsibilities include activities such as assembling the goods, transportation, warehousing and distribution of the supply (Thomas & Kopczak, 2005). The operational effectiveness of the humanitarian logistics operations could be affected by host logistics or regional logistics providers (Kovács & Spens, 2007). Hence, the logistics providers play an important role in delivering the aid to the affected by disasters.

Government

The activities of the humanitarian organizations are often impacted by national and local government and then usually in terms of coordination (Thomas & Kopczak, 2005). Host government impacts the involvement of other countries and the host government is also important since warehouses and fuel depots are controlled by them (Kovács & Spens, 2007).

Donors

Donors are also important actors since it is necessary to have bulk for major relief operations and therefore funding is one important factor for the aid agencies. Donations come from specific countries but also from individual donors, foundations and the private sector contribute with sources of funding for the aid agencies. (Kovács & Spens, 2007)

Media

The role of media is important in disaster relief and their role in relief operations is highly connected to donations (Van Wassenhove, 2006). It is via the media that the disaster gets attention and thereby it contributes to humanitarian organizations receiving donations (Charles et. al., 2010). Humanitarian organizations are thus dependent on media coverage to receive donations to their relief operations. It can also be added that the humanitarian organizations compete among themselves to receive media attention (Van Wassenhove,
Though, too much media coverage can instead mean problem. If it results in too many donations and humanitarian organization might not have the capacity to manage it, which leads to decreased ability to deliver aid (Charles et. al., 2010).

Military

The involvement of the military can be quite controversial in terms of practical, political and ethical issues (Van Wassenhove, 2006). Despite this the military can be beneficial in the complex relief situations as they could possibly provide assistance such as communications, logistics and planning capabilities (Kovács & Spens, 2007).

2.3.3 Disaster Relief Phases and Actors Connected

We have now presented the phases of a disaster and the actors that are possibly involved and these are now connected into a framework for disaster relief logistics (figure 2) (Kovács & Spens, 2007). Here actors are divided into two different groups, regional and extra-regional and it is based on the perspective they take on humanitarian logistics and their preparedness and operations during the different phases (Kovács & Spens, 2007). Larger aid agencies, donors, governments, international actors (e.g. UN), logistics providers and extra-regional NGOs that are involved in relief operations are placed in the extra-regional perspective, then regional include host government, military, local enterprises and regional aid agencies (Kovács & Spens, 2007).

In order to achieve successful operations it is important that the actors collaborate despite their different perspectives on disaster relief operations (Kovács & Spens, 2007). In the immediate response phase the two groups of actors cooperate and the coordination of the supply network of humanitarian aid is crucial (Kovács & Spens, 2007). As seen in the framework (figure 2), regional actors engage in risk management in order to prepare for a disaster and strategic planning is related to extra-regional actors (Kovács & Spens, 2007). In the next phase, regional actors learn from crisis management, while extra-regional actors operate short-term project management (Kovács & Spens, 2007). Reconstruction then handles more stable demand and supply and extra regional actors focus on long-term project management and at regional level focus is on continuity planning (Kovács & Spens, 2007).
2.3.4 Models and theories within humanitarian logistics

Existing models and theories are present in terms of humanitarian logistics, which focus on the relationship between different phases of the disaster management process (Asghar, Alahakoon & Chrilov, 2006). Most of these models are highlighting the phases and do not cover all the various aspects of disaster management and therefore come with limitations (Asghar, et. al., 2006). Most models describe the preparedness phase and some focus on the recovery phase but it is evident that research fails to emphasize activities in the response phase (Asghar, et. al., 2006). Existing models and theories do not go beyond describing disaster stages and only provide conceptual frameworks for the basic activities of a disaster (Asghar, et. al., 2006). Most fail to incorporate hazard assessment and risk management activities and some only describe underlying causes of a disaster and fail to stress major activities of disaster management (Asghar, et. al., 2006). Further, the majority of models and theories only describe top-level actions of disaster management and fail to go into detail in the phases (Asghar, et. al., 2006). A framework that presents a comprehensive description of disaster management activities or major activities of disaster management is lacking (Asghar, et. al., 2006).

There are complex circumstances when it comes to disasters and reducing the complexity could decrease damages and the severeness of events (Kelly, 1998). Having factors to guide the response in distinguishing between critical elements and noise is particularly important.
as in disaster environment there is a high pressure when there is a time constraint to identify critical issues (Kelly, 1998). Creating a common ground of what to focus on could possibly create better integration of efforts with many actors involved, both regional and extra regional (Kelly, 1998). As there are approaches when it comes to disaster management, but it is evident that these are lacking in some aspects and are focused on a limited context, there is room for improvements or additions in order to complement existing theories (Asghar, et. al., 2006). Which would also enable improvements for forecasting of future events and managing the impacts of these (Asghar, et. al., 2006).

Additionally, having a model or theory that takes too many aspects into account can create problems in complexity (Asghar, et. al., 2006). Too many functions in uncertain circumstances such as dynamic needs and adaptive nature could cause difficulties and impracticalities in coping with all included activities (Asghar, et. al., 2006).

In order for mitigation of future disasters it is important to evaluate and analyse collected data and information related to current disasters, which sometimes is overlooked in the disaster management models (Asghar, et. al., 2006). Hence, there is a gap in current models and there is a need to look into other aspects that would handle complex situations, which are not yet addressed by models (Asghar, et. al., 2006). Moreover, there are various resources, activities and conditions involved in disaster management, using factors looking into a detailed level at the response phase would provide the basis for an effective and practical way of managing relief work and expand the attention of preparedness (Asghar, et. al., 2006).

2.3.5 Coordination

Coordination could be referred to as the relationships and interactions among different actors operating within the relief environment (Balcik et. al., 2009). It could then further be divided into vertical or horizontal coordination, which means either coordination at the same level (horizontal) or upstream or downstream (vertical) (Balcik et. al., 2009). When a disaster occurs a large number and variety of organizations are involved in the process of providing aid to the ones in need. A large part of this is transportation and logistics, it accounts for 80 % of the relief operation (Van Wassenhove, 2006), it is how supplies are transported and distributed to where it is needed (Dolinskaya et. al., 2011). Operations could possibly be improved in terms of efficiency if there is coordination between
Humanitarian operations receive a lot of criticism within this area because of the lack of coordination and collaboration during disaster relief operations (Kovács & Spens, 2007). Schulz and Blecken (2010), highlight that coordination is a challenging task due to differences among humanitarian organizations (e.g. structures, IT systems, competition). Van Wassenhove (2006) argues that more coordination among humanitarian organizations is required due to the increasing difficulty of disasters. The issue of when and how to collaborate and subsequently how to coordinate are then important matters (Van Wassenhove, 2006). According to Jahre and Jensen (2010), the cluster approach is one solution that could possibly address these issues. The cluster approach will be briefly described further below. It is not just the organizations that impact but also the relief environment and lack of sufficient resources (Balcik, et. al, 2009). Further, the response time and resources might be lost due to absence of coordination (Schulz & Blecken, 2010). Nevertheless, despite its challenges coordination could affect the overall operation positively by increasing efficiency (Schulz & Blecken, 2010).

**The Cluster Approach**

As has been elaborated above coordination is an essential factor of disaster relief operations. With a functioning coordination, gaps could be reduced and overlaps in assistance by humanitarian organizations prevented. For this matter, clusters can be a solution (Jahre & Jensen, 2010). In 2005 the cluster approach was introduced and accepted as an element to improve international responses to humanitarian crisis and handle existing gaps and weaknesses by the Inter-Agency Standing Committee (IASC) (IASC, 2006). The concept has predefined leaderships of humanitarian organizations based on capacity within a number of sectors including: nutrition, health, water/sanitation and hygiene, education, emergency shelter, camp coordination and camp management, protection, early recovery, logistics, food security and emergency telecommunications (IASC, 2006). The cluster concept is a mechanism for coordination of humanitarian aid within these sectors (Jahre & Jensen, 2010). One or more clusters can be activated if there are gaps that are not met with the existing response or if coordination does not meet needs in accordance to humanitarian principles and the clusters are active as long as these issues remain (Jahre & Jensen, 2010). One important issue is the provider of last resort, which means that the cluster is
responsible to deliver the needed service if no other is able to (Jahre & Jensen, 2010, IASC, 2006).

### 2.4 Supply Chain Strategy

In literature various strategies have been suggested to be successfully applicable to supply chains (Mason-Jones et. al., 2000; Agarwal, Shankar & Tiwari, 2005; Pettit, & Beresford, 2009). Lean and agile are well recognized strategies that are used in commercial settings (Mason-Jones et. al., 2000; Christopher & Towill, 2002). In order to be successful it is important to get the right product, at the right price, at the right time and therefore it is essential to understand the customer and the marketplace when deciding on a supply chain strategy (Mason-Jones et. al., 2000; Christopher & Towill, 2002).

Lean thinking is about doing more with less and to engage in waste reduction and thereby increase value (Agarwal et. al., 2005; Pettit, & Beresford, 2009). In terms of demand, lean thinking is preferable where demand is stable and predictable (Agarwal et. al., 2005; Cozzolino, et. al., 2012). Compared to lean, agility is more appropriate where demand is less volatile (Agarwal et. al., 2005; Pettit, & Beresford, 2009). In an agile approach, flexibility is key, meaning the ability to respond to changes in the market both in terms of design and demand (Pettit, & Beresford, 2009). Whereas a lean strategy attempts to maximize profits by waste reduction, agility focuses on customer requirements (Agarwal et. al., 2005; Pettit, & Beresford, 2009).

Lean and agile are two different concepts, with their differences and despite this a combination of both is possible (Mason-Jones et. al., 2000; Christopher & Towill, 2002). Typically, this is the case of supply chains as they intend to be cost efficient and also meet customer needs (Pettit & Beresford, 2009). This combination can be useful in uncertain markets (as humanitarian organizations typically face), where a decoupling point as part of the supply chain applying leaness upstream and agility downstream (Agarwal et. al., 2005). Christopher and Towill (2002) suggest that the decoupling point intend to increase efficiency by implementing lean principles up to the decoupling point and thereafter increase responsiveness to actual demand by agile practices (Christopher & Towill, 2002). Additionally, Oloruntoba and Gray (2006) developed an agile supply chain in relation to the immediate response phase with lean principles upstream and agile downstream. They
further suggest that for example demand forecasting, transportation sourcing, procurement and mobilization of goods, people, skills and financing are concerned by lean principles upstream. Concerning inventory, it is argued that until real demand is known and it can be processed with an agile approach, generic inventory should be held as long as possible (Christopher & Towill, 2002). Then, if a disaster occurs what could contribute to the ability of an agile and quick response is a need assessment, thereby understanding the needs of the beneficiaries Oloruntoba and Gray (2006).

The focus of humanitarian supply chains during the immediate response is on people rather than profit and cost and it is of great importance that these supply chains are responsive. Therefore, one can argue that the humanitarian supply chains would be mostly agile. Although, it can be found in literature that humanitarian supply chains should follow both lean and agile principles (Oloruntoba & Gray, 2006; Agarwal et. al., 2005). Cozzolino et. al., (2012) however found that it might be difficult to decide when and how the two principles should be used.

2.4.1 The Agile Approach

Van Hoek, et. al., (2001) studied agility in commercial settings and argue that agility concerns customer responsiveness and the ability to handle unstable markets. Further, Van Hoek et. al., (2001), suggest that four dimensions represent an agile supply chain; customer sensitivity, virtual integration, process integration and network integration. Humanitarian supply chains are often argued to be mostly agile, further the agile principles in combination to humanitarian operations, quick response, and efficient efforts and in regards to disaster relief can be found in various literatures (e.g., Kovács & Spens, 2009; Pettit & Beresford, 2009; Oloruntoba & Gray, 2006; Christopher & Towill, 2002).

As mentioned earlier agility is preferably used when demand is uncertain (Cozzolino, et. al., 2012; Agarwal et. al., 2005; Pettit, & Beresford, 2009). What also characterizes an agile supply chain is flexibility, since it has to deal with volatility and uncertainty and the ability to respond quickly and effective to changes (Christopher & Towill, 2002; Charles, et. al., 2010; Agarwal et. al., 2005; Pettit, & Beresford, 2009; Cozzolino, et. al., 2012). Charles et. al., (2010), proposed that flexibility, responsiveness and effectiveness is what makes a supply chain able to respond quickly and effective to short-term changes in demand, supply or the environment, hence in an agile manner. Following is a short description of the three
capabilities, flexibility, effectiveness and responsiveness.

**Flexibility**

Flexibility is as mentioned one of the key characteristics of an agile supply chain (Christopher & Towill, 2002) and is therefore referred to as basis of agility by Charles et al., (2010) though adding that it is not the only capability required. One way to define the flexibility capabilities is in accordance to Slack (2005), product, mix, volume and delivery. Product flexibility means that there is ability to change existing products or introduce new ones (Slack 2005). Mix refers to the ability to alternate the diversity of produced or delivered products in a given period (Slack 2005). Volume is defined as the extent of changing the compiled output (Slack 2005). Finally, if delivery dates can be moved there is delivery flexibility (Slack 2005).

**Effectiveness**

If one is doing all the right things it is effective and effectiveness can be divided into reliability and completeness (Charles et. al., 2010). Reliability, as defined by the Supply Chain Council (as cited in Charles et. al., 2010) refers to delivering the right product, to the right people, at the right time, including correct condition and packaging and the correct documentation. Completeness is the ability to achieve all the reliabilities (Charles et. al., 2010).

**Responsiveness**

Charles et. al., (2010) describes responsiveness as divided into three capabilities; velocity, reactivity and visibility. Reactivity is the ability to evaluate and take needs into account quickly and velocity refers to the ability to cover needs quickly (Charles et. al., 2010, p. 726). Then, according to Vernon (as cited in Charles et. al., 2010), visibility covers the ability to view the movements along the supply chain, including identity, location and status of transit together with planned and actual dates and times for the events.

To conclude, flexibility, effectiveness and responsiveness have been suggested as basis of the agile approach by Charles et. al., (2010) and are described above. Further, agility is appropriate when an organization require a supply chain structure that is physically effective and efficient, therefore this is an approach suitable for humanitarian organizations. However, this might be challenging for humanitarian organizations due to issues of resources and
funding, but the concepts that have been adopted in commercial settings should be relevant in this context too. To focus on supply chain management is shown important and leading to cost savings and increased customer satisfaction (Mason-Jones et. al, 2000). Hence, enhanced efficiency would appeal to humanitarian organizations to engage in such concepts, even though the supply chains in relief operations have short duration (Pettit & Beresford, 2009).

2.5 Critical Success Factors

There are some factors that are seen as critical in order for an organization to succeed with its operations (Pettit & Beresford, 2009). Instead of profit as the result of success humanitarian aid strives to deliver aid and if critical success factors (CSF) are not defined there is a large risk of failure (Pettit & Beresford, 2009).

CSFs have been studied and researched a lot in commercial business, and have been recognized to contribute to good distribution (Pettit & Beresford, 2009). Even though CSFs are commonly used within commercial settings, the concept has not very often been applied to humanitarian supply chains (Pettit & Beresford, 2009). One reason for this is the dissimilarities in circumstances in which they operate (Pettit & Beresford, 2009). Although there are differences, the basic activities in the separate supply chains are not essentially different (Pettit & Beresford, 2009). Solutions to optimize effectiveness in humanitarian aid could be identified if the factors most common to numerous industries and critical for the success are identified and thereafter assess whether they are relevant to humanitarian aid (Pettit & Beresford, 2009).

Pettit & Beresford (2009) have found seven different CSFs that are important for the success of a supply chain derived from a commercial setting and applicable to humanitarian aid environment.

2.5.1 Strategic Planning

Long-term decision-making is highly relevant to tackle in order for a supply chain to accomplish its aims (Pettit & Beresford, 2009). To be able to achieve separate goals of an aid agency and to create an effective supply chain there is a need for a strategic
management (Pettit & Beresford, 2009). This includes the evaluation of strengths and weaknesses in certain circumstances but also the recognition of assets (Pettit & Beresford, 2009). Strategic planning with a long-term approach is greatly important when a disaster hits in order to be properly prepared (Pettit & Beresford, 2009).

When comparing strategic planning in humanitarian aid and commercial organizations the main difference is that within the commercial organizations there can be a fairly stable supply chain whereas in the humanitarian aid the supply chain can vary in the stages of a disaster (Pettit & Beresford, 2009).

2.5.2 Inventory Management

Commercial inventory management focuses on market demand whereas disaster relief circumstances makes knowledge of demand and needs unspecified and has to focus on supply until demand is known (Pettit & Beresford, 2009). Therefore the forecasting of demand along the supply chain is of importance in order to be as responsive as possible (Pettit & Beresford, 2009). Further, there is also inventory based on the planning, coordination and control of material flows in the supply chain (Pettit & Beresford, 2009). When it comes to inventory management, all organizations are faced with uncertainty, including both commercial and humanitarian organizations (Coyle, Langley, Novack & Gibson, 2013). In commercial inventory management the uncertainty in demand is in regards to how much and when customers will buy (Coyle et. al., 2013). Further, when it comes to supply, uncertainty is in regards to the obtaining of what is needed from suppliers and how long it takes for order fulfilment (Coyle et. al., 2013). The purpose of inventory is mostly to function as a buffer between supply and demand, which makes the understanding of demand processes critical in terms of inventory management and building supply processes (Williams & Tokar, 2008).

When referring to inventory management both sources of supplies in the disaster area and inventory that organizations hold are considered (Pettit & Beresford, 2009). Lead times are of high importance to analyse when it comes to supply of critical items and time values are more vital in humanitarian relief than in commercial organizations (Pettit & Beresford, 2009). The reason for time being critical is the importance of getting the stocks to the right place at the right time to reach the victims in the best possible way (Pettit & Beresford,
Inventory costs when referring to commercial inventory management do also include the time period associated with transportation (Coyle et. al., 2013). Further, speed of material flow along the logistics supply chain and the level of stock have several constraints and depends on supply and demand (Gunasekaran & Ngai, 2003).

In commercial inventory management there are some reasons to hold inventory, such as the anticipation of unusual events that might happen and affect the source of supply negatively (Coyle et. al., 2013). There are also some inventory control approaches in order to be able to manage and control inventory, which are known factors such as quantity/size, reorder points, transportation factors, buyer seller relationships, lead times, quality and intervals (Williams & Tokar, 2008). Gunasekaran & Ngai (2003) further states that inventory management consists of planning, coordinating and controlling of material flows along the supply chain and the largest decisions includes the volume and timing of orders and deliveries, and the packing of items in batches (consolidation). In order to focus on having an agile organization it is essential with inventory management, where flexibility is a requirement for being responsive to changing markets (Power, Sohal & Rahman, 2001).

2.5.3 Transport and Capacity Planning

Unknown circumstances, and sometimes damaged infrastructure, make the transport and capacity planning difficult (Pettit & Beresford, 2009). A result of this can be that one needs to plan and organize transport and capacity from available resources at the location (Pettit & Beresford, 2009). These factors are also vital parts in reaching the affected areas and utilizing the logistics as planned even though the increased complexity in circumstances (Pettit & Beresford, 2009). In both commercial logistics and humanitarian logistics transportation is a vital link between agencies, allowing goods to flow between them (Coyle et. al., 2013). Organizations can use transport as a way of creating a competitive supply chain in terms of efficiency (Coyle et. al., 2013). There are challenges when it comes to transport such as the complexity of a supply chain, limited available information, the synchronization of transport with other activities in the supply chain and transportation capacity (Coyle et. al., 2013). Transportation further involves modes of transportation, scheduling, maintenance, shipping and consolidation (Gunasekaran & Ngai, 2003).
The main areas that are concerned when it comes to capacity planning in humanitarian logistics are warehousing, transport, material handling devices and human resources (Pettit & Beresford, 2009). To be able to maximize the use of capacity is often the significant factor of making the operations the most efficient (Pettit & Beresford, 2009). The main resources when it comes to capacity planning in commercial logistics are warehousing, transportation, material handling devices and human resources (Gunasekaran & Ngai, 2003). In terms of capacity planning drivers for capacity required are both long-term and short-term demand management (Gunasekaran & Ngai, 2003). Further, regarding capacity planning in the commercial sector, there are strategies to apply such as make or buy decisions and outsourcing which could maximize the capacity utilization and minimize costs (Gunasekaran & Ngai, 2003).

2.5.4 Information Management and Technology Utilization

The importance of effective utilization of technology can be found in much literature but in connection to supply chains it is vast (Power, et. al., 2001). In order to make necessary changes to logistics information one can use information technology (IT) or systems (IS) (Gunasekaran & Ngai, 2003). IT may include intranet, Internet and extranet, with EDI, WWW and enterprise resource planning (ERP) and also data mining and data warehousing (Gunasekaran & Ngai, 2003). This will contribute to the integration of activities and then data can be collected based on performance and resource utilization, thus enabling for realization of possible changes (Gunasekaran & Ngai, 2003). IS contributes to the information management by integrating links in the logistics value chain (Gunasekaran & Ngai, 2003). IT systems enable the provision and continuity of correct information, which in turn leads to increased control (Pettit & Beresford, 2009). New and emerging technology has been argued in literature to contribute to an agile capability however Power, et. al., (2001, p.253), argue that instead companies should focus on appropriate application and use of technologies.

Information management refers to managing systems with the objective of providing accurate information on the performance of different areas of the logistics value chain and on utilization of resources for value-adding activities (Gunasekaran & Ngai, 2003, p.839). Businesses use IS for their logistics value chain with the aim of performance and controlling operations (Gunasekaran & Ngai, 2003). Information management is one factor that is widely used within
humanitarian aid, as it can be the determining factor on how effective the response is in a
disaster (Pettit & Beresford, 2009). Information impacts knowledge management, which
could contribute to an increased level in the planning of existing resources (Pettit &
Beresford, 2009). Further, if an organization utilizes technology in a good manner, the
supply chain could be optimized especially in the connection of customers and suppliers
(Pettit & Beresford, 2009).

2.5.5 Human Resource Management
Human resource management is essential since it impacts effectiveness and responsiveness
(Pettit & Beresford, 2009). Even though logistics is seen very important within
humanitarian aid the expertise within humanitarian organizations is not highly prioritized
(Pettit & Beresford, 2009). A logistics division might not even exist or if it does, having
limited authority, further there might also be limitations when it comes to finding
logisticians with relevant training (Pettit & Beresford 2009). The management of people
working at the crisis is also important in regards to effectiveness and responsiveness and
the ability to deliver aid (Thomas & Kopczak, 2005). What would benefit humanitarian
organizations is to improve skills at the organization and increase the impact of the
logisticians but also to analyse and adapt practices (Pettit & Beresford, 2009). Further,
within commercial agencies human resource management is seen as a strategic management
of the workforce designed to maximize the performance of employees to reach strategic
goals and objectives (Power, et. al., 2001). When it comes to commercial organizations,
human resource management practices are of importance when trying to achieve an agile
supply chain and there is a need for coordination within companies (Power, et. al., 2001).

2.5.6 Continuous Improvement and Collaboration
Commercial supply chains are need-oriented in regards to the market and in order to meet
the needs it is important to strive for continuous improvement (Pettit & Beresford, 2009;
Power, et. al., 2001). Improving performance could be achieved with the use of metrics and
tools. Humanitarian supply chains could also benefit from this approach, and potentially
adopt the use of performance measurement systems (Pettit & Beresford, 2009).

When partners share goals and receive common benefits, working in a collaborative
manner it can be referred to as a collaborative supply chain (Williams & Tokar, 2008).
Collaboration is an essential factor in order to create integration and efficiency in logistics networks (Pettit & Beresford, 2009). From a humanitarian perspective collaboration might be diverse, where factors such as close relationships are important (Pettit & Beresford, 2009). Collaborations could possibly increase effectiveness of the humanitarian supply chain (Pettit & Beresford, 2009). One issue is that collaborations often occur at the time of a crisis and therefore it could result in coordination becoming more challenging (Pettit & Beresford, 2009). As, humanitarian supply chains often are established as crisis occurs with critical circumstances it is crucial to establish effective collaboration (Pettit & Beresford, 2009).

2.5.7 Supply Chain Strategy

As already highlighted throughout this paper, in a commercial setting a supply chain strategy is necessary to make sure that the goods arrive at the right place, at the right time, to the right people (Christopher & Towill 2002; Mason-Jones et. al., 2000; Van Wassenhove, 2006). Further, lean and agile are two strategies that have received much attention, where lean focuses on waste reduction and is preferably applied when demand is stable (Agarwal et. al., 2005; Pettit, & Beresford, 2009). Keywords of agility are flexibility, effectiveness and responsiveness (Charles et. al., 2010), with a focus on customer requirements and more suitable with volatile demand (Agarwal et. al., 2005; Pettit, & Beresford, 2009).

For humanitarian organizations to deliver value the two concept are important, the delivery of right goods, at the right, time to the right people (Van Wassenhove 2006), is essential in the humanitarian setting also. Further, since it is a matter of saving life (Cozzolino et al., 2012). Further, that the appropriate aid arrives to meet immediate needs is critical, therefore these concept are relevant to humanitarian supply chains as well (Pettit & Beresford, 2009). One of the main issues of humanitarian supply chains is to deliver aid as effective as possible (Pettit & Beresford, 2009). Additionally, the issue of delivering value is important and should be considered as the supply chain is designed to ensure that valuable aid arrives to the ones in need (Pettit & Beresford, 2009).
2.6 Summarizing the frame of reference

The research question of our study highlights; humanitarian supply chains, agility and CSFs. We therefore provide different areas in the frame of reference, both for the understanding of the concepts and also for the ability to analyse later on. We start by describing the areas of commercial and humanitarian settings to see that there are both similarities and differences between these two. Where one of the most considerable difference lays in the fact that humanitarian settings rely on voluntary contributions of finance and labour (Pettit & Beresford, 2009), but that the aim is common as focusing of getting the right goods, to the right place, to the right people, at the right time (Van Wassenhove, 2006). Also, the result of success in humanitarian settings is to deliver aid in contrast to profitability. The end-consumer also differs, where it is a buyer in commercial settings and a beneficiary in humanitarian supply chains (Oloruntoba & Gray, 2006). We also briefly describe humanitarian logistics, which is planning, implementing and controlling flows and the related information but where profitability is not the main aim.

We then move on to disaster relief, which can be divided into different phases and those phases further require different requirements and actions. The phases have been defined differently in literature including three or more phases, seen as linear or non-linear, but for the purpose of this study the view by Kovács and Spens (2007) was applied. Further it is the immediate response phase that is of most importance in relation to our purpose but the other two phases are necessary to describe for better understanding. In the phases different actors are involved and those are briefly described. These two are then connected in a framework to create a greater picture of the disaster relief operations. Coordination is another subject related to the disaster relief operations and seen as very important in the immediate response phase. We describe coordination in relation to humanitarian operations and further include one possible solution to the issue of coordination, the cluster approach.

Since we are looking at how CSFs impact on agility of humanitarian supply chains, there is a section handling the issue of supply chain strategy including the lean and the agile strategy. It is argued in literature that focusing on such strategies would enhance relief operations, contributing to efficiency and responsiveness. The agile supply chain then is
described in more depth since that is the focus of our thesis. Further, flexibility, effectiveness and responsiveness are identified as basis for the agile strategy.

This chapter ends with the description of CSFs that are identified by Pettit and Beresford (2009). The CSFs include, strategic planning, inventory management, transport and capacity planning, information management and technology utilization, human resource management, continuous improvement and collaboration and supply chain strategy. Further, CSFs are commonly researched in commercial setting contributing to adequate distribution and could possibly contribute to the effectiveness of humanitarian operations.
3 Methodology

This chapter outlines the methodology used for the purpose of this thesis and discusses research philosophy, research approach and research design followed by data collection and data analysis. Then credibility and a summary are provided at the end of the chapter.

3.1 Research Philosophy

The research philosophy could be referred to as a system of beliefs and assumptions about the development of knowledge (Saunders, Lewis & Thornhill, 2012). The subject can be divided into ontology and epistemology. Ontology refers to the set of beliefs about the nature of the reality and existence (Easterby-Smith, Thorpe & Jackson, 2015). Further, for researchers to investigate into the nature of the world in the most suitable manner the theory of knowledge assists, which is the epistemology (Easterby-Smith et al., 2015). Other than research philosophy; ontology and epistemology, methodology and method are connected to each other and method is founded on choices of the other parts (Easterby-Smith et al., 2015). If researchers manage to create a consistent set of assumptions, it would create a credible research philosophy and further establish other choices within methodology (Saunders et al., 2012). It is of high importance to note the underlying research philosophy when doing a research, as it would imply a particular way of viewing the world (Saunders et al., 2012).

Within ontology there are four different positions one can take; realism, internal realism, relativism and nominalism (Easterby-Smith et al., 2015). Realism concerns that the world is concrete and external with one single reality, whereas internal realism regards the single reality to be obscure (Easterby-Smith et al., 2015). Relativism on the other hand is about realities created by the human, and there can therefore be more than one reality depending on views (Easterby-Smith et al., 2015). Lastly, from a nomalist ontology the focus lies in the behaviours of people (Easterby-Smith et al., 2015).

When it comes to epistemology there are two main frameworks; positivism and constructionism (Easterby-Smith et al., 2015). Positivism discusses that the observer is independent of what is being observed and that reality exists independently of the
phenomenon or object that is being researched (Easterby-Smith et. al., 2015). Further, constructionism discusses that the observer is part of what is being researched and that the human is the main driver of science (Easterby-Smith et. al., 2015).

This thesis follows a relativist ontology with a constructionist epistemology. Our starting points are questions to gain depth and increase an understanding of a specific situation. To collect data we will use a case and data types will be mainly words with some numbers. We will then analyse with triangulation, by using various sources of data to facilitate validation, and a comparison of data in order to reach the outcome of theory generation.

3.2 Research Approach

There are different possible approaches that a study could undertake, which should be defined in the early stages of a research process approach (Saunders, et. al., 2012). One can use an inductive, deductive or abductive approach for a research approach (Saunders, et. al., 2012).

Taking the scope of this study into account, but also knowing there is a shortage in literature in regards to CSFs and agility when referring to humanitarian supply chains and logistics, there is not a possibility to create a hypothesis from existing literature. There was, however, as reviewed in the frame of reference, literature to create a general understanding of the topics and conceptual frameworks. In order to arrange for the empirical data collection the information found in literature was the basis for the structure of this section. Hence, this thesis is contributing to more and new insights into a phenomenon based on a range of limited theories.

Saunders et. al., (2012, p.124) state “A deductive research approach tries to generate theory by testing hypotheses based on existing theory”. Where they also state “Induction builds up new theory on the basis of collected empirical data”. Since humanitarian logistics is a field, which is under researched and further a rather young subject to investigate, an inductive approach was chosen to be most suitable to answer the research question and meet the purpose of this study.
3.3 Research Design

The research design can be seen as the set of methods and procedures of how the research questions are to be answered so as to fulfil the purpose, hence the plan of how to accomplish the purpose (Saunders et. al., 2012). Further, the research design should also address data collection and ethical issues.

3.3.1 Classification of Purpose

The aim of this thesis is to explore and analyse how agility is impacted by the CSFs in the immediate response phase during an emergency. To explore and analyse this purpose, actions of humanitarian organizations are addressed. When choosing the method it is important to keep the construction of the purpose in mind in order to create coherence between purpose, method and analysis (Saunders et. al., 2012). Since, the purpose can be exploratory, descriptive and explanatory these are also ways to approach the study (Saunders et. al., 2012; Yin 2014).

We have chosen an exploratory approach because this is suitable when the understanding of a problem desires to be clarified (Saunders et. al., 2012). Further, it is exploratory since the research of this subject is rather limited and this means that it is possible to discover new insights. What is beneficial with an exploratory study is its flexibility and during the research it is adaptable to change and new insights that might occur (Saunders et. al., 2012).

3.3.2 Research Method

Based on the nature of the purpose and in order to achieve it, a qualitative approach was applied. A qualitative approach is also more suitable when an inductive approach is used. Further it allows for a deeper understanding of the topic that is studied. This study is not based on numbers as in quantitative studies, but on non-numerical data and in this case, opinions and meanings that come from words (Saunders et al., 2012).

3.3.3 Research Strategy

The decision on research strategy was guided by the research approach as described earlier in this chapter being inductive. Further, the research purpose and research method was taken into consideration and based on that a case study appeared as most accurate research
strategy. A case study is preferably used as the purpose is exploratory or descriptive, hence answering what, how or why (Yin, 2014). Also, when the researcher desires to gain rich descriptions, understanding and insightful explanation of the situation, case studies are appropriate (Saunders et. al., 2012; Yin, 2014). According to Yin (2014, p.16), a case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident.

We have chosen an embedded single-case design in order to explore and analyse the unique circumstances during the immediate response phase of the typhoon in the Philippines 2013. This is in line with the characteristics of a single case study typically representing critical, extreme, unusual or unique cases (Saunders et. al., 2012; Yin 2014). Here, the typhoon represents an extreme case. This research involves the analysis of several humanitarian organizations, thus explaining the embedded design. Further, allow embedding several subunits that could possibly lead to a rich understanding and insights in the case (Yin, 2014).

The purpose, and the aim of understanding the impact of CSFs on the agility of humanitarian supply chains based on the typhoon in the Philippines 2013 is in line with Yin’s (2014) definition of a case study. Further, as Yin (2014) highlights that case studies are suitable when a specific, real-life phenomena are studied and therefore we argue that a case study is the most appropriate research strategy trying to fulfil our purpose.

The case that was chosen for the purpose of this research is as mentioned above the typhoon Haiyan that hit the Philippines in 2013. With the effects of the typhoon Haiyan in 2013 in mind it becomes clear that this event caused a lot of damage and further that it is of importance due to the fact that an extensive amount of people was affected. As mentioned before, this disaster is one of the most destructive typhoons and it was the disaster that caused the highest amount of deaths in this area in 2013 (reliefweb, n.d.). The amount of people dead counted for more than 7000 and the total damage about 10 billion USD (em-dat, 2017c), further around 4 million people were displaced due to this event (reliefweb, n.d.). According to OCHA it is the natural disaster that affected the most people in the span of 2010-2016 with 21,2 million people affected (OCHA, 2017). What further made this natural disaster rather complex to handle in terms of relief operations are the large geographical area that was affected and the fact that it included many islands.
3.4 Data Collection

The superior part of this thesis is constructed around primary data, however secondary data was also included but for a smaller part of the thesis. This research is cross-sectional as it studies a specific phenomenon at a specific point in time. The data collection occurred over a limited time period with the objective of a particular occurrence, i.e. the typhoon in the Philippines 2013.

3.4.1 Primary Data

For a case study research strategy, the most appropriate source of primary qualitative data is to conduct semi-structured interviews (Yin, 2014). Primary data was collected for this study by conducting semi-structured interviews, which were organized via the telephone and emails. The respondents from the interviews are to give insights in circumstances during the immediate response phase of the typhoon in the Philippines 2013 by those agencies. Additionally, give insights regarding how the CSFs impacted the capabilities of an agile supply chain. Further, we used meeting minutes written during the Haiyan disaster that we collected from logcluster.org.

Collection of primary data was also made through scientific articles, academic books and databases. Existing research covering the area of this thesis and closely related topics was studied and put together in a frame of reference in order to create a valid background and thereby develop an understanding of the subject in matter. To find suitable information and previous research the databases Primo, Scopus and Google Scholar was used but also the library at Jönköping University.

3.4.2 Sampling

This thesis is, as stated above, a qualitative research and has also undertaken a non-probability sampling technique in order to be able to generalize about the population without it being on statistical grounds (Saunders et. al., 2012).

The respondents were selected by purposive sampling and were chosen due to their relevance to the typhoon in the Philippines 2013. When selecting the respondents, we
identified organizations engaged in the response phase during the catastrophe in the
Philippines and contacted candidates based on our purpose. To be able to identify relevant
candidates contact lists of the humanitarian organizations were used as a starting point.
These respondents in turn were kind enough to suggest further possible candidates to
contact, and this can be referred to as snowball sampling (Saunders et. al., 2012). The
contact was made by sending the potential candidates a personalized email presenting our
case study and asking for their availability to participate in an interview.

3.4.3 Interview Outline

An interview outline (see Appendix 1), was created and used for the semi-structured
interviews, the outline works as guidelines and thereby creates flexibility as it allows
questions to be altered during an interview (Saunders et. al., 2012). If a respondent does
not feel comfortable in answering some questions these could be removed or in order to
explore a topic further the outline allows the adding of additional questions (Saunders et.
al., 2012).

The questions were carefully considered and well executed in order to receive data with
quality, since the question impact the depth and quality of findings. Issues with interviews
could be that interviewees interpret questions differently and perhaps provide answers that
the interviewee expects the interviewer to want (Yin, 2014). In order to possibly avoid
those issues, the interview outline was as mentioned considerably prepared with open-
ended questions and formulated with ‘how’ (Saunders et. al., 2012). Literature suggests that
open-ended questions are appropriate in order for the interviewee to elaborate their
answers and to give a deeper understanding for reasons for decision-making (Saunders et.
al., 2012). The semi-structured interviews also follow an outline with key questions and
specific themes (Saunders et. al., 2012).

The interviews were conducted via Skype and started with an introduction of our thesis
and ourselves. Subsequently, consent from interviewees were asked for audio recording the
interview and if they preferred to take part in the study anonymously. Further, if the name
of the organizations from where the respondents came was allowed to be mentioned in the
report.
The respondents interviewed within this thesis came from two different organizations, namely Plan International (Philippines) and International Federation of Red Cross and Red Crescent Societies. The interviews were conducted via Skype and each took approximately one hour. Moreover, the respondent from Plan International has the title Program Technical Manager for Disaster Risk Management and is referred to as P1 within this thesis. The respondent from the Red Cross has the title Programs and Operations Manager and is referred to as P2 within this thesis.

3.4.4 Secondary Data
Secondary data was collected through websites, newspaper articles and publications of humanitarian organizations and institutions. This data was collected to get background knowledge regarding the Haiyan typhoon in the Philippines in 2013 and also to contribute to the preparation of the interviews.

One of the webpages that was used for the purpose of collecting data was http://www.logcluster.org. At this page, we first selected the country of where the disaster took place, the Philippines. Followed by choosing meeting minutes and thereby filter by document type, we further limited the meeting minutes by year, 2013, and date, November and it included 19 meeting minutes from the 11th of November until the 28th of November. The meeting minutes covered areas all over the Philippines and we did not reject any meeting minutes based on area. The meeting minutes are from, Manila, Cebu, Tacloban, Ormoc, Roxas and Guiuan.


Statistical data in relation to disasters, the Philippines and Haiyan was collected through http://www.em-dat.be.

3.4.5 Case Background
The Philippines is a country located in the Asia-Pacific area with around 101 million inhabitants (2015) (OCHA, 2017). The Philippines is highly exposed to disasters and from
In November 2013 the typhoon Haiyan struck the country causing huge damages. The typhoon reached at least 235 kilometres per hour (km/h) near the centre and wind gusts at 275 km/h according to the Philippine Atmospheric, Geophysical and Astronomical Service Administration (cited in OCHA, 2013a). It was estimated that around 14 million people were affected by the disaster including 4 million displaced people (reliefweb, n.d.; Logistics Cluster, 2013b), the number of people affected however differs a bit and OCHA (2017) present that more than 21 million people were affected. The total number of deaths counts for about 7400 people (em-dat, 2017b), this means that Haiyan was the deadliest event in Asia-Pacific this year (reliefweb, n.d.). At November 9th 2013, 1223 evacuation centres were established having around 330 000 people (OCHA, 2013b).

It is said to be the most devastating typhoons ever recorded (OCHA, 2017). Further, the total damages amounts to about 10 billion USD (em-dat, 2017c). The damaged that was caused by Haiyan limited access, due to roads being damaged and trees that were fallen (OCHA, 2013a). Airports and the main seaports were also closed due to the effects of Haiyan and its damages (OCHA, 2013a). Losses of communication, electrical power, initially security issues were also effects of Haiyan (ECHO, 2014). What also made the relief operations more difficult and affected the access was the huge geographical area and that the Philippines consist of many islands. In terms of destruction, some areas suffered from 80 % to total destruction of houses, commercial establishments and public communications in a reach of 100 kilometres from the eye of the typhoon (ECHO, 2014).

Just after the typhoon hit the Philippines, at the 16 of November 2013, the immediate needs included shelter, wash, health and food supplements and the estimated number of people in need at that time was between 300 000 and 500 000 (Logistics Cluster, 2013b). Looking at one of the cities, Tacloban, there was no food, water or electricity as of the 9th of November 2013 (OCHA, 2013b). Several actors were involved in the humanitarian relief operations and contributing to alleviate the suffering. For example the Logistics Cluster
facilitated the transport of 11,880m³ of relief cargo by sea on behalf of 29 organizations, the provision of 14,000 m² of storage space and 45,141 m³ of relief cargo by road.

To further display the typhoon and its affects we included a map. The map confirms that the Philippines is consisting of many islands and the areas that were most affected were in the eastern parts of the country.

Source: Philippines National Disaster Risk Reduction and Management Council and USAID (from the Lancet, 2013)

3.5 Data Analysis

This paper is based on an inductive approach and therefore we found a template analysis the most appropriate (Saunders et. al., 2012). When collecting data themes are identified which are a representation in the form of a template that contains codes and categories (King, 2004; Saunders et. al., 2012). When applying a template analysis one can predetermine codes but also alter them as the data is being analysed, which contributes to a qualitative analysis (Saunders et. al., 2012).
Applying a template analysis could add to flexibility in the analysis process as you are allowed to amend its use in order to adapt it to the necessity of the research (King, 2004; Saunders et. al., 2012). Template analysis is the creation of categories that attaches to components of data, which further is coded and analysed to determine themes, patterns and relationships (Saunders et. al., 2012). A code can be defined as a label attached to a section of text to index it as relating to a theme or issue in the data which the researcher has identified as important to his or her interpretation (King, 2004, p.259).

The template analysis was applied to this research and its purpose to organize, analyse and interpret the collected data. This was done by initially coding the data but then reorganize the data after the semi-structured interviews were conducted. Focus was on trying to find a good balance of codes in line with suggestions by King (2004) who argues that an extensive amount of codes may prevent exploration and on the other hand a small number of codes can give an extensive amount of data, which increases complexity. When constructing the template we also based it on suggestions by King (2004) to use the interview outline, which in turn is from the frame of reference and secondary data. Then, key words and initial codes were identified, codes were adapted along the analysis, and an initial template was formed. As the process went on the template was revised in response to the collected data.

When collecting the data for the empirical findings within each CSF, categories were identified. For example within transport and capacity planning it included air, port, road, power supply, transport, available resources, capacity and communication. They are further stated in the empirical findings before each CSF. From the categories found in each CSF, codes were defined relating to the categories. For example within transport and capacity planning the codes were transport network damage, inaccessibility, congestion, lack of capacity, delays, capacity issues and limited infrastructure. These are displayed in the tables within the analysis section together with the predetermined codes from the capabilities of agility, namely flexibility, effectiveness and responsiveness.

To be able to answer the research questions of this thesis and hence fulfil the purpose we have chosen to analyse from the perspectives of organizations. The research attempts to discover the impact of CSFs on the agility supply chain. The reason why we are researching from this perspective is to communicate the focus that should be undertaken by
organizations to reach goals within humanitarian logistics. Further, the significance of this thesis is to gain insights from a new perspective.

3.6 Credibility

This section concerns issues of validity and reliability of the research results and were considered in order to ensure the quality of the research findings. According to Yin (2014), the research design ought to display a logical set of statements, thus to verify this there are some concept that could assist. Validity and reliability are such concepts and these are relevant for case studies (Yin, 2014).

3.6.1 Validity

This section of validity will include and describe construct validity, internal and external validity. Generally, it refers to whether findings are what they appear to be about (Saunders et al., 2012). First, construct validity refers to that accuracy with which case study’s measures reflect the concepts being studied (Yin, 2014, p.238). Or as explained by Saunders et al., (2012, p.193) the extent to which your research measures actually measure what you intend them to assess. Multiple sources of evidence was used, both primary and secondary data, this to increase construct validity, in line with recommendations by Yin (2014). Second, internal validity is about causal relationships and whether a relationship between two variables can be established (Saunders et. al., 2012). This is relevant during the analysis part, however mainly a concern for explanatory case studies (Yin, 2014). Third, external validity concerns the extent to which the findings from a research can be generalized (Saunders et. al., 2012; Yin, 2014) hence it concerns the applicability to other research settings. External validity is one of the main issues of neglecting case studies as research strategy, further it has been argued that the base of scientific generalization from case studies is small (Yin, 2014). The reason of why a case study made sense for this research was based on the research questions, which includes “how”, and helps for seeking generalization, thus aim for external validity. Compared to quantitative research, case studies cannot build on statistical interference but rather analytical interference (Yin, 2014). Three main criterions for validity when using a constructionist design are authenticity, plausibility and criticality (Easterby-Smith et. al., 2015).
This research includes carefully evaluated methods, which were found to provide relevant information that are both concerned with broad and in-depth data gathering approaches. These are further integrated with secondary data sources. Hence, this thesis’ collection of data captures the information that was intended to be measured.

3.6.2 Reliability

If your data collection techniques and analytics procedures would produce consistent findings if they were repeated on another occasion or if they were replicated by a different researcher (Saunders et al., 2012, p.192) it is reliable. The aim of reliability is to reduce errors and biases (Yin, 2014). Documentation is one of the ways to increase reliability and therefore the research process with the interview guideline is presented. Our research processes are described in detail, which provides transparency and facilitates transformability to conduct the same study in a similar environment, with other organizations and researchers. In order to enhance our reliability interviews were audio-recorded, this to also prevent interpretation of data and create bias. We have made sure that the assessments made within this thesis are consistent.

3.6.3 Ethics

To complement validity and reliability of the research, research ethics has been considered in order to ensure that no harm comes to participants, to respect the dignity of participants, to ensure a fully informed consent of research participants and to protect the privacy of participants (Easterby-Smith et. al., 2015). Further, research ethics has been applied to ensure confidentiality of research data and to protect the anonymity of individuals or organizations (Easterby-Smith et. al., 2015). Research ethics has also been used in order to avoid deception in regards to the nature or aims of the research, to keep honesty and transparency in communicating about the research (Easterby-Smith et. al., 2015). Lastly, research ethics has further been used to avoid any misleading or false reporting of research findings (Easterby-Smith et. al., 2015).

In this thesis, these factors have been thoroughly considered. The respondents were informed of the purpose and content of the study and we received their consent of participating in the study. The participants were further asked if they agreed to audio recording of the interviews as well as if they desired to remain anonymous throughout the thesis. We also asked if they were ok to name the organization they were representing,
which they agreed to. The anonymity of the participants ensured that no harm would occur due to their participation and that their dignity was respected. Further, data was treated carefully and we made sure unauthorized access was minimized in order to ensure security and confidentiality of the data.

Further, in this study we have addressed transparency in order for the reader to understand the research processes, the reasoning of the researchers and for the understanding of how conclusions were drawn. The researchers of this thesis have also developed results so that misleading of the reader is avoided and to thereby decrease misinterpretations.

3.7 Summary

We conclude this chapter with a summary of the methods and methodologies chosen for the purpose of this thesis.

A constructionist epistemology and a relativist ontology are chosen for this thesis, where we aim to gain depth and an increased understanding of a certain situation. Based on the found literature within the area we created a general understanding of the topics and that is later used for the structuring of the empirical findings. We have further chosen an inductive approach as the most suitable approach to fulfil our purpose.

The purpose of this thesis is to explore and analyse how different CSFs impact on agility in the immediate response phase during an emergency and in order to fulfil this a plan is needed. Further, the approach of the purpose is exploratory based on the aim of understanding and the rather limited research of the subject, which implies the opportunity to gain new insights. To reach our purpose a qualitative approach was applied, which is also suitable with the inductive approach and allows for a deeper understanding of the studied topic.

Moving on to the research strategy, which was guided by the choices of research approach, we have chosen a case study as the appropriate research strategy. Further, the case that was chosen in order to explore and analyse the circumstances during the immediate response phase of a disaster is the Haiyan typhoon in the Philippines in 2013. Case studies are also suitable for specific, real-life phenomena.
This thesis includes the collection of both primary and secondary data and it is cross-sectional as a specific case is studied at a specific point in time. To discover respondents for interviews, purposive sampling was used and done by identifying organizations that participated in the response phase during Haiyan. An interview outline can be found in Appendix 1 and this was used for the semi-structured interviews conducted via Skype. The outline functioned as guidelines and allowed us to be flexible during the interviews, the questions were further created so that respondents had the possibility to elaborate their answers.

The collected data is then analysed by the use of template analysis where themes are identified and used together with codes and categories, with the purpose of organizing, analysing and interpreting the data. This way of analysing allows for predetermination of codes but also the alternation of codes during the process of analysing.

Finally, ideas of credibility are taken into consideration to ensure the quality of the research findings. We have evaluated methods in order to gain relevant in-depth and broad information for the purpose of our thesis together with secondary data sources and thereby validity is increased. To increase reliability, the research process is described in detail to provide transparency and enable for other researchers to conduct the same study. In terms of ethics, respondents gave their consent of participating and they are anonymous in this study.
4 Empirical Findings

This chapter starts with a recap of the background on the case of the typhoon Haiyan in the Philippines 2013 and it also shortly discusses some preparedness and immediate response phase data. The empirical findings within this chapter mostly focus on the CSFs.

Haiyan was a typhoon that hit the Philippines in November 2013. The Philippines is a country that is highly exposed to disasters and especially storm related events (em-dat, 2017b). Haiyan caused huge devastation for the country and was the deadliest event in Asia-Pacific in 2013 (reliefweb, n.d.). The damages that Haiyan caused affected accessibility of roads, airports and ports negatively (OCHA, 2013a), but also communication and electrical power was lost and security was an issue initially (ECHO, 2014). The number of people affected is estimated to around 4 million people that were displaced and around 6000 people died (Logistics Cluster, 2014).

4.1 Preparedness

The Philippines has suffered from many weather catastrophes and based on events and relief operations occurred during 2008-2011, humanitarian relief plans have been established to prepare for future emergencies or natural disasters. However, when Haiyan struck it was so much more severe and the preparedness established beforehand was therefore not enough and the country was not prepared for a catastrophe of this magnitude.

4.2 Immediate Response Phase

One organization described that when they were working during Haiyan in 2013, the immediate response phase lasted for a month, although due to the severity of the disaster it could have been longer. The timeframe of the immediate response phase depends on what kind of disaster or catastrophe. It is also sometimes difficult to define the immediate response phase and agencies tend to define it differently as they evaluate different factors. During data collection it was evident that the response phase lasted for more than one month, as interviewees discussed actions made three months from when the typhoon struck. However, the immediate response phase is defined to be one month.
Referring to the map that displays the storm path and people affected presented in section 3.4.5 it is evident that the most affected areas were around the cities, Tacloban, Cebu and Ormoc. This was also highlighted during the interviews and in the meeting minutes frequently. Adding to this, Manila is located in the North were Haiyan did not cause as much devastation as to the eastern islands and this was also were many returned for to use Internet and to retrieve relief supply.

4.3 Critical Success factors

The empirical findings of the following CSFs in the Philippine typhoon 2013 during the immediate response phase are presented below. They cover the transport and capacity planning, information management and technology utilization, human resource management, collaboration, inventory management and supply chain strategy.

4.3.1 Transport and Capacity Planning

The transport and capacity planning factors investigated within this thesis are: air, road network, port, transport, available resources, capacity, power supply and communication.

When referring to airports it was evident that there was a lack of capacity as most of them were completely destroyed or heavily congested, although some were made clear for landing purposes. Access to air assets were difficult and management of air slots and the insufficient airplanes were major issues. The military and the civilian defence were handling flights and air operations and the airport in Cebu was made the main entry point for incoming flights to the Philippines due to it being fully functional. Solutions for travel options were commercial air charters, although these were also congested and often had to be re-routed. Another solution was to use helicopters, as they do not have to apply the landing restrictions and used stadiums as landing options. These were furthermore used for initial travel to affected areas for quick response without having to regard restrictions of airplanes. Air solutions were also used for rescue operations and transport of relief items where a cargo move priority list was initiated by the humanitarian country team. Further,
when the military demobilized, air options turned to commercial air companies, which assisted with helicopters and aircrafts.

Transport was mainly done using the road network and a focus was for the transport of fuel supply and movement of cargo with relief items. However, an issue early on was the lack of information in regards to the status of the roads, the ability to use them and the accessibility of roads. Road conditions were severely damaged, however the various islands had different conditions where Ormoc was not as affected as other islands. Some roads were blocked and each municipality cleaned up their roads from rubble and made them available for use. Rehabilitation of the roads were highly time consuming and the road conditions made traffic congested, which resulted in long waiting times for transportation.

The ports in the Philippines were damaged, although not as damaged as road network and there were ports that were operational and functioning. However there were ports that experienced limited capacity and long delays for berth. Further, there were different options available for sea transport such as commercial ferries, which were commonly used throughout the relief operations. Consequently, there was a high pressure on ports, where there were many trucks at the ports and cargo that was not handled and left at port caused congestion. Additionally, the commercial sector was functional and available for contracting to move relief items around the country by sea.

The main problem in transport was the congestion issue, which made the organizations assess of alternative routing. However, prioritization was not given to humanitarian organizations in terms of boarding ships, which created long waiting times. Adding to this, there was a lack in heavy equipment and at the base camps there were neither fresh water nor fuel.

There were capacity issues in terms of human resources (staff), storage, management and equipment. Some areas suffered from limited or non-existing logistics infrastructure and limited ability to receive, store and handle goods.

To find suitable trucks for distribution was an issue for some and the availability of trucks differed depending on location. Organizations had to organize their own transport for cargo movement from ports and also had to break down the loads into smaller ones and
using smaller vehicles because of the damaged road conditions. This was emphasised by P2 (personal communication 2017-05-03) who expressed that due to damaged roads, weight limitations were imposed and therefore only small trucks were usable, which hindered desired volume to be delivered. Further, to increase levels of trucks on the islands, recommendations were to send cargo by truck. Also, there was a super shuttle, Ro-Ro, which had the capacity of 91 trucks.

Storage and warehousing was expressed challenging, both in terms of limited availability and warehouses at some locations were not secure and did not provide sufficient support for effective relief distribution. Further, offloading facilities were also lacking together with handling equipment such as forklifts and therefore unloading and loading was made by hand. Moreover, to address storage issues, the establishment of common mobile storage unit (MSU) compound was made and 25 MSUs were erected.

Lastly, there was no power supply and it took about 3-4 months to rehabilitate. Therefore generators were used for electricity purposes. In terms of Internet and mobile communications it was lacking in the majority of the islands, however there were partnerships made with local telecommunication companies. The strong winds affected telecommunications highly in the beginning and especially the most affected areas. Further, organizations such as Plan Philippines had satellite desks at offices in order to be able to connect immediately and thereby access NGOs and local government ombudsmen.

4.3.2 Information Management and Technology Utilization

The information management and technology utilization factors investigated within this thesis are: Information sharing, management of information and IT.

During the relief operations for Haiyan, information was one of the factors that were highly emphasized. This since operations and coordination depend on information. Information was needed in several areas (e.g. accessibility, capacity, cargo tracking, resources, supplier details, storage etc.) and more information was requested throughout the time period studied. It was emphasised by respondents that in the early stages of the relief operations, information was scarce and further uncertain. The communication of
information was observed as frequently discussed during meetings of the Logistics Cluster. It appears to have been more difficult with communicating and sharing information in the beginning of the relief operations, partially due to that offices and coordination had to be established first. Further, organizations had their own information offices to facilitate communication and share information and the Logistics Cluster also served partly for this purpose.

It was important that organizations shared information, as this was the basis of the operations in many fields, the shared information was consolidated in order to create one common data. Organizations were requested to share as much information as possible as soon as they had information in order to handle the issue of visibility and also to facilitate long term planning. But again, information was scarce.

One area where it seemed to be of importance to gather information was in regards to accessibility of ports and roads and there was later an access constraints map established to provide information for transportation. The access constraints map was updated continuously and one example is provided below, this map is from November 25, 2013 (Logistics Cluster, 2013a).
The information shared was used for the purpose of deciding and delegating where, what and who. Also to prioritise, plan and manage ground assets and to be able to do that, information regarding incoming cargo and its destination was one example that was needed. Coordinating the management of storage and facilities also requires information but was restricted since organizations had limited information to share. Another usage of information was supplier details and rates to avoid overcharging of suppliers’ warehouses and transport. Further, information and gathered data plays an important role when it comes to raise awareness both among participants in the country but also to the outside world. P1 (personal communication, 2017-04-10) expressed actions taken regarding this
issue where information was collected and shared to news reporters in order to raise awareness to the world and as a way to share information with other organizations.

The Logistics Cluster functioned as a basis of where to find a great deal of information, such as reports, forms, procedures, accessibility and schedules. Basically all the information that was to be found here was based on information shared by the organizations. The Logistics Cluster also handled bookings of transport on for example aircrafts and ferries.

Information was crucial all the time in order to be as updated as possible, further assessments regarding the current need of information were made. Though one issue was that organizations were inconsiderate with information that they provided on forms. Essentially, the management of information was identified as a logistics gap.

When it comes to technology utilization and IT, it was used extensively for the purpose of communicating and sharing information. Prepositioned satellites enabled the use of Internet but also phones and equipment such as laptops and printers were available. In order to handle cargo tracking, systems were used as an accountability measure and visibility tool. P1 (personal communication, 2017-04-10) stated that the signal in Manila was working, hence a good place to report the gathered data.

4.3.3 Human Resource Management

The human resource management factors investigated within this thesis are: management of people, expertise, skills and leadership.

The relief operations of Haiyan required extensive use of human resources, though it appeared as skills were lacking. When Haiyan struck the country and it became clear that the devastation was larger than ever experienced, there was a strong request for deployment of staff from other countries. P1 (personal communication 2017-04-10) said that rosters with prepositioned staff existed within the organization and staff was deployed according to the roster.
It can be observed that several managers existed and operated during the relief operations. Logistics officers and coordinators, country directors as liaison points to UNHAS (United Nations Humanitarian Air Service), Civil Military Officers and Cargo tracking officers are some examples, though it seems as if it was not enough. P1 (personal communication, 2017-04-10) expressed that even though 100 experts were brought in for guidance it was not enough nor efficient. Mostly, due to that not all experts were knowledgeable and to the time adjustment to the location. The leadership caused confusion around tasks and assignments. Further, managers at location did have different leadership styles and differences in management and technical inputs, which also created conflicts and sometimes led to confusion.

There was furthermore the issue of non-existing expertise in some areas such as cold-chain capacity. Though, not only expertise was lacking but skills in general. Partly explained by the large scale of the disaster and staff that did not have previous experience of similar events. Further, labour was affected by the disaster and made vulnerable.

Labour was needed in several areas, such as off loading, cargo at entry point and final destination, warehousing etc. Labour for off loading was offered by the Logistics Cluster and for other purposes it had to be organizations own supply. The issue of labour capacity was another area during the relief operations that could be considered as uncertain. Further, based on assessments of needs labour was rearranged during the immediate response phase. Though one area that was of importance to provide labour was the handling of inter-agency cargo in order to streamline operations and avoid congestion.

### 4.3.4 Collaboration

The collaboration factors investigated within this thesis are: collaboration, communication and relationship.

The Logistics Cluster meetings provided the opportunity to discuss problems that occurred, issues and a place to liaise with each other. Communication was of high importance, to keep an open dialogue in order to facilitate collaboration, especially when it comes to the shipping and space on vessels. Further, communication was important both between organizations and to the Logistics Cluster regarding plans, needs, warehousing and
the presence of the Logistics Cluster among other things. The meetings were also when target areas and assignments were divided among participants. This was important to consider since some of the participating organizations had the same program and thus to further avoid duplication. The importance of keeping good relationships was highlighted in order to augment decision-making. Since the aim is to reach many beneficiaries, organizations collaborated and complemented each other’s resources.

Planning was one of the difficult issues during the relief operations and to handle this there was intended coordination with partners, government and humanitarian country team (HCT). For example, the Logistics Cluster supported the government with shuttling of food and water. Collaborations existed among the organizations in terms of for example sharing pipelines. Further, several collaborations also existed with different armies, both local and foreign, in terms of assistance and providing assets.

When it comes to the shipping of relief items collaboration actions were intended where assistance was provided on an ad hoc basis and special shipping services were set up for the humanitarian community. Within the Logistics Cluster and its participants, trucking was contracted by the organizations themselves but also shared among them if there was remaining space, though it seems to have been limited.

There were different actors involved in the relief operations, humanitarian organizations, commercial operators, and governments, military and local organizations to mention some of the ones identified. The commercial actors could be reached through the Logistics Cluster. If an organization was not yet registered in the country, local organizations could be potential solutions as partners. Negotiations were also noticed as continuous, with for example the department for social welfare and development and other local authorities.

4.3.5 Inventory Management

The inventory management factors investigated within this thesis are: supply, demand, storage, warehousing, material flow and time.
During the initial part of the relief operations there were difficulties experienced in regards to efficiency in terms of supply. However, these were incrementally decreased and adjusted along the operations. When it came to medical and health items there were little or no visibility and due to uncertainties of supply there were demurrage charges for cargo at airports. There were uncertainties in regards to interagency goods in cargo where volumes and supply were unknown many times. Further, some organizations solved the issue of supply by purchasing and procuring goods from areas that were not as affected as others by the typhoon. Adding on to the uncertainties of supply there was a high demand for storage and especially in regards to incoming supply. Further, to assess the demand and identify needs during the typhoon there was a rapid assessment made of funding and the scalability of the disaster in affected communities.

Even though there was a high demand for storage, there were uncertainties in regards to availability of storage and it also became clear that it was a high lack of storage. Therefore, temporary storage was established with the purpose of preventing congestion at airports. Further, there were also storage difficulties due to the damages in the infrastructure. Additionally, to solve the issue of insufficient storage MSUs and commercial options were used as an option for interagency storage. Storage issues in regards to handling and staging of cargo was also present. Further offloading facilities was an additional issue and consequently local storage was heavily strained. Moreover, supply such as medial items required certain handling, cold chain storage but the capacity of such handling was uncertain.

Closely related to storage and the issues in regards to it is the warehousing issue. There were evident difficulties in terms of warehousing such as secure handling and staging of cargo and there was a need of an inter-agency warehouse compound and warehouses were also set up close to ports. In regards to commercial and governmental warehouses there were a lot of damages and to address the lack of warehouses commercial malls were contracted to support operations. The warehousing capacity was very low and was recognized as a logistics gap by involved agencies.

To address the issues of storage and warehousing, some flows were directly distributed instead of incorporating warehousing. This was also to solve the issue of unhandled and left goods at ports and airports. Further, to facilitate flows that were still flowing and to
increase the visibility of flows, fuel was sent out to avoid congestion. The travel time from Manila to the Eastern Samar was 3 days and some organizations was relying on supply arriving from there. Flows of goods were time consuming, and there were long waiting time for goods due to congestion in traffic, but also due to packing and organization of goods. Moreover, the loading period for sea transport was 2 days and therefore a direct distribution from trucks was applied. As mentioned earlier interagency storage was used but only as transit and the time limit here was 72 hours. Lastly, due to congestion and that humanitarian organizations and their relief items were not prioritized caused a lot of waiting time.

4.3.6 Supply Chain Strategy

The supply chain strategy factors investigated within this thesis are: coordination, strategy, waste, prioritising and need.

Coordination meetings were held on a daily basis with clusters from various locations. The meetings enabled efficient and wise use of resources in terms of what and where to target. In order to complement resources between organizations and to reach more beneficiaries with good quality and without duplication, coordination was established at the meetings. Further, during cluster coordination meetings target areas and assignments were divided between organizations. As mentioned previously there was limited information available, which constrained the planning. Consequently, a coordination gap was recognised and mentioned during meetings. Further the pipeline planning and the supply chain of relief goods noticed as affected by the lack of structured coordination and challenges of communication. Moreover, the visibility of upstream pipelines of organizations was a continuous issue. One solution by the Logistics Cluster to fill the coordination gap was to have logistics officers in each town. Further, there were three base camps at three different locations set up during the relief operations.

Organizations, government and HCT coordinated with each other to handle planning and tasking difficulties. In order to handle the issue of customs clearance the government created one-stop shops and the bureau of customs of the Philippines was activated at ports and airports and expediting the processing and release of international release goods.
Further, the health cluster was responsible to coordinate what health relief items entered the country and also coordinated with the Philippine department of health.

When it came to coordination at the ports commercial companies were given responsibility by the government and had authority, handled task management and prioritised berthing. The services at ports, except labour were offered free to organizations and organizations also coordinated so that they could share shipping space. Additionally, organizations also coordinated their transport with other NGOs. Further, in order to avoid congestion, it was essential that organizations collected the cargo at ports on time and had clearly marked trucks. Adding to this, the coordination of the inter-agency storage was transit storage with 72 hours, however there was space for organizations to have their own MSUs.

Moreover, The Logistics Cluster was used as a channel for a request of movement of humanitarian cargo using US military assets. The US army was further responsible for moving passengers as coordinated with the Philippine government. Additionally, civil military coordination was a service that was offered to all cluster members.

During the relief operations there was a focus on establishing and maintaining key services to fill logistics gap. There was also a strategic response plan based on the identified gaps, revised concept of operation, and service catalogue. Further, there was a preliminary operations plan, which could be changed with the reflection of needs of organizations, logistics gaps and bottlenecks. To coordinate these plans the Logistics Cluster meetings were held on an ad hoc basis. The most effective way to manage the handling of incoming cargo and accessing and allocating air, sea and ground assets was to provide visibility on agencies respective planning and incoming cargo and intended destinations. The main receiving hub for international aid was Cebu due to the close proximity, and for operations not to be disrupted cargo needed to be moved from the airport. Adding to this, all flights were booked on first come first served basis and helicopters were used for initial travel to affected areas in order to avoid landing restrictions. Further, there was a primary focus on reducing congestion at airport and streamlining operations and therefore a cap was set on organizations per flight, 2 per/agency, in order to create the opportunity for organizations to get where they needed. Additionally, in order to prevent backlog there was a limitation for request for airlifts.
One strategy was to send cargo by trucks so that trucks would remain on the island in order to be used for further distribution and onward movement to other locations. There were also option routes in order to avoid congestion. Further, there was no plan to establish a common road transport due to the existing commercial transport, however there was trucking capacity if it was needed.

WFP and Logistics Cluster provided for offloading and transporting of cargo to the MSU farm in order to prevent congestions and the Logistics Cluster services were not intended to compete with local transport services offered, but they augment the capacity in order to speed up delivery of priority. Further, cargo was left overnight in trucks and then moved onwards the following day to avoid unnecessary offloading and loading operations. Another strategy to avoid congestion was to send out fuel. Further, agencies were responsible for the recovery of their own consignments whilst being transported via Logistics Cluster, however to improve the customer service the usage of consignment tracking was set as a priority.

If looking more at an organizational level one respondent expressed that their supply chain strategy was not prepared for a disaster with such level of destruction, however that the supply chain was rather flexible and could be adjusted later on in the relief operations.

Strategies of addressing waste during the relief operations included the removal of the import and tax fees. Additionally, penalties were given for abusing services and cancellations had to be done as early as possible with a valid explanation provided. Further, it was also demanded that when wanting to use services details had to be communicated and in order for supply to reach as many beneficiaries as possible, to assure quality, and avoid duplication, resources were coordinated at the cluster coordination meetings.

Strategies of prioritising and making sure urgent needs were met first, cargo airlifts were prioritised to support medical needs and in order to prevent congestion organizations were to avoid sending noncritical relief goods. Further, priority was to establish user requirements to define the number and capacity of air assets and then prioritisation was made based on needs. Prioritising at ports were authorised to a private company and HCT were responsible for prioritising cargo sending. Further, the main bottleneck was that cargo
ferries were congested and NGOs were not given priority by the government. Additionally, congestion at airports was also an issue and therefore priority was to take care of cargo sitting at the airport.

There was limited availability of military civil defence assets but it was expected to increase, the priority of these assets was to support medical needs to the affected. Further MAERSK offered cold chain capacity containers in order to manage health care items.

There was an expected increase in traffic, which could lead to congestion, and issues were raised in the ability to absorb the expected volumes of relief cargo. There was also an evaluation of needs to support an establishment of additional storage sites and if this was necessary. Further, there was a continuous need for warehousing but difficulties to find options for this area of concern.

Consolidated requests were sent out to access limited services. There were forms to fill out to state needs in regards to sea, road and storage common services. Further, set schedules were open to change after an assessment mission. Additionally, assessments were made in order to establish the needs in terms of coordination, warehousing and information management.
Analysis

This chapter presents an analysis of the empirical findings. It includes the impact of the CSFs of the agility of humanitarian supply chains and also the actions taken by humanitarian organizations are analysed.

5.1 Transport and Capacity Planning

Transportation is something that gets highly affected by disasters and is often damaged with decreased functionality, hence affecting the transport capability (Kovács & Spens, 2007; Pettit & Beresford, 2009). The empirical findings within this study prove that the logistics infrastructure was highly limited because of the devastation and destruction of the typhoon. A lot of damage was caused to the infrastructure, which affected the transportation and also led to congestion. When the transport network was not fully functional it led to failures in the network structures, which implies a negative effect on quick response, hence operations were slowed down. Further, the damages from the typhoon made the transport network vulnerable and affected the quality of efforts. Thereby, damages on networks prevented the ability of being reliable in delivering goods.

Pettit & Beresford (2009) state that difficulties are created when it comes to transport and capacity planning because of unknown circumstances and damaged infrastructure. During Haiyan the accessibility of transport network decreased, which led to a change of transport usage. The damages of the transport network increased uncertainty and made capacity limited on how to use the different modes of transport. Observed in the empirical findings is that the included participants attempted to work with the available resources and the ability to use the different modes of transport. Despite the damaged infrastructure, organizations by the help of the Logistics Cluster tried to find solutions to be able to transport and manage flows based on the available resources at the location, which is also a solution stated by Pettit & Beresford (2009) to handle those situations.

Coyle et. al., (2013) define that transportation is one of the most important links between agencies which allows for goods to flow. The findings indicate that there are interdependencies between infrastructure and when one mode of transportation is affected another is indirectly affected. This can be seen in the congestion issue which appeared
when re-routing was made from one damaged route to a functional one and hence put high pressure on available transport routes. The Philippines is composed of several islands, which also makes it clear that infrastructure is highly important and that alternative routes and modes of transportation are solutions to damages and congestion. The infrastructure is therefore a support system to keep flows stream and increase the connectivity of operations. This is also discussed by Coyle et. al., (2013), who state that there are challenges when it comes to transport such as the complexity of a supply chain, limited available information, the synchronization of transport with other activities in the supply chain and transportation capacity.

The capacity of airports was limited and airports were almost completely destroyed. Ports were affected by the typhoon but still operational and thus many organizations turned to this option for transporting. Congestion was apparent in terms of a large amount of trucks near the ports and the unhandled cargo left at the ports. Another issue at the ports was that humanitarian organizations were not prioritised to board ships, which created long delays for berth. This affected the operations negatively, hence the effectiveness and responsiveness in terms of an agile supply chain was negatively impacted, which is also seen in table 5.1.

Capacity planning and the maximal use of them is another important factor of making efficient humanitarian logistics, including warehousing, transport, material handling devices and human resources (Pettit & Beresford, 2009). The capacity was observed as differing among the islands and limitations of resources in terms of staff and limited or no existing infrastructure was challenging. For example, Tacloban had zero capacity in terms of human resources (staff), storage, management and equipment. The limitations of infrastructure affected the ability to receive, store and handle goods, which implies that the impact on the agility in terms of effectiveness and responsiveness was negative. What further had a negative impact on effectiveness was the lack of capacity in terms of available resources since there was a limited availability of fuel, heavy equipment and staff. Thus, the reliability was low since it caused uncertainties whether operations could be completed. Capacity shortage further affected the responsiveness negatively as it indicated difficulties in terms of being responsive as intended. It can be resolved that the capacity was not enough to handle situations as desired and table 5.1 displays this issue in relation to the capabilities.
The power supply was lost during the typhoon and the disaster logistics was further hindered in terms of communication technology and the usability of road network can further be diminished if power supply is compromised. Observed from table 5.1, the lack of power supply had a negative impact and constrained the operations. The power supply was non-existent during the Haiyan typhoon, however generators were available and used for electricity purposes. The power supply did not have an impact on the capability of flexibility of humanitarian supply chains as defined by Charles et al., (2010). However, the delivery was negatively affected since communications were constricted.

The focus on logistics can be the determinant of success or failure of relief operations (Van Wassenhove, 2006). When analysing the transport we could see that what is mostly coordinated during the operations is transportation, the constant assessment of the infrastructure and what mode of transport to use. Consistently, since humanitarian supply chains aim to save as many lives as possible with high efficiency (Oloruntoba & Gray, 2006). Discussions about infrastructure and the status of it, though information often recognized as limited, was the basis for decisions regarding transportation and due to the realization of the massive destruction of the airports the main focus of transportation landed in sea- and road transport. There was also the requests for trucks to keep them on the island, which might imply that the local logistics providers had limited capacity at some locations, which according to Kovács & Spens (2007) restricts the operational effectiveness of disaster relief operations.

Based on the empirical findings of the CSF, transport and capacity planning and its identified key issues in this study one can identify a strong emphasis on the importance of it. Together with the importance of this critical success factor comes several constraining issues, which is also seen in the empirical findings in terms of congestion, accessibility, lack of capacity, damages etc. This is in line with what Balcik et. al., (2009) discuss in regards to that transportation within humanitarian relief is extremely challenging, together with damaged infrastructure, limited resources and much supply to distribute.

The table below, 5.1 displays that transport and capacity planning has an impact on relief operations and its responsiveness, effectiveness and flexibility and in the case of Haiyan the impact was negative.
Table 5-1 Evaluation of Transport & Capacity Planning

<table>
<thead>
<tr>
<th>Transport &amp; Capacity Planning</th>
<th>Flexibility</th>
<th>Effectiveness</th>
<th>Responsiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volume</td>
<td>Product</td>
<td>Mix</td>
</tr>
<tr>
<td>Transport network damage</td>
<td>n</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Inaccessibility</td>
<td>n</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Congestion</td>
<td>n</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Lack of Capacity (air, port, road)</td>
<td>n</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Delays</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Capacity issues (HR, storage, management, equipment)</td>
<td>n</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Limited power, Internet infrastructure</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>


5.2 Information Management and Technology Utilization

When making decisions, information is essential in order to avoid them being made on assumptions (Kovács & Spens, 2007). An issue and a major concern that was observed in the empirical findings of this study was the limitation of information. It was also identified that the importance of sharing information was crucial during Haiyan to enhance operations and reduce suffering. P2 “Information collection, analysis and output was vital to make decisions”. The information shared during Haiyan provided some coverage of the impact of the disaster, which contributed to the decision making process. The shared information during the relief operations was the basis to guide actions taken by involved actors and it was evident that information was the factor that actors were reliant on for the operations.
Businesses use information sharing for their logistics value chain with the aim of performance and controlling operations (Gunasekaran & Ngai, 2003). Information during the typhoon was highly important in order to make constant updates on the situation for organizations. Initially information was difficult to communicate and share and during meetings the focus was on consolidating data to create a common base. Information was seen as a logistics gap and consequently the impact of the capability of effectiveness was negative and performance declined.

When disasters occur they receive attention through media, which sometimes helps organizations in the form of donations (Charles et al., 2010). From the empirical findings it was evident that the media was used with the purpose of making information and data widely available and to further spread information and awareness (P1). Information was made accessible to all actors with English as the common language both within the international and national participants, which improved speed and accuracy of information but also created a shared frame of reference to coordinate with the understanding of each organization's capacity. Although, having English as the common language could have put strains on national participants if this was not a commonly used language in the country.

Information and the ability to create a flow of information are important for humanitarian logistics (Thomas & Kopczak, 2005; Bhimani & Song, 2016), which was an apparent importance in the study in order to efficiently provide aid to beneficiaries. Also, to have a cohesive outlook on the disaster in order to make decisions with good results was found challenging without information. A lot of the information came from the organizations and the relief operations had to rely on it being up to date. One can therefore contemplate over the accuracy of the information and thus its effects on decision making, as expressed by Kovács and Spens (2007) with regards to assumptions and decision-making. The scarcity of information during Haiyan was expressed by actors to limit the success of the operations as the stream of information was inadequate, which made the situation vulnerable. One example of vulnerability in terms of transport, and in line with Coyle et al.,’s (2013) statement on that limited available information also impact on the transport, is that the scarcity of information caused congestion. This, since visibility of incoming cargo and destinations were lacking and the limitation and lack of information also forced transports to use optional routes. Further, information was somewhat collected and shared, for example in regards to incoming cargo and destinations, with the intention to prioritise and
plan operations. However, since information was scarce it affected decision-making, limited the performance and made it difficult to respond.

Gunasekaran and Ngai (2003), says that IT is helpful when wanting to make changes in logistics information. This was the case during Haiyan as IT was used to gather and share important information about logistics, for example access constraints maps or schedules. IT is something that could provide the ability to modify logistics information (Gunasekaran & Ngai, 2003). Organizations had prepositioned satellites that allowed connectivity, also for the use of Internet and the ability to send email and satellite phones were also available for use. Satellite desks were established at offices as quickly as possible in order to ensure connectivity with the purpose of keeping operations running with updated information sharing. Within the empirical findings it was observed that IT solutions during the relief efforts did not have a negative impact or hindered operations, but rather had a positive impact and enabled the accessibility of information. As seen in the table 5.2 both IT solutions and accessibility of information have predominantly positive impacts on the three capabilities.

Information management is one factor that is widely used within humanitarian aid, as it can be the determining factor on how effective the response is in a disaster (Pettit & Beresford, 2009). Information in regards to upstream pipelines was required from coordinators to be able to manage storage and facilities. Further, there was also a request for supplier details and rates information in regards to warehousing and transport in order to avoid overcharging, although the organizations had limited information themselves on these issues. This resulted in inconsistent information, which increased uncertainty in regards to the situation at hand and hindered proper actions to address issues.

Information was one of the elements that connected all actors involved in the humanitarian response through meetings. Further, when actors have quality information it results in better coordination and decision making and thereby improving the response to beneficiaries. This is evident in the findings where P1, explained the issue of organizations having the same program and the need to complete each other and integrate these programs to create a balance and prevent duplication of relief efforts. Hence, information was vital to share in order to coordinate operations. Based on the findings, the uncertainty of information shows that the response efforts became more difficult and complicated.
operations, as priorities were difficult to set. Further, this lead to a delay in the relief efforts, which hindered the efforts to be carried out as quickly as possible and thereby being efficient. In parity with Gunasekaran and Ngai (2003) the sharing of information contributes to the information management by integrating links in the logistics value chain. As indicated in table 5.2, one can see that the issues in regards to uncertain information affected the effectiveness and responsiveness negatively.

One issue that was furthermore apparent in the empirical findings was the difficulty in setting priorities as various experts used information differently, which caused confusion in the relief work. This was expressed by P1 as being one major concern and created frustration amongst actors and the worry of taking unnecessary or inappropriate actions. The findings also showed that measures were taken to avoid duplication of resources, which prevents waste of scarce resources. This is in line with the aim of saving as many lives as possible. Confirmed by Kovács and Spens (2007) is the importance of information to make good decisions.

Table 5.2 Evaluation of Information Management

<table>
<thead>
<tr>
<th>Information Management</th>
<th>Flexibility</th>
<th>Effectiveness</th>
<th>Responsiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volume</td>
<td>Delivery</td>
<td>Reliability</td>
</tr>
<tr>
<td>Scarce information</td>
<td>o o o o</td>
<td>n n n n</td>
<td>n n n n</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>o o o o</td>
<td>n n n n</td>
<td>n n n n</td>
</tr>
<tr>
<td>Information sharing</td>
<td>o o o o</td>
<td>n n n n</td>
<td>n n n n</td>
</tr>
<tr>
<td>IT solutions</td>
<td>o o o p</td>
<td>p o p p</td>
<td>p p p p</td>
</tr>
<tr>
<td>Accessibility of</td>
<td>o o o p</td>
<td>p o p p</td>
<td>p p p p</td>
</tr>
<tr>
<td>Information</td>
<td>o o o p</td>
<td>p o p p</td>
<td>p p p p</td>
</tr>
</tbody>
</table>

:o= no impact, n=negative impact, p=positive impact
5.3 Human Resource Management

Strategic plans are often established during the preparation phase (Kovács & Spens, 2007), but due to the large scale of this disaster, the preparations of staff were insufficient. Further, staff on location got affected by the disaster, which thereby hindered the prepared operating plans. A deficit was recognized within the empirical findings when it comes to the existing skills of the staff, which contributed to unsatisfactory performance levels. Confirmed by P1, “there was also an immense request for training skills for the people on location”. Within the empirical findings it was observed as highly important during the immediate response phase to have the skills to make rapid assessments in order to meet immediate needs and prevent suffering. The study further revealed that lacking skills were present during Haiyan and thereby decreased the effectiveness of the operations.

Even though some skills were at hand and uncoordinated assets were taken care of in the sense of focal persons assigned to manage assets e.g. loadmasters and customs procedures there was still a high demand for more skills for processes to be functioning. From the findings it was observed that the lack of skills kept operations from achieving productive results, which were aimed for and restricted actors to use their full potential. Which was highlighted by P2 saying, “an issue was the scale of the disaster which demanded a quantity of people that was not available and it affected operations inefficiently”. Consequently, the lack of skills had a negative impact on effectiveness and responsiveness and without skills there is not enough action and thus processes are slowed down, which is shown in table 5.3.

According to Kovács and Spens (2007) the key to having successful operations is the collaboration of actors, despite their different agendas within disaster relief. Even though there was a lead agency, WFP, an established logistics coordination cell in Manila with a cluster coordinator consignment tracking officer and information management officer and additionally loadmasters at the seaports, there were still leadership issues. Moreover, one issue with leadership during the relief operations was the different leadership styles of involved experts and differences in management and technical inputs, which created conflicts and sometimes led to confusion. From the empirical findings of this study one can observe the importance of leading by example and thereby influence the employees to perform at their best capacity.
There was during the relief operations a need for training in leadership. Leaders were unclear with what they were planning and how they wanted things to be organized. So even though there were plenty of leaders, they did not seem to have a cohesive understanding and aim of the operations. Further, the different training from beforehand made it evident that there were many different leadership styles, which created uncoordinated processes and some confusion. The findings of the study shows that good management skills include the importance of having the ability to communicate effectively, and when this fails confusion occurs. Hence, the quality and value of the management efforts are jeopardised. As seen in the table 5.3 the lack of managerial skills had a negative impact on the three capabilities. Hence, the inconsistency in leadership decreased the ability to define and address needs and thereby deliver results.

As explained by Pettit and Beresford (2009), logistics is an essential part of humanitarian aid but the expertise within the area is not highly prioritised. Despite this argument, it was clear that expertise was present during the typhoon. One example is that there were concerns expressed by organizations that were addressed by experts in the field, such as with customs procedures. Another issue was the ground handling which was improved by adding a cargo-handling trainer together with extra equipment. Even though expertise was highly demanded, the specific expertise that existed was distributed in ways that made operations react and show visibility with e.g. a tracking officer. From the findings it is observed that within the areas where expertise was sufficient, operations were running smoothly, enhanced the performance and increased positive impacts on performance.

P2 expressed that expertise is highly important within relief operations as this could enhance the ability to perform fluently in operations. This is also a source of strength in operations, which could be used to prevent errors in actions. From the empirical findings within this study it is evident that there were sources of expertise although in many areas expertise was highly lacking, and a gap can be identified when it comes to expertise. P1 expressed that even though 100 experts were brought in for guidance, this was not enough nor efficient enough for the relief operations. One example of where expertise was lacking was in the cold-chain capacity, which is of importance when it comes to medicine and a main source of decreasing suffering. It was also observed in the findings that without
expertise, decisions were made with negative consequences and hence the decision-making came with poor quality.

When many different organizations are involved it could lead to challenges in coordination which is communicated by several authors stating that involved organizations are different in terms of size, abilities, authority, logistics capability, structure, IT systems and expertise (Dolinskaya, et. al., 2011; Balcik, et. al., 2009; Schulz & Blecken, 2010). From the empirical findings within this study it is evident that when there are many different organizations involved and when expertise is lacking it leads to challenges in coordination and strains operations. Subsequently, when expertise is present, coordination is enhanced and operations will have positive impacts on the outcomes.

Even though staff was mobilized during the catastrophe, it seemed as if the capacity and amount of staff was limited. Another issue presented in literature is finding people with relevant training (Pettit & Beresford, 2009). The staff that was working with relief operations during Haiyan, did have more or less experience and level of preparation for disaster relief operations, though as expressed by two organizations the staff knowledge was still not enough due to the size of the disaster. Pettit and Beresford (2009) suggest that it would be beneficial for humanitarian organizations to increase skills and this was also an issue identified during the relief operations, as the staff at least at some organizations appeared to lack knowledge.

One of the processes of humanitarian logistics includes the deployment of people and skills so as to assist where needed (Van Wassenhove, 2006). It is not very obvious whether this was applied during the relief operations, however strong request for deployment of staff from other countries to augment existing staff was made and also done from rosters with prepositioned staff. Thomas and Kopczak (2005), emphasizes the importance of managing people to deliver aid as effective and responsive as possible. Within the empirical findings of this study it is evident that there was uncertainty in regards to labour capacity and additionally the quantity of people needed for the scale of this disaster was not available, which affected operations negatively and further slowed down the relief operations.
5.4 Collaboration

What characterises humanitarian supply chains is that they are established under critical circumstances, since disaster might occur suddenly and then effective collaboration is important (Pettit & Beresford, 2009). Almost immediately when Haiyan hit the Philippines, UN cluster coordination meetings were established and collaborative actions started. Within the empirical findings of this study it is evident that there were coordinating efforts of the entire relief operations and the striving to integrate processes of participating organization. As disasters are seen as increasingly difficult, the issue of when and how to collaborate and the connected coordination issue are important matters (Van Wassenhove, 2006). Hence, the coordination meetings were established to decide on these key issues in order to support a shared vision and avoid unnecessary risk taking. It was further evident in the findings that the output was greater the more input that was put in from organizations, as more ideas was gathered in the sense of discussions of solutions.

Collaboration is crucial for successful operations (Kovács & Spens, 2007) and working towards the same goals and sharing benefits can be referred to as collaborative (Williams & Tokar, 2008). This was the case as the involved organizations in the relief operations had the aim to assist the beneficiaries with their needs, and actions were taken trying to avoid
duplication of efforts and goods. Organizations worked collaboratively based on the cluster coordination meetings so as to reach the most effective manner, based on discussions of problems and issues that existed. It is evident in the findings that the sharing of information at the meetings and the decisions on how to distribute resources was a teamwork implementation strategy in how each party can accomplish their part in reaching a mutual objective of decreasing suffering. Though, as expressed by Pettit and Beresford (2009), in order for operations to be as effective as possible collaborations need to include the development of trust between the organizations. It is possible that the Logistics Clusters involvement contributes to this issue, since it can be found in the findings that information was shared amongst them.

Referring to table 5.4, the coordination in relation to the critical success factor of collaboration is despite intentions to coordinate and collaborate impacting the capabilities of agility negatively. One example of collaboration with positive impact is that the Logistics Cluster for example supported the government with services such as shuttling of food and water. It is also confirmed in literature as a challenging issue when it comes to humanitarian operations (Schulz & Blecken, 2010). The lack in coordination in terms of collaborative measures decreased productivity to some extent during the relief operations and caused delays in the completion of tasks. This could have been prevented if organizations collaborated to a larger extent.

For logistics network to work as efficient as possible and including integration, collaboration is critical (Pettit & Beresford, 2009). The intentions to collaborate in the relief operations during Haiyan could be frequently observed and without clear communication practices were slowed down. Collaboration was the basis for planning and dividing tasks, further to try to solve the issue of transportation of cargo and space, where organizations ended up sharing pipelines for enhanced effectiveness. Though, during almost every meeting the importance of communication was highlighted and expressed so that organizations would share their needs, capabilities and resources. Further, a lack in communication could be the reason for uncertainties in terms of roles and responsibilities, and thereby some tasks were overlapping and others were overlooked which resulted in a failure to achieve objects. It could be seen in the empirical findings that in some parts of the operations there were a high level of uncertainty, some of this uncertainty could possibly be a result of a lack in communication. Communication was especially important
to facilitate the coordination of shipping and space on vessels, but it seemed as despite requests for communicating information there was still not enough visibility within the operations. Further, it could also be seen in the findings that poor communication lead to productivity being strained and efficiency was thereby obstructed. Having poor communication could also lead to misunderstanding of each other and thereby create decreased productivity results.

Cozzolino et. al., (2012) state that there is a need for a team to create networks where the main focus should lie in creating channels for information and material flows. During the catastrophe in the Philippines there were commercial operators available and the commercial actors could be reached through the Logistics Cluster. However, communication was only made through the Logistics Cluster, which means the efficiency level may have been lower than what it could have been. Van Hoek et. al., (2001) further suggest that network integration is one of the dimensions of an agile supply chain. In line with what Schulz and Blecken (2010) argue when it comes to lack of coordination leading to diminished use of resources and valuable response time.

<table>
<thead>
<tr>
<th>Collaboration</th>
<th>Flexibility</th>
<th>Effectiveness</th>
<th>Responsiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volume</td>
<td>Mix</td>
<td>Delivery</td>
</tr>
<tr>
<td>Lack of communication</td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>Coordination</td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
</tbody>
</table>

\(o=\text{no impact, n=negative impact, p=positive impact}\)

### 5.5 Inventory Management

Within this factor, it became clear that storage was one major issue, but that warehousing was even worse and neither one was sufficient. Williams and Tokar (2008), emphasises that understanding demand is necessary for good inventory management and supply processes.
Though in the case of Haiyan, warehouses were lacking and supply was inefficient, indicating that stock of supply was not particularly well prepared.

When Haiyan struck, the supply of goods was uncertain during the relief operations and even though some supply existed there was still a scarcity in resources. With the devastation from the typhoon it seemed as despite preparations for such an event they were not sufficient enough to pursue operations as wanted. To increase customer satisfaction and in the case of a catastrophe meaning saving lives, one strives to match supply and demand, however uncertainties creates difficulties in doing so (Mason-Jones et. al., 2000). When it comes to Haiyan, the destruction and the extent of damages were large and there were therefore difficulties with efficiency in terms of supply as there was a shortage. Both in the amount of supply and where to obtain the supply from when planned supply was unusable. Thus operations were hindered and thereby slowed down, this is also indicated in table 5.5.

Charles et. al., (2010), proposed that flexibility, responsiveness and effectiveness is what makes a supply chain able to respond quickly and effective (agile) to short-term changes in demand, supply or the environment. During Haiyan some organizations solved the issue of supply by purchasing and procuring goods from areas that were not so affected by the typhoon (P1). However, even though there were solutions to the lack of supply, there were still uncertainties and a hard time defining what supply existed. Further, cargo included inter-agency goods, though volumes and supply of goods were uncertain. Subsequently, there were evident difficulties in allocating existing resources.

Due to uncertainties at the airport there were demurrage charges for cargo, which slowed down processes and affected responsiveness as well. Additionally, in regards to health items it was clear that there was little or no visibility, which made it difficult in knowing what items existed and what was lacking, as uncertainties were high regarding the supply. Without inventory responsiveness could not be achieved as planned, hence reaching results were hindered and thus suffering was not prevented.

According to Pettit and Beresford (2009), due to circumstances of a crisis, demand and needs are often uncertain, they further highlight that forecasting demand is important. To address this, rapid assessments of funding and the magnitude of the disaster in the affected
community was made, this was also pointed out as commonly used in many organizations for identifying needs according to P1. This type of need assessment, understanding the beneficiaries' needs, can contribute to agility for organizations (Oloruntoba & Gray, 2006). Nevertheless, the size of this disaster made the demands high and supply was not sufficient to meet demand and difficulties were experienced in distribution of supply where it was demanded. In such situations, assumptions base the decisions concerning needs (Kovács & Spens, 2007). Though, as can be seen in table 5.5 the high demand did not in itself have impact on the capabilities of agility.

Storage of goods and related information are parts of humanitarian logistics that are to ease the suffering of vulnerable people (Thomas & Kopczak, 2005). There were uncertainties in regards to availability of storage but it also became clear that it was a lack of storage. The magnitude of the typhoon and the destruction caused from it, restricted storage of supply. The demand of goods was high subsequently followed by a great amount of incoming cargo at locations and as a result storage was needed. The lack and uncertainty of storage and further the high demand of storage caused operations to slow down and hindered the aim of reaching beneficiaries quickly and thereby it had a negative impact on suffering. What could be added to this is that temporary storage was established as a solution and with intentions to prevent congestion and also MSUs were available for inter-agency storage.

Further, there were evident issues in warehousing, which contained insufficient and not secure handling and staging of cargo. There was also a high demand for warehousing although due to the damages on existing warehouses a consequence became a lack of warehousing. Additionally, there was need for an inter-agency warehouse compound and in regards to commercial and governmental warehouses there were a lot of damages. Some organizations had no warehouses and instead contracted commercial malls to assist (P1). As warehousing capacity was so low, and even identified as a logistics gap from agencies, this restricted the ability to respond to needs and made thereby the impact on responsiveness negative. From the empirical findings within this study it was evident that the lack of warehousing resulted in the incapability of handling incoming cargo flows and thereby caused congestion and further there was a large amount of unhandled goods because of this.
Some of the planned incoming flows of goods were held back from damages in infrastructure and could not work as planned, which affected relief negatively due to the high need of the incoming flows (P2). Where the flows were moving smoothly more work was done to keep them going, such as providing with fuel to prevent congestion, these flows were then pressured extensively. This is also why there was such a need for visibility to be able to make more flows working and used to complement the working flows and create more responsiveness. From the findings within this study it was evident that there was a high need of having visibility especially when it came to various flows. This because where visibility was low, there was a risk of duplication, which prevented the efficiency of the operations. Gunasekaran and Ngai (2003) state that inventory management consists of planning, coordinating and controlling of material flows along the supply chain and the largest decisions includes the volume and timing of orders and deliveries, and the packing of items in batches (consolidation). Some flows had to be rerouted to prevent congestion and further delays and due to the lack of warehouses it was decided to make direct distribution instead of incorporating warehouses to thus reach beneficiaries in the most optimal manner. Another reason for visibility to be such an important part was the fact that there were sometimes unhandled goods or left goods that were risking congestions. In order to focus on having an agile organization it is essential with inventory management, where flexibility is a requirement for being responsive to changing markets (Power, et. al., 2001).

Time is critical in humanitarian relief and getting the right product, at the right time, to the right place for the alleviation of suffering of beneficiaries (Petitt & Beresford, 2009). Time was sensitive also during the relief operations of Haiyan and a large issue. In the empirical findings within this study it is evident that time was a delicate issue and quick response was a recurrent topic at the coordination meetings. Organizations were focused on providing timeliness to reach the joint goal of decreasing suffering in affected areas.

It seemed as if a lot of activities were time consuming during the disaster relief operations, such as transport. Organizations had to wait for supply to arrive from different destinations before relief work could be done, such as the 3 days travel time from Manila to Eastern Samar. Another issue that caused the prevention of smooth operations was the congestions that appeared due to transportation of supply. According to Gunasekaran and Ngai (2003), inventory management includes the monitoring of material flows and one of the essential
parts is decision in regards to volume and timing of order and consolidation of items. The different flows were adjusted and adapted accordingly with existing resources and capabilities, such as using direct distribution due to the lack of warehouses. The need to have strategies focusing on quick responses and processes was identified, although coordinating these strategies were time consuming and time efficiency was decreased in the initial part of the operations.

### Table 5.5 Evaluation of Inventory Management

<table>
<thead>
<tr>
<th>Inventory Management</th>
<th>Flexibility</th>
<th>Effectiveness</th>
<th>Responsiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volume</td>
<td>Product</td>
<td>Mix</td>
</tr>
<tr>
<td>Supply Issues</td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>Visibility of Flows</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>High Demand</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Lack of Storage</td>
<td>n</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Lack of Warehouses</td>
<td>n</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>Unhandled goods</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>

\(o=\) no impact, \(n=\)negative impact, \(p=\)positive impact

### 5.6 Supply Chain Strategy

Many organizations are involved during relief operations and coordination is necessary, though it might be challenging (Kovács & Spens, 2007), further coordination is essential especially under circumstances of a disaster (Van Wassenhove, 2006). From the empirical findings within this study it is evident that the meetings held during the disaster was the prevailing strategy for the humanitarian emergency response. They were intended to coordinate relief efforts and minimize duplication of humanitarian services, thus filling gaps and preventing overlaps to further achieve a common objective to enable and improve a coherent response. Humanitarian logistics puts emphasis on the mobilization of people, skills, resources and knowledge and is designed to deliver the right goods, to the right place, to the right people, at the right time (Van Wassenhove, 2006). The observed actions taken during Haiyan was in line with this, nevertheless, the disaster was larger than
experienced and therefore more difficult and plans were somewhat insufficient. From the findings it was observed that capacity, personnel and time was limited and the extent of meetings could have been experienced as coordination overload.

Local and commercial agencies as well as government and military were in charge of certain procedures and processes, whereby the humanitarian organizations did not conflict in. They took care of areas where coordination was lacking. These actions are in line with what Kovács & Spens (2007) argue about military being beneficial in the complex relief situations as they could possibly provide assistance such as communications, logistics and planning capabilities. Organizations, government and HCT coordinated with each other to handle planning and tasking difficulties. Participating actors brought assistance to where needs were critical to be met in order to reach a mutual objective and thereby decrease suffering. It was evident in the empirical findings that the organizations strove to coordinate distribution for an equitable coverage of vulnerable communities.

Pettit & Beresford (2009) discuss collaboration as being an occurring issue in crises and could result in coordination being challenging. Even though meetings were held and focusing on collaboration, there were still gaps identified in coordination and areas where this was lacking. Humanitarian logistics covers the processes of mobilizing people, resources, skills and knowledge with the aim of assisting people in need, getting the right product to the right place etc. (Van Wassenhove, 2006). This is in line with the coordination establishment made at meetings for the purpose of complementing resources between organizations and to reach more beneficiaries with good quality and without duplication. There were also target areas and assignments that were divided between organizations. From table 5.6, a coordination gap based on the empirical findings and the previous discussion is identified as having a negative impact on the capabilities. Even though efforts of coordination existed a gap was present and thus causing the negative effects.

When demand is uncertain, the strategy of being agile is suitable, this implies the ability to respond quickly, with a flexible supply chain and effective to changes (Christopher & Towill, 2002; Charles, et. al., 2010; Agarwal et. al., 2005; Pettit, & Beresford, 2009; Cozzolino, et. al., 2012). Focus should be on customer requirements (Agarwal et. al., 2005; Pettit & Beresford, 2009), so in this case to provide aid to the beneficiaries and working in
accordance to circumstances. In the empirical findings in this study it was evident that strategies to handle congestion issues were a major focus due to the large extent of the destruction of the typhoon. As infrastructure, capacity, resources and accessibility were strained there were various strategies to both prevent and manage congestion, as it was an inevitable issue to occur. One example found in the findings was the scheduling of shipping, where the recognition of the amount, what type and when cargo was being sent from each organization to prevent that goods arrived simultaneously and caused congestion. Another example of a strategy to prevent congestion, which is strongly observed in the findings, is the discussion of finding optional routes in order to make rerouting of transport and increase flows being smooth.

To deliver aid as effective as possible is a main aim of humanitarian logistics (Pettit & Beresford, 2009). Different strategies could be identified so as to solve the issues and working with what was available. Strategies of transport included sending cargo by truck so that trucks would remain on the island in order to be used for further distribution and onward movement to other locations. Further, the organizing of shared shipping between organizations to avoid unnecessary use of space. Also, penalties were applied to increase efficiency and avoid unnecessary work that would deteriorate the operations. Cargo was also prioritised in terms of sending only critical relief items to avoid congestion. In terms of storage, MSU were established and direct distribution was used, again to avoid congestion. Nevertheless, gaps still existed and more strategies could have eased relief operations. From the findings it is observed that strategies were mainly prioritized to avoid the wasting of time and the hindering of operations. A main focus of the strategies implemented is recognised to be the prevention of delays and the managing of uncertainties.

From the empirical findings of this study it is evident that prioritising was an issue that impacted operations. Prioritization was done at airports and ports by different authorities. Though, humanitarian organizations experienced it problematic, as they were not given priority and this affecting delivery and flows. Therefore it is apparent that during the relief efforts more prioritising in more aspects of operations were needed in order to reach beneficiaries as quickly as possible and avoiding unnecessary waiting time, thus increasing the quality of efforts and decreasing suffering. As shown in the table 5.6 this mostly affected the effectiveness of operations.
After having analysed the main parts of our findings, we now present a summary that emphasises the broader picture. All the evaluated codes within the CSFs are summarized in table 5.7 below.
Table 5-7 Summary of evaluated CSFs

<table>
<thead>
<tr>
<th>Transport &amp; Capacity Planning</th>
<th>Flexibility</th>
<th>Effectiveness</th>
<th>Responsiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport network damage</td>
<td>n o o o n n</td>
<td>n n n n n n</td>
<td></td>
</tr>
<tr>
<td>Inaccessibility</td>
<td>n o o o n n</td>
<td>n n n n n n</td>
<td></td>
</tr>
<tr>
<td>Congestion</td>
<td>n o o o n n</td>
<td>n n n o n n</td>
<td></td>
</tr>
<tr>
<td>Lack of Capacity (air, port, road)</td>
<td>n o o o n n</td>
<td>n n n n n n</td>
<td></td>
</tr>
<tr>
<td>Delays</td>
<td>o o o o n n</td>
<td>n n n o o n</td>
<td></td>
</tr>
<tr>
<td>Capacity issues (HR, storage, management, equipment)</td>
<td>n o o o n n</td>
<td>n n n n n n</td>
<td></td>
</tr>
<tr>
<td>Limited power, Internet infrastructure</td>
<td>o o o o n n</td>
<td>n n n n n n</td>
<td></td>
</tr>
</tbody>
</table>

| Information Management        |             |               |               |
| Scarcity of information       | o o o o n n | n n n n n n   |               |
| Uncertainty                   | o o o o n n | n n n n n n   |               |
| Information sharing           | o o o o n n | n n n n n n   |               |
| IT solutions                  | o o o p p p | p o p p p p   |               |
| Accessibility of Information | o o o p p p | p o p p p p   |               |

| Human Resource Management     |             |               |               |
| Lack of Skills                | o o o o n n | n n n n n n   |               |
| Lack of Managerial skills     | n n n n n n | n n n n n n   |               |
| Lack in knowledge/expertise   | n n n n n n | n n n n n n   |               |
| Uncertain labor capacity      | n o o o n n | n n n n n n   |               |

| Collaboration                 |             |               |               |
| Lack of communication         | n n n n n n | n n n n n n   |               |
| Coordination                  | n n n n n n | n n n n n n   |               |

| Supply Issues                 |             |               |               |
| Supply Issues                 | n n n n n n | n n n o o o   |               |
| Visibility of Flows           | o o o o n n | n n n n n n   |               |
| High Demand                   | o o o o o o | o o o o o o   |               |
| Lack of Storage               | n o o o n n | n n n o o o   |               |
| Lack of Warehouses            | n o o o n n | n n n o o o   |               |
| Unhandled goods               | o o o o n n | n n n o o o   |               |

| Supply Chain Strategy         |             |               |               |
| Coordination gap              | n n n n n n | n n n n n n   |               |
| Lack of communication         | n n n n n n | n n n n n n   |               |
| Disregarded priority          | o o o o n n | n n n o o o   |               |
| Congestion prevention strategies | p o o p p p | p o p p p p   |               |
| Lack in preparation           | n n n n n n | n n n n n n   |               |

\* n = no impact, o = negative impact, p = positive impact
Throughout the analysing process within this study it became evident that the critical success factors reviewed are interconnected and thus linked to each other. The factors are observed to affect each other both in positive and negative manners. Noticed within the analysis is also the utmost importance of establishing a common knowledge and base of the operations in order to work towards the same aim of reaching beneficiaries and hence reducing suffering and saving lives. Therefore this study illustrates the significance of information and visibility during the course of a crisis to achieve a cohesive outlook on circumstances. When this common base is established further collaborations can be developed to optimize the relief efforts during a disaster in the response phase. Collaborations between organizations foster information sharing and communication, which is evident to be the substantial reason whether gaps or duplication are created and thus the reason why operations may fail or succeed. Further, the study shows that coordination is correlated with information sharing and can only be made when information is available and flows are visible. When analysing the case of Haiyan it was evident that within each critical success factor time was one of the biggest concerns and quick actions were vital.

The analysis further highlights the major damage and impact that the typhoon caused and thereby strained operations severely. Especially when it came to storage and warehousing which created further needs to execute solutions for this issue and thus more staff was highly demanded. Moreover, the lack of storage and warehousing affected the operations by putting more pressure on transportation and hence the issue of congestion became a consequence, which slowed down the delivery to beneficiaries and hence decreased quality of operations. The immense destruction from the typhoon caused disruptions in several areas of the supply chain and thus vital factors became evident within the empirical findings to emphasize in order to make operations run and enable coordination to make rapid and appropriate decision-making.
6 Conclusion

In this section we shed particular light on concepts that appeared during our analysis to be recurrent. By discussing them more we advance our analysis and apply a funnel approach. We demonstrate how we answer our research question and hence fulfill our purpose. We furthermore present how this study contributes theoretically. Finally, we conclude this chapter with limitations and future research opportunities.

6.1 Discussion

After analysing the case in this thesis, we have found areas within the findings that show interdependency between the success factors. As our research goes deeper into the CSFs one by one, it became evident that they are somewhat interrelated and issues or enabling actions within one CSF could affect the performance or impact from another CSF.

We have found that improvements in areas such as human resources and specifically leadership skills affect the level of coordinated actions within humanitarian relief operations. This could further impact e.g. inventory management where decisions within capacity planning are in need of strong leadership skills. Further, the extent of the participation of all actors within humanitarian relief and the collaboration towards more effective partnerships has strong effect on coordinating strategies within humanitarian relief. This could either create gaps in coordinating mechanisms, resources, assets and knowledge or foster the expanding coverage of them. Our research shows that the plethora of various actors within this case had varying levels of skills, experience and capacity and therefore coordination was stretched beyond its capacity.

The study illustrates the necessity of CSFs however it further became clear that success goes beyond the independency of each CSF even though they are each of importance to succeed.

6.2 Conclusion

Our insights within this thesis were developed from the collected data based on the case study of the disaster that hit the Philippines in 2013. The disaster was a typhoon named Haiyan and it was classified as the largest devastating event and further the most deadly
catastrophe in 2013 in this area of Asia-Pacific. We interviewed organizations that participated in the immediate response phase of the disaster and further retrieved information from meeting minutes documented by the Logistics Cluster from the relief operations to create a basis for our findings and thus to gain an understanding of the perspective of the involved organizations.

The focus of this study has been to gain knowledge in the area of agile humanitarian supply chains and a number of critical success factors identified by Pettit and Beresford (2009). For the convenience of the reader the purpose is once more stated “The purpose of this thesis is to explore and analyse how agility is impacted by critical success factors in the immediate response phase during an emergency.”

The investigation within this thesis was aiming to answer the question “How do the critical success factors impact the agility of humanitarian supply chains in the immediate response phase during an emergency?”. This study has shown that the CSFs investigated within this study have an impact on the agility of humanitarian supply chains. Our findings show that the impact of the CSFs was in the case of Haiyan mostly affecting negatively, though some of the categories were partially impacting positively. All of the factors impacted the ability of humanitarian organizations to be agile in relief operations. As previously stated within this study, the CSFs are interrelated to each other to some extent and should be combined when applied to the immediate response within disaster relief operations. Hence, the research findings indicate that there is a need for humanitarian organizations to consider the realization of the joint importance of the factors.

The most vital aim within humanitarian relief operations is in the end to save lives and thus it is essential for humanitarian organizations with high responsiveness as it is concerned with timesaving (Cozzolino, et. al., 2012). Adding to this, one of the most essential aims of humanitarian supply chains is high efficiency and not wasting the scarce resources, since this affects the aim of humanitarian organizations which is to save as many lives as possible (Oloruntoba & Gray, 2006). As the devastation of Haiyan was so severe, it made circumstances in which the organizations were operating in highly complex. Consequently, we found it evident from this study that such complex environment with a large amount of involved actors made CSFs of high importance to increase the ability to be agile and reach the main goal of saving lives in the most effective manner possible.
Lastly, a result of the extensive destruction of the disaster is the indications of existing issues as well as functioning areas that could occur during a catastrophe. The extent of the catastrophe further indicates the importance of having structured and essential protocol in making decisions and in avoiding assumptions, which would aid operations. Therefore having CSFs to guide operations could be good indicators to making effective decisions that can be the determining factor of success and thereby save more lives.

6.3 Theoretical Contribution

This study advances the theoretical knowledge in humanitarian logistics and further provides insights in the area of agility and CSFs within a humanitarian relief context, which has not previously been discussed extensively in literature. Subsequently we have advanced a well-established strategy from commercial logistics to humanitarian logistics by using the CSFs identified by Pettit and Beresford (2009) and incorporating another dimension to it. This allows a better understanding of critical factors that influence the process of strategic decision-making. Additionally, with this study we also add an understanding of the organization point of view when it comes to decisions made within humanitarian relief.

Our study contributes to literature within humanitarian logistics in the field of strategies in relief operations by focusing on the impacts that occur with CSFs. We show that the application of CSFs could change the decision-making process positively in order to achieve an agile supply chain and reach the aim of decreasing suffering during a disaster. By applying the perspective of organizations to humanitarian logistics, CSFs and agility we also advance the understanding of this combination.

From a practical perspective we provide a better understanding of the decision making process in humanitarian logistics. We demonstrate the importance of CSFs in humanitarian relief and how they can guide organizations to create a better outcome of operations. Not only NGOs can apply these CSFs to achieve an agile supply chain but also other organizations can be guided with the strategies for a better decision-making process. The study therefore further contributes to a managerial understanding and enhancing the ability to respond to disasters with the help of CSFs as guidelines. Thus, the study can help open
up a discussion, create awareness and improving the decision-making process in humanitarian relief.

### 6.4 Limitations and Future Research

This thesis has some limitations that have to be considered, which also generate areas of opportunities for future research. Hence, we firstly state the limitations, which introduce the foundation for further investigation, and secondly we give suggestions for future research.

This study aimed at providing insight into the area of disaster relief operations and humanitarian supply chains, more specifically how agility is impacted by a number of identified CSF’s from Pettit and Beresford (2009). One main limitation of the study is the cross sectional study design, where we investigated a specific disaster at a specific point in time. A consequence of this could hence be that the study is highly connected to one particular crisis and circumstances of other various disasters are then excluded. Thus it might limit the ability to gain a deeper knowledge of the topic.

Another limitation in this study is that we merely have two interviews, which could imply that the perception of organizations is not particularly in depth. Although, time limitation and the facts from the meeting minutes, which confirmed both organizations’ perspectives, gave us the good amount of information needed to conduct the study with an overlooking focus.

To address the limitations, future research within these areas could provide a more in depth and detailed knowledge in regards to humanitarian relief, CSFs and agility. Hence, future studies should include a longitudinal design in order to explore further and enable an in depth analysis of the subject. It could be of value to conduct similar research in other countries or regions of the world. This could further broaden the view on the differences in responses of various types of circumstances and thus identify and give insights in what parts of humanitarian logistics that could be generalizable in terms of CSFs and agility.

Further, the focus of this study is the immediate response phase and other phases could also apply CSFs to achieve agility. Thus, research within the other phases could
complement this study and create a more holistic supply chain throughout all of the disaster phases.

This study focuses on CSFs on a more individual level and a connection between the individual factors was identified during the process of analysing the findings. In a broader context it could be of value to put further emphasis on the identified interdependency between CSFs and thus it is an opportunity for future research.

Future research could also include a financial aspect to analyse in order to reach further understanding of financing processes and access to capital when it comes to decision-making within humanitarian relief. Additionally, the scope of laws and regulation as well as cultural aspects could be areas of further research to broaden the understanding of issues and opportunities in humanitarian relief operations.

Concluding, we believe that our research lays the foundation for exploring further and thus opens up opportunities for interesting and emergent topics for further research within humanitarian logistics.
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Appendix 1

Critical Success Factors

Inventory Management

» How did the flows of goods impact your relief work in terms of existing goods at location and goods outside location?

» Which impact did the flows of goods have on the flexibility, responsiveness and effectiveness of the supply chain?

» How were those factors addressed by humanitarian organizations?

Transport and Capacity Planning

» How did the infrastructure impact your relief work in terms of road network, airport, harbour, power supply and communication infrastructure?

» Which impact did the infrastructure and transport have on:
  - the flexibility (mix, product, volume, delivery)
  - the responsiveness (velocity, reactivity, visibility)
  - the effectiveness (reliability, completeness)
  - in terms of the supply chain?

» How were those infrastructural factors addressed by humanitarian organizations?

» How did the available resources at the location change the prepared plan for the relief work?

» Which impact did the change in terms of warehousing, material handling devices and HR have on the flexibility of the supply chain?

» How were the changes addressed?

Information Management and Technology Utilization

» How did Information during the disaster relief operations impact the relief work?

» How did Technology during the disaster relief operations impact the relief work?

» Which impact did the information management and technology utilization have on the flexibility,
responsiveness and effectiveness of the supply chain?

» How were those factors addressed by humanitarian organizations?

Human Resource Management

» How did skills and knowledge of your staff during the disaster relief operations impact the relief work?

» Which impact did the human resource management have on the flexibility, responsiveness and effectiveness of the supply chain?

Collaboration

» How did the collaboration during the disaster relief operations impact the relief work?

» How did networks during the disaster relief operations impact the relief work?

» Which impact did the various collaborations have on the flexibility, responsiveness and effectiveness of the supply chain?

» How were those factors addressed by humanitarian organizations?

Supply Chain Strategy

» How did the supply chain strategies during the disaster relief operations impact the relief work?

» Which impact did the strategies have on the flexibility, responsiveness and effectiveness of the supply chain?