CONSOLIDATION IN HUMANITARIAN LOGISTICS

ALAIN VAILLANCOURT
Consolidation in Humanitarian Logistics

Helsinki 2015
Consolidation in Humanitarian Logistics

Key words: supply chain, humanitarian logistics, consolidation, kitting, procurement

© Hanken School of Economics & Alain Vaillancourt, 2015

Alain Vaillancourt
Hanken School of Economics
Department of Marketing, Supply Chain and Social Responsibility
P.O.Box 479, 00101 Helsinki, Finland

Hanken School of Economics

ISSN-L 0424-7256
ISSN 0424-7256 (printed)
ISSN 2242-699X (PDF)

Edita Prima Ltd, Helsinki 2015
PREFACE

This thesis presents an overview of material consolidation in humanitarian supply chains. It explores different facets of the topic through a general literature review leading to an analytical framework and two case studies on procurement and kitting. This thesis was written in the context of a PhD in Supply Chain Management and Social Responsibility. The point of the thesis is to present an overview of considerations for consolidation in humanitarian logistics through the presentation of three different research articles. It should provide useful background for other humanitarian logistics research that might touch on this topic as well as for practitioners that might be interested in understanding consolidation in their field from a more theoretical perspective. The thesis was written after a pre-PhD volunteer stay of a year in Haiti where consolidation activities were lacking between organizations. This led to the decision to carry out in-depth research on the topic as my PhD work.

The author would like to acknowledge, first and foremost, his thesis and exam supervisor professor Erkko Professor in Humanitarian Logistics Gyöngyi Kovács, Professor Anthony Beresford and Professor Ruth Banomyong whose guidance proved invaluable in this thesis work. The author would also want to thank his colleagues of the Supply Chain Management and Social Responsibility subject and the HUMLOG institute for providing a sounding board and advice. The UNICEF WIM team provided information without which this thesis could not have been written and thus is key to this work. Finally I thank my mother and father for reading and providing inputs on my various papers.

The author would also like to acknowledge Professor Stanley E. Fawcett and Minchul Sohn for their participation as opponents at the manuscript seminar. The following funding sources also helped support this research: the Finnish Cultural Foundation, Resilience in Disaster Relief and Development Supply Chains – Managing Challenges of Climate Change, Urbanization and Security project, the Hanken Foundation and the Department of Marketing, Supply Chain and Social Responsibility.
CONTENTS

1 INTRODUCTION....................................................................................... 1
  1.1 Aim of the thesis .............................................................................. 2
  1.2 Positioning of the thesis ................................................................. 4
    1.2.1 Research paradigms ................................................................. 4
    1.2.2 Underlying frame of reference .............................................. 5
    1.2.3 Research approaches ............................................................... 10
  1.3 Limitations ...................................................................................... 10
  1.4 Is material consolidation a matter of concern? ......................... 11
  1.5 Structure of the thesis ................................................................. 13

2 MATERIAL CONSOLIDATION CONCEPTS AND HUMANITARIAN
   LOGISTICS ACTIVITIES....................................................................... 14
  2.1 Core concepts for material consolidation types ....................... 14
    2.1.1 Warehousing consolidation .................................................... 15
    2.1.2 Procurement consolidation ..................................................... 16
    2.1.3 Transportation consolidation ................................................ 17
  2.2 Consolidation in the context of Humanitarian Organizations .... 18
    2.2.1 An overview of consolidation in humanitarian logistics ........ 19
    2.2.2 Procurement consolidation in humanitarian logistics .......... 20
    2.2.3 Material consolidation through kits in humanitarian logistics .. 22

3 RESEARCH DESIGN............................................................................. 25
  3.1 Content analysis ............................................................................ 25
    3.1.1 Data collection ........................................................................ 26
    3.1.2 Data analysis ........................................................................... 29
    3.1.3 Validity and reliability ............................................................. 31
  3.2 Case studies ................................................................................... 31
    3.2.1 Data collection ........................................................................ 31
    3.2.2 Data analysis ........................................................................... 32
    3.2.3 Trustworthiness ....................................................................... 33

4 FINDINGS OF THE ARTICLES............................................................. 34
  4.1 Contributions to dynamic capabilities ........................................ 34
  4.2 Findings of paper A ....................................................................... 35
  4.3 Findings of paper B ....................................................................... 39
4.4 Findings of paper C .................................................................................................................. 40

5 CONCLUDING DISCUSSION ...................................................................................................... 42
  5.1 Limits of the research ............................................................................................................. 44
  5.2 Further research ..................................................................................................................... 44
  5.3 Publishing strategy ............................................................................................................... 45

REFERENCES .............................................................................................................................. 47

6 ARTICLE A: A THEORETICAL FRAMEWORK FOR CONSOLIDATION IN HUMANITARIAN LOGISTICS........................................................................................................... 75

7 ARTICLE B: PROCUREMENT CONSOLIDATION IN GLOBAL HUMANITARIAN SUPPLY CHAINS .................................................................................................................. 103

8 ARTICLE C: KIT MANAGEMENT IN HUMANITARIAN SUPPLY CHAINS.......................................................................................................................... 131

APPENDICES

Appendix 1 Case study interviews for article B and C ............................................................... 154

Appendix 2 Questionnaires sent out for kitting in article C: .................................................. 158

TABLES

Table 1 Supply chain management theories in relation to consolidation .................................. 7

Table 2 Potential issues for each consolidation type ........................................................................ 15

Table 3 Kit distribution by UNICEF, 2013 .................................................................................... 22

Table 4 Benefits and weaknesses of kits in the supply chain ..................................................... 23

Table 5 Coding categories for content analysis in article A ...................................................... 29

Table 6 Potential impediments or opportunities to cooperate .................................................. 36
FIGURES

Figure 1  Article topics and material consolidation types discussed .................... 3
Figure 2  Underlying framework of each article .................................................. 9
Figure 3  Classification of procurement consolidation activities inside organizations 16
Figure 4  Supply chain activities in humanitarian activities ................................. 19
Figure 5  Content analysis methodology steps in paper A .................................... 26
Figure 6  First selection of articles based on entire text ....................................... 27
Figure 7  Second selection of new articles based on abstract ............................... 28
Figure 8  Framework for consolidation in humanitarian logistics ......................... 38
Figure 9  Kit consolidation points across the organization ................................... 41
Figure 10 Article B and C’s complimentary results to article A ............................ 43
1 INTRODUCTION

Major disasters occurred throughout history and their legacy has been recorded by the scholars and observers who witnessed their aftermaths. Such large scale disasters still occur; recent examples include the Japanese (2011) and Indonesian (2004) Tsunamis, the Haitian Earthquake (2010) and Philippine’s Haiyan Typhoon (2014). Natural disasters trends (EM-DAT The International Disaster Database, 2011) from 1954 to 2013 indicate a relative increase in the number of disasters, an increase in the number of people affected by disasters, an increase in the economic cost and a decrease in the number of people killed in disasters. These trends can be explained in part because of better information on disasters but also result from economic development and an increase in total human population. This population increase is accompanied by climate change which is expected to bring an increase in intensity of flooding events (Few, 2003). Disasters can also include technological and industrial disasters such as Bhopal in 1984, the Bangladesh factory garment collapse (2013) or the lac Mégantic train disaster (2013); sometimes natural disasters can be compounded by industrial disasters such as in Fukushima (2011) to complicate further an already disastrous situation.

Another issue that has affected the wellbeing of humans is violent conflicts. Conflicts can be between states and can also include non-state actors (Uppsala University: Department of Peace and Conflict Research, 2014). These actors will become involved in conflicts for a multitude of reasons that can range from poverty and inequities between groups to a lack of state legitimacy (Barnett, 2003). Sometimes these reasons can even stem from natural disasters such as droughts which exacerbate the issue of water access between communities (Gleick, 1993).

Both conflicts and disasters contribute to create humanitarian crisis not only from economic hardship but also through death and destruction which displaces, injures and kills people. Some of the aid sent to address humanitarian crises is comprised of material goods and can cover a wide range of needs for the people affected such as: health, education, sanitation, shelter, food, etc. These needs may vary according to different factors such as the cause of the crisis, its intensity, its location as well as the number of people affected. These factors will also influence how the goods will reach the people affected with humanitarian crisis often making access and management of the transportation of goods difficult. Issues that complicate the management of supply chains in humanitarian crisis include infrastructure disruptions, lack of resources and unknown demand (Day, et al., 2012; Safran, 2003; Balcik, et al., 2010). Another important consideration is the fact that the cost of transporting the items to the site of the humanitarian crisis can account for an important amount of the cost of the items. Some estimates place the share of this in total cost at up to 70-80% (Trunick, 2005; van Wassenhove, 2006) while others place this share at around 40% compared with 15% for transportation costs in the context of normal business supply chains (Whiting & Ayala-Öström, 2009). These high costs, the field difficulties, the massive amount of people affected (353 disasters and 96 million affected in 2013 (EM-DAT The International Disaster Database, 2011)), the important sums of money spent on humanitarian aid and development ($12 billion was awarded for humanitarian aid and $156 billion was awarded for development in 2011 (Global Humanitarian Assistance, 2014)) as well as the importance of efficiency and equity in humanitarian operations (Van Wassenhove & Pedraza Martinez, 2012) make the study of consolidation relevant. Indeed, consolidation can offer benefits in the business sector, it can reduce transportation, procurement and warehousing costs as well (Gray, et al., 1992; Cooper, 1984; Trent &
Monczka, 1998). This issue of cost is especially relevant when considering the fact that funding appeals by the UN often go partially unmet; in 2013 with 19 funding appeals, the highest funded appeal was Afghanistan with 77% of requested funding received and the lowest was the Philippines Bohol earthquake appeal with 21% of funding needs met (Smith & Swithern, 2014). By addressing cost and efficiency issues in the supply chain through material consolidation, humanitarian organizations can acquire more lifesaving material and spend less on handling and procuring it.

Consolidation in the humanitarian sector is not a research topic that is commonly addressed in the supply chain literature. Literature on consolidation concerns a wide range of consolidation types from financial consolidation of companies to transportation consolidation, process consolidation, and IT consolidation. Consolidation can be understood as the regrouping of a multitude of similar items or activities in order to obtain economies of scale and leverage to gain certain advantages. The work presented here constitutes an article-based thesis and is composed of a substantive introductory chapter followed by three relevant articles; the whole in the remainder of this chapter will be referred as a “thesis”. For the purpose of the thesis and of the articles presented, consolidation will refer to the consolidation of material. Material consolidation is a common activity in supply chains especially in the context of cost management where high volumes offer organizations better prices. However, there are many different considerations to take into account on how material consolidation is managed and this thesis will cover different topics related to consolidation:

- Material consolidation: grouping items together for management purposes.
- Warehousing consolidation: the grouping of items in a fixed installation.
- Procurement consolidation: the grouping of material incoming from a supplier.
- Transportation consolidation: the grouping of materials during their transfer from one point to another.
- Kitting: the grouping of a specific number and type of items in a single standardized package or container.

1.1 Aim of the thesis

This thesis and all three articles it contains aim to understand the competence and underlying resources for consolidation of materials in supply chains by humanitarian organizations. This thesis adds to the scarce knowledge on consolidation in humanitarian logistics through the presentation of three different research articles. Together these articles present an application of dynamic capabilities in an often unpredictable environment not related to technological change. They also put forward relevant activities poorly discussed for procurement and kitting. The thesis focuses on consolidation of materials and its management specifically in procurement, warehousing and transportation. Each of these activities provide an opportunity to consolidate materials together and obtain certain benefits. However, these benefits derived from different consolidation activities are obtained with trade-offs and impose specific management considerations that are related to the type of consolidation performed. These specific considerations are taken into account in each article. Article A addresses theoretical considerations for humanitarian logistic, article B explores the
role of procurement consolidation for materials and article C explores the role of kits for consolidating materials. The aim of article A is to develop a theoretical framework to better understand incentives and obstacles to consolidation of materials in humanitarian logistics and its research question is: how can a framework be developed to conceptualise material consolidation in humanitarian logistics? The aim of article B is to understand and explore how intergovernmental humanitarian organizations can consolidate materials through their procurement activities and its research question is: how do humanitarian organizations manage to consolidate global procurement needs? The aim of article C is to understand and explore how consolidation occurs through the specific use of kits in humanitarian supply chains and its research question is: what are the required resources to organize kits and what do they offer to humanitarian organizations?

Consolidation of materials takes place in the context of procurement, warehousing and transportation; these three activities can be done by the supplier, by the organization or by the customer depending on the decision to consolidate the materials. In this thesis the three types of consolidation are discussed (figure 1) with the notion that a single organization manages consolidation either internally or externally depending on the resources it has available to do so. Consolidation can be understood as a specific type of competence of firms and this thesis and the articles use dynamic capabilities to understand what are the resources required to obtain the organizational competence for consolidation in the context of humanitarian supply chain. With the right resources, humanitarian organizations can address obstacles to consolidation and benefit from the different incentives consolidation can offer. This thesis thus also helps develop the dynamic capability framework by understanding the role of resources in the context of non-profit organizations.

<table>
<thead>
<tr>
<th>Material consolidation types</th>
<th>Article A</th>
<th>Article B</th>
<th>Article C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warehouse consolidation</td>
<td>Overview of consolidation management</td>
<td>Procurement consolidation</td>
<td>Consolidation through kitting</td>
</tr>
<tr>
<td>Procurement consolidation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation consolidation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 1  Article topics and material consolidation types discussed**

Article A is a theoretical article and attempts to build a framework to better understand consolidation in humanitarian logistics. It is based on content analysis and uses an examination of existing literature to develop its coding. Article B is a case study that explores consolidation in procurement in the context of humanitarian logistics. Article C follows the same format as article B but focuses on kitting and has multiple cases. The research questions for each article are as follows:
• Article A: how can a framework be developed to conceptualise material consolidation in humanitarian logistics?

• Article B: how do humanitarian organizations manage the consolidation of global procurement needs?

• Article C: what are the required resources to organize kits and what do they offer to humanitarian organizations?

1.2 Positioning of the thesis

This thesis and the articles it presents are set in the context of supply chain management. The supply chain management and logistic stream of scientific literature is rather large and different sub literature streams are drawn upon for each article. Article A draws from the literature on general consolidation practice and humanitarian logistics. Article B draws from the literature on procurement consolidation and humanitarian logistics. Article C draws from the literature on kitting and humanitarian logistics.

Arlbjørn and Halldorsson in their 2002 article “Logistics knowledge creation: reflections on content” (Arlbjørn & Halldorsson, 2002) clearly identify the different issues behind scientific research in the context of logistics. Although not discussed in depth in each article itself, the theoretical background, research paradigm and research approaches play an important underlying role in guiding the research process. To better understand this process and the overall positioning of this thesis, it is important to discuss these issues and Arlbjørn and Halldorsson offer a way to organize them in different levels of knowledge (Arlbjørn & Halldorsson, 2002). The first level of knowledge that is addressed is the meta-level or philosophy of science where research paradigms are discussed. The second level is the discipline level where theories and methods are discussed. These two first levels constitute the main discussion of the positioning of the thesis while the third level, the practice level, can be found in the articles themselves. The rest of this section continues by discussing research paradigms then addresses the theory used in each article and links the theory to the methods through a brief overview of the research approach.

1.2.1 Research paradigms

To consider the research paradigm within which this thesis positions itself, it is important to understand its underlying ontological and epistemological positions. The consideration of what is knowledge or the “nature of knowledge” is named ontology (Arlbjørn & Halldorsson, 2002). In social sciences, the most common ontological dichotomy is an opposition between nominalism and realism where nominalism bases the social world on names and labels to structure reality while realism defines the social world as external to individual cognition and made of tangible structures (Burrell & Morgan, 1979). This thesis is set in the context of realism where an external reality is present and the items that are described exist objectively.

Epistemology aims to understand the dissemination and creation of knowledge (Steup, 2014). The definition of knowledge and its source have led scientists to align themselves along an epistemological divide that can be simplified as positivist and anti-positivist in the context of social sciences. In this case, positivism can be understood as
a way to: “[...] explain and predict what happens in the social world by searching for regularities and causal relationships between its constituent elements.” (Burrell & Morgan, 1979, p. 5). Opposite to this notion of positivism as an understanding of how knowledge is created, is anti-positivism which views the social world as: “[...] essentially relativistic and can only be understood from the point of view of the individuals who are directly involved in the activities which are studied.” (Burrell & Morgan, 1979, p. 5).

The debate related to epistemology also applies in the context of logistics and supply chain management. The field of supply chain management and logistics is quite often portrayed as being single sided towards positivist epistemology (Gammelgaard, 2004; Kovács & Spens, 2007). This can usually be explained by the emphasis of the use of quantitative methods. However, this thesis does not follow the prevalent positivist epistemology and instead is based on critical realism.

Critical realism hinges on the ontological idea of realism and considers that there is a difference between what is real (objects, structures and power), actual (when objects, structures and powers are activated) and empirical (what is observable) (Sayer, 2000). Critical realism which was put forward by Roy Bhaskar is situated in the middle of a spectrum between positivist and interpretivist epistemologies (Kovács & Spens, 2007). This specific epistemology creates knowledge through the study of causal relationships in social sciences where multiple structures and mechanisms can tend to lead to certain events or prohibit them (Danermark, et al., 2002). These characteristics make critical realism compatible with various research methods depending on what is being studied and what are the questions related to the research issue (Sayer, 2000).

The underlying aim of the thesis of trying to understand the activities and capacities related to consolidation of materials in supply chains by humanitarian organizations reflects the underlying idea of knowledge creation of critical realism. Indeed, by trying to understand consolidation, it focuses on the tendency of organizations to self-organize their supply chains in order to obtain a certain outcome (consolidation). Furthermore, supply chains are based on a complex set of entities and their interactions through different types of flows (Mentzer, et al., 2001). This thesis envisions that each supply chain and its flows can be organized in a multitude of ways that might change throughout time and have different types of outputs to obtain material consolidation. To aim to understand these different structures and their mechanisms leads to the creation of knowledge on the tendencies of supply chains to achieve material consolidation.

1.2.2 Underlying frame of reference

There is a large number of theories linked to supply chain management and logistics. Stock (1997) identifies 41 selected theories from other disciplines that have been applied in logistics and a further 53 theories from other disciplines that could be applied in logistics (Stock, 1997). Many of these theories can provide interesting insights for material consolidation. Unfortunately not all the theories present in the literature are of use to supply chain management; indeed theories like accident theory (Skilton & Robinson, 2009) and enactment theory (Scott, et al., 2011) are, by their quite specific approach, too narrow to be of great value in understanding material consolidation in supply chains. This critique is also applicable to many of the theories that are listed by Stock in his article (Stock, 1997). Not all theories have this problem; some theories have too wide a focus and do not suit the specific requirements of
studying consolidation. The theories of post-modernism, Marxism and feminism applied in a broader context of economic geography (Barnes, et al., 2004) are unfortunately too large to be used and could be seen as a higher hierarchical level of theory than most theories used in supply chain, even though they are useful to help notice neglected aspects of supply chain management. To gain a more holistic overview of the possible frame of reference for this study, it is beneficial to review some of the different theories in the field of supply chain with the overall idea that consolidation can be seen as one of the practices that can come out from integration and collaboration (Mangan, et al., 2008). To achieve this holistic point of view, a selection of theories identified from articles by Halldorssson, et al., 2007 are briefly discussed while considerations for consolidation are put forward in table 1.

Most of the theories presented in table 1 attempt to explain consolidation that happens between organizations. They can be divided in roughly two categories; either static or dynamic (Halldorssson, et al., 2007). The focus of the two static approaches of principal agent theory and transaction cost focus on reducing costs and on maximizing efficiency; these concepts are also found in the theory of total cost analysis (Bowersox, 1969). As a lot of research on consolidation focuses on efficiency and consolidation is often done through third parties within contractual agreements, principal agent theory and transaction cost analysis could be interesting avenues to study consolidation. The principal agent-theory proposes an interesting avenue as consolidation of material is often undertaken by an agent for another organization, often in the context of third party logistics provider or freight forwarders who use economies of scale in consolidation. In this case, the person organizing the consolidation might not be inclined to share all information about its operations in order to increase its margin. Good contracts with partners are thus key to share the savings in economies of scales in a way that both principal and agent are satisfied. Transaction costs analysis also gives interesting insights in material consolidation. This approach is similar to the issues brought in principal agent theory but it also includes other cost factors than simple contractual engagements such as the search and information costs. As consolidation is undertaken by an organization it will reduce the total number of transactions required as each transaction will cover a larger percentage of its volume of activities. This in effect could help reduce the transactions costs by reducing duplicating activities.

However, cost is not necessarily the only considerations when choosing to carry out consolidation of activities; indeed the overall objectives might also aim to improve quality of the service offered or to obtain a better utilisation of assets and facilities. To better understand these incentives, the network and resource based view offer a more in depth representation of organizations with less emphasis on efficiency and more on the different capabilities and adaptation possible. Furthermore, theories that are only interested in financial flows are too constricting in their point of view to accommodate the subject in its entirety since they focus mainly on the notion of competition and rent-seeking in between organizations which is not necessarily an important driver for humanitarian organizations.
Table 1  Supply chain management theories in relation to consolidation

<table>
<thead>
<tr>
<th>Theory</th>
<th>Considerations related to consolidation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal agent theory</td>
<td>Contractual arrangements and their management influences supply chain consolidation agreements.</td>
</tr>
<tr>
<td>Transaction cost analysis</td>
<td>Transaction costs can bring about consolidation of supply chain by actors thereby reducing the number of transactions because of the greater scope they now cover.</td>
</tr>
<tr>
<td>Network Theory</td>
<td>The interactions and relations with its suppliers and clients are the key for any consolidation to be done outside the company.</td>
</tr>
<tr>
<td>Resource based view</td>
<td>The capacity to consolidate activities because of specific assets allows certain companies such as 3PLs to develop specific competencies.</td>
</tr>
</tbody>
</table>

Network theory is becoming a broad theory that reaches across multiple disciplines (Borgatti & Li, 2009) and is an interesting perspective for the study of consolidation because the very act of consolidation requires a thorough network thus allowing for economies of scale and more bargaining power with the supplier network. There is thus an incentive to build trust by all members which is an important aspect of network theory with the help of communication to build relationships and enhance social exchanges (Halldorsson, et al., 2007). In the case of consolidation through the network, this leads to more discrete types of ties as material is moved from one point to another sometimes changing ownership and responsibility (Borgatti & Li, 2009). Network theory thus brings in two very important notions that are required for the accomplishment of consolidation in supply chain management: trust and different types of ties. Another point brought up by network theory is the fact that relationships allow organizations to combine their resources to gain advantages (Halldorsson, et al., 2007). This point of view can be seen as an excellent description of the main interest of consolidation which aims to reduce costs for the organizations involved as well as help increase their efficiency and effectiveness.

The main frame of reference for this thesis as well as the articles presented is the one of dynamic capabilities. This framework is based on organizations acquiring Schumpeterian rents by adapting to their environments. “We define dynamic capabilities as the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments.” (Teece, et al., 1997). Humanitarian organizations when they respond to disasters also have to reconfigure their activities to face a rapidly changing environment and as such add to dynamic capability. Dynamic capabilities can be understood as a set of different processes or routines based on patterns to address issues and changes (Eisenhardt & Martin, 2000; Winter, 2003). The theoretical development of dynamic capabilities comes from the resource-based view of the firm (Teece, et al., 1997) put forward by Wernerfelt (Wernerfelt, 1984) and developed in another seminal paper by Barney in 1991. In it, he argued that resource characteristics allowed the organization to obtain certain strengths and gain a sustained competitive advantage (Barney, 1991). Teece also argues that the ability to hone “internal technological, organizational, and managerial
processes inside the firm” (Teece, et al., 1997) helps organization achieve its goal of wealth creation.

The resource-based view approach was then expanded in the literature to encompass a broader point of view and go beyond the static state of a firm’s resource; researchers tried to address the evolution and management of these resources by a firm as a capability (Amit & Schoemaker, 1993). A capability could then be defined as a: “[...] special type of resource—specifically, an organizationally embedded non-transferable firm-specific resource whose purpose is to improve the productivity of the other resources possessed by the firm.” (Makadok, 2001). These capabilities thus transcend tangible and intangible resources and put an emphasis on managing the interrelation of physical resources, human resources, processes and knowledge to create a combination of strategic assets (Amit & Schoemaker, 1993).

When defining the framework behind dynamic capabilities Teece et al. highlighted how factors of production and resources can be put together to form organizational routines that lead to core competencies with successful organizations being able to modify these competencies through their dynamic capabilities (Teece, et al., 1997). These dynamic capabilities are what allow creating profits in a sustainable manner for companies and ensure that actual or potential competitors cannot acquire some of the rent created by the organization. Using the notion of resources that are managed inside an organization with the possibility of being arranged in certain ways to gain competencies that offer capabilities implies that these resources exist and can be manipulated. Indeed some of the resources can be knowledge while others can constitute physical assets which are managed through processes. This idea is consequent with the ontology of realism in which a real world exists; both the organization of resources and the resources themselves imply tangible structures.

However, this setting is defined by actors who play an important role either through NGOs or government organizations, as is the organization examined in article B and article C. By their goals and mandates, these organizations are usually not for profit. This not for profit approach somewhat contradicts the idea of dynamic capabilities where rents are acquired. Even though not for profit organizations do not seek profit, they still manage resources and competencies and aim to do so to gain the most of them to guarantee the achievement of their goals. Their goals and activities are often supported by funding agencies; this puts non-profit organizations in a situation where competitive advantage is not centered around sustainable profits but focuses more on providing value for both their donors and their beneficiaries (Kong & Prior, 2008).

Some literature tries to identify non-profit organization resources and point at different human based resources such as intellectual capital (Kong & Prior, 2008), human capital, social capital (Akingbola, 2013) and relationships (Herlin & Pazirandeh, 2012). The specific context of humanitarian logistics also includes other resources that are available to organizations to respond to emergencies. A study of the capability of the UK’s Ministry of Defence applied to cyclone preparedness identifies a thorough list of resources to enable response capability such as infrastructure, personnel, equipment, organization, information, logistics, training and doctrine (Tatham, et al., 2012).

This thesis and all three articles it presents use the underlying ideas of dynamic capability to understand consolidation of materials in a humanitarian setting. Consolidation should be envisioned as an organizational routine or a competency based on resources that are arranged inside the organization. The organizational routine of consolidation offers humanitarian organizations the possibility to put forward cost
efficient processes attractive for donors which in turn help in acquiring different funding from multiple sources over time. The focus of the thesis and all three articles is on how the different resources are organized to enable the organizational competence of consolidation (figure 2).

This underlying framework is used in each article given that they study the role of consolidation for humanitarian organizations. Consolidation in itself is a competence or a routine that is based on resources. Article A discusses generic resources configurations for consolidation. Article B discusses procurement consolidation as a competence and presents its specific resources requirement while article C discusses consolidation through kitting as a competence and presents its specific resource as well. Each type of consolidation presented in this thesis help bring some level of efficiency to the supply chains of the organizations that manage consolidation. Each article thus presents the resources required, how they are grouped for consolidation and what is their link to performing supply chains. The resources consist of knowledge, infrastructure and relationships and as such are not different than resources found in the private sector. The interest of this research focuses on the configuration of these resources in organizations. The specific characteristics of the context in which these organizations operate and how it affects their management and the required resources, processes and competencies required to achieve their goals which is of interest. For article A which serves to orient article B and C it focuses on the development of theoretical considerations that give a deeper insight. Article B and C, through their specific in-depth case study approach offer to improve the general understanding of the management of two specific phenomenon related to procurement and kitting in relation to the specific context of humanitarian organizations. In this case some resource configurations are unique because of the context of the organization which would be hard to reproduce.

Figure 2  Underlying framework of each article
1.2.3 Research approaches

Research approaches allow tying theories to the appropriate method. The research methods for all three articles are qualitative and are based on dynamic capability. However, there are specific considerations to take into account when assessing research approaches based on the researcher’s view of reality and research questions (Gammelgaard, 2004). These can be encompassed in a general methodical approach; Arbnor and Bjerke offer a specific classification of the different research approaches (Arbnor & Bjerke, 1997) which consists of: the analytical approach which looks into reality using causal relations, explanations and hypothesis; the systems approach which aims to categorize the objects under study and the actors approach which aims to understand the continuously reinterpreted and ambiguous social reality. The research approach which most closely fits this thesis and all three articles is the systems approach, more specifically the self-organizing system model (Arbnor & Bjerke, 1997). The systems approach fits the underlying idea behind the aim of each article that material consolidation is managed by different entities with different supply chain activities and constraints related to the work of the organizations in the humanitarian setting. The holistic point of view of the systems approach has been identified as having a central role in the logistics discipline (Lindskog, 2012). The systems approach also is identified as being in the middle of the interpretivist-positivist spectrum of epistemologies. This specific epistemology is one of scientific realism which includes critical realism (Kovács & Spens, 2007).

Even though the paradigm and underlying framework of the three articles are similar, it should be noted that they do not follow the same methods. Only article B and article C follow the case study method while article A uses a content analysis method in the context of a literature review. These different methods will influence the conscious scientific reasoning and approaches to create new knowledge (Spens & Kovács, 2006). This knowledge is created in articles B and C in an inductive manner where the literature review and discussion of the results drive propositions for further research. The material consolidation literature review in article A, which uses a content-analysis method, creates new knowledge through the establishment of a conceptual framework; the article offers a theoretical framework to understand the considerations of material consolidation in the humanitarian framework.

1.3 Limitations

There are inherent limits to the combination of critical realism epistemology with case studies and content analysis methods. In article A, the use of content analysis of multiple articles in a literature review offers an overview of generalisations towards material consolidation in scientific literature. The findings have a very low explanatory power and will be difficult to generalize to specific organizations as these will have very specific and unique operational constraints that change over time and location. For articles B and C, the use of a single organization and intensive qualitative methods leads to findings that also have limited generalizability as the relations found between the objects are an intrinsic part of the object. Nevertheless, articles B and C each have units of analysis to help compare the management activities of the organization.

The choice of dynamic capability also has some inherent limits. The first most obvious limit is the focus on the notion that organizations will actually change to meet emerging challenges (Zahra, et al., 2006). However, in the context of humanitarian organizations, the legal context of their operations and their sources of funding might prohibit or
inhibit certain activities that lead to change in the organizational competencies. Another critique is the requirement to sense the change in the environment for the capabilities of the organization to adapt (Ambrosini & Bowman, 2009). This requires the organization to have the opportunity to sense its environment. However, the environment of humanitarian organizations can include poorly developed infrastructure, disaster zones and conflict zones which makes obtaining appropriate information difficult to make the right decisions with regards to adapting capabilities.

The activity of material consolidation is a limited subset activity done inside supply chains; it is not undertaken in the context of every supply chain. Indeed, certain organizations might use decentralized or disaggregated activities to achieve its organizational goals. This absence of waiting time can often be found in certain supply chains managed in a just-in-time approach which aims to reduce work in progress inventory, batch size and unit cost. Furthermore, when the cost of materials is extremely high compared to its shipping cost, the use of non-consolidated shipping might be appropriate to speed up the delivery of the materials required. By limiting themselves to consolidation activities, the articles presented in this thesis are limited in their coverage of supply chains. However, this limitation allows for a better understanding and more in depth understanding of the phenomenon studied. The other limitation of the articles in this thesis is the context of humanitarian logistics supply chains. Indeed, these supply chains evolve in a specific context which is not necessarily one that normal business organizations face on a regular basis such as disasters or conflicts as well as in development activities in resource poor areas.

1.4 Is material consolidation a matter of concern?

The fact that consolidation is not a research topic commonly addressed in humanitarian logistics is not in essence justification enough for consolidation as a relevant research topic. Material consolidation has been studied in many different contexts in business literature. For humanitarian logistics, the study of consolidation helps move forward research on the well-researched topic of coordination.

Cooperation, collaboration or coordination are topics often present in the literature and material consolidation is a specific type of centralized coordination. Coordination and partnerships are critical for humanitarian organizations (Balcik, et al., 2010) and it requires adequate matching between partners (Akthar, et al., 2012). One approach to facilitate it is the humanitarian cluster system; however horizontal and vertical cooperation between intercluster and intracluster coordination force trade-offs because of limited resources (Jahre & Jensen, 2010). Coordination and collaboration is also important between different actors (regional and extra-regional) for different steps of the disaster phase (Kovács & Spens, 2007). Further research by Chandes and Paché point to coordination as important for reducing costs but hindered through competition for funding (Chandes & Paché, 2010). and Dolinskaya et al. identify different approaches to facilitate coordination (web-based systems, membership subscription, mechanisms to mitigate risk and costs allocation, easy to use sharing and information tools and feedback mechanisms to facilitate learning) and they also identify issues that limit coordination (large number and diversity of participants, urgency of relief and limited time for coordination, limited information sharing and communication, allocation of costs and benefits and limited personnel dedicated to coordination) (Dolinskaya, et al., 2011). Further challenges are also identified as the number and diversity of actors, donor expectations, competition, effects of the media, unpredictability, resource scarcity or oversupply, cost, determining and dividing gains
and lack of standardization (Feng, et al., 2010). Moore et al. studied the response for the 2000 Mozambique flood and found that the bigger the potential for an organisation to cooperate the higher, on average, number of beneficiaries that were covered (Moore, et al., 2003).

Material consolidation in humanitarian logistics would be expected to be different than material consolidation practices in the private sector. Material consolidation is an operational practice with the overall aim of efficiency and performance. Consolidation can reduce costs or improve performance or sometimes, depending on the strategy put in place, it can achieve both. Material consolidation requires planning and infrastructure to be able to optimize and aggregate material flows. In a business logistic perspective, the opportunity for demand planning as well as the easy access to resources to manage consolidation often makes consolidation a standard business decision. This decision might be easily outsourced to third party logistics companies. From the humanitarian perspective, unknown or hard to plan demand with the lack of resources such as funding and human resources (Balcik, et al., 2010) would complicate the application of consolidation practices. These issues coupled with the often lacking or poor infrastructure and other difficulties found in the context of disasters or developing countries would make the application of consolidation practices somewhat harder for humanitarian logistics.

Finally the use of dynamic capabilities offer an interesting perspective in respect to understanding consolidation in humanitarian logistics. Humanitarian organizations are not-for profit and their funding comes from grants or donations and, as such, the investments required to effectively put in place consolidation might not be relevant to short term funding activities. The funding mechanisms also exclude supply chains being an important factor of competition as in the private sector as organizations compete for grants through their programme activities. Supply chains are thus viewed as a support role for programme activities. However, humanitarian organizations are also interested in performing supply chains to improve their response, whatever that response may be. Adding to this need for performance and low competition in supply chains, is the fact that usually many organizations collaborate or coordinate on the ground and as such might share resources to improve their response. Thus the humanitarian perspective for consolidation in conjunction with dynamic capabilities could lead to interesting findings on how resources and competencies are managed by non-profit organizations. Indeed, the humanitarian perspective means that organizations are faced with bigger constraints in terms of resources, bigger disruptions in the environment, a lower incentive to compete over supply chains and more incentives to collaborate and coordinate to improve the help they deliver all the while still wanting to improve their performance and lower their costs like private organisations. Although the resources to manage consolidation might be similar to the private sector, it is how they are organized that is of interest in order to understand the differences between both sectors and push forward the understanding of consolidation in humanitarian logistics. There are different reasons for the topic to be of relevance both in terms of real world application and in terms of research. The implications are the following:

In the real world, there is a need for improved performance which consolidation can offer because of:

- The importance of logistics costs for humanitarian organizations.
• The important amount spent on humanitarian aid and development every year.

• The chronic under-funding of appeals.

• The study of material consolidation in humanitarian logistics offers new avenues of research found in the three articles through:
  
  • The development of theoretical considerations that give a deeper insight in a specific type of collaboration and coordination.
  
  • Improving the general understanding of the management of two specific phenomenon related to procurement and kitting in relation to the specific context of humanitarian organizations.
  
  • Elaborating considerations for resources and competencies for dynamic capabilities which are based in a non-profit setting.

1.5 **Structure of the thesis**

The rest of the introductory chapter discusses different topics that pertain to each article. After an introduction to logistics considerations with respect to consolidation, section two discusses general considerations for consolidation, procurement consolidation and consolidation through kitting. Section three explores the different research design for each article. In the case of article A, the research method is content analysis and for article B and C, the method is a case study. Section four addresses the different contributions of the papers while section five offers an overall concluding discussion of this thesis.
2 MATERIAL CONSOLIDATION CONCEPTS AND HUMANITARIAN LOGISTICS ACTIVITIES

2.1 Core concepts for material consolidation types

Consolidation in the field of management is an activity that is undertaken to concentrate similar items or activities into a single common entity. One of the most common consolidation goal that is found in supply chain literature is market consolidation resulting from the merger or acquisition of companies where companies will combine assets and activities to rationalize them and cut costs (Manuj & Mentzer, 2008; Van Zyl, 1992; Wu & Chou, 2007). Another literature stream where consolidation is common is information technology system (Davenport, et al., 2004; Grosswiele, et al., 2013; Mahato, et al., 2006). In the context of logistics and supply chain management literature, consolidation is often discussed either as market consolidation especially following the 1970s deregulation of transportation in the United States which allowed numerous mergers and acquisitions or as consolidation of materials through different management activities. Consolidation is usually driven by a desire to improve efficiency either through the reduction of costs or a better usage of assets. Material consolidation is often done in the context of three different activities for supply chain and logistics: inventory, handling and purchasing activities (Brauner & Gebman, 1993).

The three different types of material consolidation involve diverse management considerations to ensure that materials are regrouped at different points of the supply chain. Organizations might partake in a single type of consolidation or use more than one and sometimes integrate them in a common strategy to use their resources as efficiently as possible along the entirety of their supply chain. The consolidation of activities would be done based according to the specific trade-offs required by the organization to achieve its overall goals while controlling costs in its transportation, warehousing and procurement activities. Of course each type of consolidation faces different issues (table 2).
Table 2  Potential issues for each consolidation type

<table>
<thead>
<tr>
<th>Consolidation type</th>
<th>Potential issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warehousing</td>
<td>Increase in transportation costs</td>
</tr>
<tr>
<td></td>
<td>Increase in delay</td>
</tr>
<tr>
<td></td>
<td>Lack of flexibility</td>
</tr>
<tr>
<td></td>
<td>Creation of uncertainty</td>
</tr>
<tr>
<td>Purchasing</td>
<td>Infrastructure investment cost</td>
</tr>
<tr>
<td></td>
<td>Increase in transportation distance</td>
</tr>
<tr>
<td>Transportation</td>
<td>Increase in investments (e-procurement, ERPs)</td>
</tr>
<tr>
<td></td>
<td>Reduction in flexibility</td>
</tr>
</tbody>
</table>

2.1.1 Warehousing consolidation

Warehousing consolidation describes the activity of regrouping items to facilitate their management inside a fixed installation. This regrouping is done to manage the needs of multiple clients at the same time and ensure the availability of materials. Warehousing consolidation plays an important role in material consolidation as it enables goods to be stored and managed inside a single installation. If this installation has a large enough capacity, the warehouse enables both the process of shipping consolidated goods to multiple clients and responding to clients with large orders that require to be consolidated. Consolidation in a large warehouse however allows pooling safety stocks and focusing on standard lead times. These benefits come with an increase of transport costs and an increase in distance travelled but with a reduction of total inventory holding costs and economies of scale through higher volume (Wanke & Saliby, 2009). In contrast, decentralized warehouses allow the use of smaller warehouses closer to the clients reducing transportation costs. However, this also implies bigger safety stocks and thus inventory holding costs as well as less standardized lead times throughout the warehouse network. Many organizations that manage goods will usually have materials managed in at least one point of distribution. This distribution point can act as a consolidation node and be positioned either upstream or downstream depending on the types of material handled as well as their final destinations.

A similar approach to warehousing is the practice of cross-docking which aims to transfer goods from inbound to outbound transportation without storing them or by storing them for a short period of time (Gu, et al., 2007). Even with no holding time, items are still regrouped at a fixed location. This central point allows reducing less-than-truck-load (LTL) shipments by regrouping materials together based on their destination. This re-routing is similar to what is done with hub and spoke activities for airlines. In this case airlines use hub and spokes to consolidate passengers from small destinations through consolidation points or hubs located on main routes to maximize the use of their assets (Bryan & O'Kelly, 1999). However, cross-docking implies a complex organization that requires a good level of coordination and a high level of
performance. This performance is required as the lack of storage for goods implies that there are no safety stocks as there would be in the warehouse to cover changes in the demand or returns due to defective products.

2.1.2 Procurement consolidation

Procurement consolidation describes the goal behind regrouping purchases to facilitate their management in order to increase the efficiency of the organization. The strategies to achieve this goal can be carried out internally by regrouping suppliers or externally through centralization of activities (Figure 3). There is a debate on the differences between procurement and purchasing activities and the relative importance of different activities (Ramsay & Croom, 2008) with some arguing about the lack of strategic relevance of purchasing (Ramsay, 2001) or the relative importance of strategic purchasing (Mol, 2003; Rozemeijer, 2008). In this thesis and articles, the concept of procurement mainly refers to externally oriented planning which involves value-adding tasks and includes purchasing and buying activities (Trent & Monczka, 1998). In article B which discusses in details procurement, there is also a discussion on sourcing strategies to further the understanding of the relationship between the suppliers and the organization. The notion of procurement is also relevant and public procurement rules contain different components such as “[…] strategy and policy of the organization, methods and procedures, personnel and organization, and information” (Thai, 2009, p. 3). These addition to the procurement process also put public procurement management considerations on the same level as strategic purchasing or strategic sourcing. Figure 3 presents the various steps of procurement consolidation.

**Figure 3** Classification of procurement consolidation activities inside organizations

The first type of activity that enables procurement consolidation are supplier relationship programs (Choi & Krause, 2006; Angeles & Nath, 2005; Cox, et al., 2005). This approach reduces the number of suppliers for an organization in order to increase the volume purchased from each supplier and obtain better leverage when interacting with this reduced number. In exchange for the higher volume of procurement, suppliers will offer lower costs, improve service levels or provide other benefits to the organization (Pollitt, 1998; Croom, 2000). The organization can enable the use of supplier relationship programs by regrouping their suppliers to only keep better
performing ones. Alternatively, if the organization is highly decentralized or global, it can decide to enforce specific contracts for its subsidiaries by changing its internal business procedures and aggregating its procurement activities internally. Establishing supplier relationship programs requires a certain level of cooperation or coordination with the supplier to obtain the desired output by the organization and its use might depend on the type of goods being procured and the performance required from the supplier (Goslink, et al., 2010).

The second type of activity that enables procurement consolidation is electronic procurement. This approach focuses on procurement via information technology activities and online services that require a high level of technical integration. This integration and use of e-procurement tools such as E-Tendering, E-Marketplace, E-Auction/Reverse Auction, and E-Catalogue/Purchasing, E-sourcing and E-MRO (Vaidya, et al., 2006; Bruno, et al., 2009; Doherty, et al., 2013) require organizations to work with a small number of external suppliers that they regroup through the online activities of suppliers. These online activities and their supporting information systems enable the organizations to tailor their processes to ensure that a procurement activity is managed in a standard way with the same tools. Electronic procurement activities also enable a better analysis and understanding of procurement activities and offer a reduction in transaction costs as well as better access to procurement data for analysis.

The third activity that enables procurement consolidation consists of purchasing groups. Purchasing groups usually represent multiple organizations with similar procurement needs and help in obtaining better leverage and purchasing power by regrouping the material needs of all the organizations involved in the group (Rolfstam, 2012; Huff-Rousselle, 2012). This gives an incentive to the organizations part of the purchasing groups to use the suppliers of that group to obtain the benefits and reduces their potential number of suppliers. Internally, purchasing groups can bring a reduction in the need for internal knowledge or procurement activities since they are effectively, partially or entirely, outsourced to the purchasing groups. Instead of managing multiple suppliers, the organization can focus and centralize its procurement activities in a standardized manner to help it consolidate its procurement and benefit from participating in a purchasing group.

### 2.1.3 Transportation consolidation

Transportation consolidation describes regrouping items in order to use at full capacity a certain transport module such as a container or trailer truck. Full truck load consolidation is a very common topic in the literature for research on consolidation in both the context of qualitative and quantitative articles. These articles identify different types of shipping policies to optimize the efficient use of vehicles and ensure the proper use of assets. One common shipping policy that is related to pure dispatch decisions is the use of time withholding policies (Çetinkaya, 2005). This type of policy is implemented by waiting a certain period of time before shipping items instead of shipping items as they are ready to ship. Shipping takes place either after a specific time constraint or when the container or truck is full. This policy offers the opportunity to ensure a certain level of service by timing deliveries to the downstream customer and allows managing the trade-off between costs and service level. A high service level implies that the waiting time would be shorter resulting in an important amount of less than full shipments while waiting longer ensures that shipment is closer to be fully consolidated and thus increases the efficiency of transportation activities while decreasing service levels.
Consolidation policy for transportation is sometimes complex as the need to reflect the different shipping considerations requires to integrate wide ranging information. In the context of less than truck load shipping, there are different shipping rates depending on the amount of material that is loaded into the truck. Trucks that ship with a higher weight or volume depending on the dimensional weight of cargo can offer certain discounts for usage of its capacity for transportation (Russell & Cooper, 1992). This transportation practice allows the introduction of quantity withholding consolidation policy. The addition of discount systems can replace waiting for a fully consolidated truck load as a shipping rule. Instead transportation policy can aim to achieve a certain level of consolidation to obtain lower costs with a minimum weight or volume required to be reached before time becomes a constraint (Russell & Cooper, 1992). Consolidation is also a concern in the context of milk-run transportation (Du, et al., 2007) and reducing CO2 emissions (Wu & Dunn, 1995).

2.2 Consolidation in the context of Humanitarian Organizations

Material consolidation is a common activity in many logistics systems and is often undertaken in the context of warehousing, procurement and transportation. Each of these activities offers the possibility to obtain certain benefits through the regrouping of materials. Consolidation is also undertaken by humanitarian organizations. However, the specific context in which they deploy their operations bring about certain challenges as well as objectives that they need to address to increase the efficiency of their supply chains.

There are different considerations to take into account when addressing the context in which humanitarian organizations operate. These operations will often be defined in the context of the organizational mandates as well as the available resources to respond to different situations. Humanitarian crisis can take different forms such as disaster, conflicts or chronic poverty and development problems. Regardless of the form of the crisis, the main factor of concern that will influence the operations is the time frame. Disasters can have different timings with fast-onset disasters (earthquakes, landslides, floods and storms) and slow-onset disasters (erosion, pests, insects, and drought) (Kovács & Spens, 2009). Slow-onset disasters are predictable and allow for easier management than fast-onset disasters. These differences in disaster timing can also be found in the context of conflicts with conflicts suddenly appearing or intensifying after simmering on for years. Time is an issue when an intervention requires a very fast reaction and this emphasis on time is critical in fast-onset disasters and sometimes in conflicts. This leads to the management of humanitarian crises in phases usually described as preparedness, response and recovery (Beamon, 2004; Bedini, et al., 2009; Jahre & Heigh, 2002; Thomas, 2002; Schulz & Blecken, 2010).

To manage disaster response, there are usually three steps followed by humanitarian organizations: preparedness, response and reconstruction (figure 4). Proper planning of the first phase usually prevents or reduces poor performance in the second phase (Tatham, et al., 2012; Jahre & Heigh, 2008). The second phase begins when disaster strikes and humanitarian organizations need to deploy their resources to the field in a timely manner while addressing different problems. These problems can consist of disrupted infrastructure, lack of resources, an unknown demand and a sudden and large demand (Day, et al., 2012; Safran, 2003; Balcık, et al., 2010). These complications can also be found for aid activities in remote underdeveloped areas. However, to reach the countries of operations many humanitarian organizations use the same standard shipping activities globally or work with local markets if applicable. These different
considerations that affect humanitarian organizations and their supply chains make them somewhat different from normal business supply chain. To respond to the demand, there can also be a multitude of actors such as NGOs, the army, government, third party logistics and others (Kovács & Spens, 2007) involved whose coordination is hard to manage (Schulz & Blecken, 2010; Balcik, et al., 2010). The third phase of reconstruction aims to restore the affected area and population to its status previous to the humanitarian crisis. This step is quite similar to development aid and long term activities (McEntire & Myers, 2004; Régnier, et al., 2008) where plans and demands are well known and allow for simpler management while resources and funding might still be limited.

Humanitarian crisis all have a security dimension but those that involve conflicts have a more complex security component that needs to be addressed and might prevent response from happening (Tomasini, 2012). When access is possible, goods will be shipped to affected populations. Population that require humanitarian aid are also present in the context of ongoing development activities and large humanitarian organizations will often try to address the issue of both emergency disaster response as well as ongoing development aid. Figure 4 links humanitarian logistics phases and supply chain activities.

---

### Figure 4  Supply chain activities in humanitarian activities.

#### 2.2.1 An overview of consolidation in humanitarian logistics

Material consolidation is a preoccupation of humanitarian organizations and certain initiatives are taken to enable consolidation. One example is the United Nations Humanitarian Response Depot (UNHRD) (WFP, 2014). The UNHRD offers to multiple organizations to store, transport and procure prepositioned goods across a worldwide network of warehouses. Another example is the cluster approach put forward by the United Nations Office for the Coordination of Humanitarian Affairs in 2005 with the aim to increase coordination (United Nations Office for the Coordination of Humanitarian Affairs, 2014) between UN and non–UN agencies in disasters. This cluster is managed by WFP and, during the 2010 earthquake in Haiti, it managed the consolidation of goods for transportation between Santo-Domingo and Port-au-Prince (Logistics Cluster, 2010).

Humanitarian organizations deploy in a wide variety of operations with different types of crisis in different geographical situation. This implies multiple activities by varying number of humanitarian organizations with different capacities and mandates. These organizations are sometimes joined by other actors such as: donors, aid agencies, local NGOs, governments, the military and logistics providers (Kovács & Spens, 2007). Even though there are multiple actors involved in humanitarian activities, they do not necessarily partake in consolidation across their organizations or inside their own organizations.
Material consolidation activities have been parsimoniously mentioned throughout the literature on humanitarian logistics. Schulz and Blecken mention potential consolidation stemming from shared warehousing, transportation and procurement through the use of horizontal cooperation (Schulz & Blecken, 2010). Consolidation activities are also one of the activities put in place in Darfur by the WFP as lead coordinator for the logistics cluster (Tomasini, 2012). The cluster approach put in place by the United Nations Office for the Coordination of Humanitarian Affairs (OCHA, 2014) regroups major humanitarian organizations and helps improve cooperation between them during emergencies. The logistics cluster operations offer the opportunity to coordinate and sometimes consolidate materials however, this is not a well-documented practice in the literature.

Apart from humanitarian organizations, there are other actors in the humanitarian network that play the role of consolidators. Some of these actors are private transportation companies and third party logistics providers who use consolidation as part of their activities to increase the productivity of their assets (Maltz, et al., 1993; Knemeyer & Murphy, 2004; Sohail, et al., 2006). Another organization that is sometimes active and present in humanitarian networks or deploys in areas with similar constraints as humanitarian organization is the military. Military literature discusses considerations for consolidation as they have tried to bring in different commercial practices within their supply chains (Steiner, 1996). Multiple types of consolidation can be identified in the military context such as: activity consolidation, material consolidation, management consolidation and control consolidation (Brauner & Gebman, 1993). Material consolidation, in this case just as in Schulz and Blecken’s article, consists of procurement, warehousing and transportation. Consolidation can also take place between humanitarian organizations and the military where warehousing and installations are shared to improve operations (Rodman, 2004; Sebbah, et al., 2013).

### 2.2.2 Procurement consolidation in humanitarian logistics

Procurement in humanitarian organizations plays an important role. The United Nations across all its agencies procured a total of $15,372$ billion US$ with 44% in goods and 56% in services in 2012 (UNOPS, 2013). The UN as well as other government or NGOs is subject to strict procurement requirements that focus on open competitive bidding awarded to the lowest cost supplier both locally and internationally (UN Procurement Division, 2013). This approach allows for transparency towards suppliers and accountability to the donors. The UNHRD is also a good example of how procurement consolidation can be done for multiple organizations (WFP, 2014).

Supply chains take into account material and information flows that can be localized or span the globe when taking into account the procurement activities of organizations. Humanitarian organizations are similar in the sense that they must often source their materials from multiple markets differing in industrial structure and size. Some markets are local while other markets can be on a global scale. The wide variety of different situations in which humanitarian organizations might deploy ranges from disaster zones to conflicts and sometimes development activities. While development activities, slow-onset disasters and protracted conflicts might offer the possibility to plan procurement in advance, fast-onset disasters create uncertainties in terms of planning for potential demand. Indeed, the sudden increase of demand from events such as the South Asian Tsunami or the Haitian earthquake are hard to take into account and procure for.
Even in the context of sudden onset disasters, there is the option to procure material in an organized manner to try and palliate for demand management issues when disaster strikes. The first phase of disasters is preparedness and this phase offers the possibility to manage supplies that will be used in upcoming disasters. Disasters might require a variety of goods for which suppliers must be identified, goods procured and transported to the appropriate warehouses to pre-position them and increase preparedness for disasters (Balcik, et al., 2010). The preparedness phase is thus ideal to manage consolidation as it offers the appropriate time to group internal orders or cooperate with external organization to consolidate procurement needs.

The second phase occurs when disasters strike and complicates procurement activities for material as there is an emphasis on speed to reach the people affected. Sometimes the victims of a disaster might receive money instead of actual goods to speed the response in the case where the local market is still functioning (Farrington & Slater, 2006). Procurement activities in disaster response will occur directly at a local level or on a global scale based on the field assessments of the needs of the affected population (Blecken, 2010). Even though unexpected and unpredictable, the needs can be addressed through prior framework agreements and contract arrangements with suppliers for certain goods.

The third phase of reconstruction is similar to development activities and humanitarian organizations have the opportunity to plan ahead the type of procurement activities to do in line with their goals. These goals can be reached through the use of the appropriate resources for the strategy chosen by the organizations (McEntire & Myers, 2004; Régnier, et al., 2008). In the context of supply chain activities, consolidating materials through procurement becomes an option to increase the efficiency of the resources available.

There already are a few scientific articles discussing procurement in the humanitarian sector. One approach is the use of quantitative models such as stochastic, mixed-integer or holistic models which aim to study competitive bidding and auctions (Ertem, et al., 2010; Falasca & Zobel, 2011; Trestrail, et al., 2009; Bagchi & Virum, 1996). Another topic found in the literature is the role of ethical procurement (Walker & Harland, 2008; Wild & Zhou, 2011); for example, UN agencies are reluctant to use e-procurement because of the digital divide with potential suppliers in developing countries. In the literature, procurement consolidation is often mentioned as part of coordination and cooperation activities. These activities can be linked on a strategic level to consolidation through supplier reduction, centralization of activities and group purchasing. Humanitarian organizations sometimes operate distribution centers where procurement is managed for multiple organizations (Schulz & Blecken, 2010). Other methods used by humanitarian organizations are supplier-buyer alliances and collaborative procurement (Balcik, et al., 2010). However, there are various issues that might prevent cooperation or coordination to enable consolidation such as lack of funding, competition for funding, different mandates from organization to organization, sources of purchasing power and purchasing strategies (Pazirandeh & Herlin, 2014; Pazirandeh & Norrmam, 2014). Another issue that might come up is the use of competitive bidding in public procurement which precludes the use of preferred suppliers (Snider & Walkner, 2009) and thus the sustainable relationships that might lead to consolidation.
2.2.3 Material consolidation through kits in humanitarian logistics

Kits are part of the response activities of the main humanitarian organizations (Berger, 2013). They can be relatively simple to be directly given to the beneficiaries or extensively complicated to cover a broad need such as the Inter-Agency Health Kit (World Health Organization, 2011). Organizations such as UNICEF manage an important number of kits every year (table 3).

Table 3 Kit distribution by UNICEF, 2013.

<table>
<thead>
<tr>
<th>Type of supplies</th>
<th>Kits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical supplies and equipment</td>
<td>13.7 million malaria rapid diagnostic test kits</td>
</tr>
<tr>
<td></td>
<td>13.2 million HIV rapid diagnostic test kits</td>
</tr>
<tr>
<td></td>
<td>110,500 health kits in 62 countries</td>
</tr>
<tr>
<td>Water and sanitation</td>
<td>212,000 adult hygiene kits</td>
</tr>
<tr>
<td></td>
<td>41,000 family water and sanitation kits</td>
</tr>
<tr>
<td>Education supplies</td>
<td>24,000 classroom kits</td>
</tr>
<tr>
<td></td>
<td>14,000 Early Childhood Development kits</td>
</tr>
<tr>
<td></td>
<td>32,000 recreation kits</td>
</tr>
<tr>
<td></td>
<td>140,000 country-specific classroom kits</td>
</tr>
</tbody>
</table>

Source: UNICEF Supply Division, 2014

Material consolidation can occur at different points in the supply chain in transportation, warehousing and procurement. At each of these steps different strategies can be used such as time withholding for transportation and group purchasing for procurement. However, one specific approach that is present in certain supply chains and which is relevant for procurement, warehousing and transportation is the use of kitting. Kitting was first discussed in the management literature in the context of assembly chains and has been defined as: “a specific collection of components and/or subassemblies that together (i.e., in the same container) support one or more assembly operations for a given product or “shop order.” (Bozer & McGinnis, 1992)”. There is no clear cut case to choose between kitting and line stocking (Hua & Johnson, 2010; Caputo & Pelagagge, 2011) however, kits act as means of consolidation since materials are regrouped before being used at a later time and point in the supply chains. This creates a consolidation point in the supply chain where the proper items are stocked, prepared and assembled regardless whether they are fed to an assembly line or shipped to another organization or person to be used at a later date.

Kitting is also an activity that can be done by third party logistics provider as a specialized and value adding service in a distribution center (Mortensen & Lemoine, 2008; Gripsrud, et al., 2006; Bagchi & Virum, 1996). Material consolidation through
Kitting can also be done directly by a supplier (Lanier Jr., et al., 2010; Das, et al., 2006) and act as a way to facilitate management, consolidate volumes, reduce supply chain complexity and obtain better service (Handfield, 1993). Obviously these benefits come at a trade-off of service level and timeliness (McGinnis, 1992; Bagchi & Nag, 1991; Mohammed Zain, 1990) since consolidation into kits implies a withholding of items until they are assembled. This trade-off is often seen in the consolidation of items in transportation and warehousing; however kits, because they regroup items required to be used together at the same time, have additional benefits and disadvantages to take into account (table 4).

Table 4  Benefits and weaknesses of kits in the supply chain.

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kit allows for efficient space usage and material handling</td>
<td>Bozer &amp; McGinnis, 1992; Hua &amp; Johnson, 2010; Caputo &amp; Pelagagge, 2011; Kilic &amp; Durmusoglu, 2012</td>
</tr>
<tr>
<td>Kits improve quality for the final user</td>
<td>Brynzer &amp; Johansson, 1995; Caputo &amp; Pelagagge, 2011; Kilic &amp; Durmusoglu, 2012</td>
</tr>
<tr>
<td>Kits reduce fetching and picking time of parts when they are used</td>
<td>Kilic &amp; Durmusoglu, 2012; Hanson &amp; Medbo, 2012</td>
</tr>
<tr>
<td>Kits help increase flexibility through their mix of items</td>
<td>Hua &amp; Johnson, 2010; Caputo &amp; Pelagagge, 2011</td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
<td></td>
</tr>
<tr>
<td>Kits are labor intensive as they combine all picking and moving required to pre-assemble items before their use</td>
<td>Caputo &amp; Pelagagge, 2011; Bozer &amp; McGinnis, 1992</td>
</tr>
<tr>
<td>Kits require space and time</td>
<td>Caputo &amp; Pelagagge, 2011; Bozer &amp; McGinnis, 1992</td>
</tr>
<tr>
<td>Kits require extra management and planning</td>
<td>Caputo &amp; Pelagagge, 2011; Bozer &amp; McGinnis, 1992</td>
</tr>
<tr>
<td>Kits are easily disrupted by a quality issue on a part</td>
<td>(Bozer &amp; McGinnis, 1992</td>
</tr>
</tbody>
</table>

The advantages specific to kits are what motivates humanitarian organizations to use them out of the context of an assembly line. Indeed, even outside the context of factory production, kits still play an important role and help address issues faced in humanitarian logistics. There are ten major humanitarian organizations that procure kits from suppliers to distribute them in the field (Berger, 2013) in case of humanitarian crisis. The type of humanitarian crisis will often dictate what sort of kits are needed which can vary widely and be composed of medical kits, educational kits,
water and sanitation kits, kitchen kits, winterization kits and any other type of kits according to the needs.

In the context of disasters, kits are an important part of preparedness and response and are included in strategic procurement decisions and warehousing operations (Blecken, 2010). One of the characteristics of kits that interest humanitarian organization is how they enable being reactive to events (Chandes & Paché, 2010). When disaster strikes time is short to react and having pre-picked and assembled kits for specific bundles of needs allows to reduce non-value adding activities and increase timeliness in the response phase. The preparation phase can also include all activities related to planning of material combination and quality control to ensure that the material is adequate for the response. In the response phase, kits offer quality, flexibility, rapidity and standardization especially in the initial first phases of the response (Charles, et al., 2010; Kovács & Spens, 2007; Scholten, et al., 2010). The reconstruction phase however has more of an emphasis on long term activities for which needs have been thoroughly assessed which reduces the usefulness of kits. Indeed, kits at this point might have superfluous items and shipping individual items might better address the needs of the people affected.
3 RESEARCH DESIGN

Research design focuses on the step by step actions required to address a research question. In the context of article A, which consists of a literature review with a content analysis, the goals and lack of propositions or hypothesis to evaluate make for a straightforward research design. In the context of article B and C which are based on exploratory case studies, they can follow the different components of research design identified by Yin such as a research question, unit of analysis and criteria to interpret findings (Yin, 2009).

3.1 Content analysis

Article A which consists of a literature review uses a specific method called content analysis to examine written texts. This method has been used in a wide range of different research fields (Seuring & Gold, 2012) and tries to understand the meaning and context of the written texts selected and their content (Cullinane & Toy, 2000). Content analysis can be done in the context of a quantitative or qualitative research which leads to different types of content analysis. However, most content-analysis follows a specific step by step approach with different iterations required to better assess and analyze the material (figure 5) which will be discussed in the analysis and that is comprised of:

1) The delimitation of the material,
2) the assessment of the characteristics of the material,
3) the definition of the structural dimensions of the coding to apply it to the material, and
4) the analysis of the material.

Source: Seuring & Gold, 2012.
3.1.1 Data collection

To obtain an accurate understanding of incentives and obstacles of consolidation of goods for humanitarian organization through the development of a conceptual framework, it is necessary to delimit the material used in the literature review. To identify the scientific articles, first the appropriate journals must be chosen. This choice was based on two articles that ranked journals based on a survey of their usefulness by academics (Gibson & Hanna, 2003; Menachof, et al., 2009). Once the journals are chosen, the next step is to pick the different articles based on topics that are related to consolidation through keywords. The keywords of “logistics” and “supply chain management” are included for their wide coverage of the topic while “humanitarian logistics” was chosen for its relevance. Other relevant articles included articles on “distribution” (Fein & Jap, 1999), consolidation in “purchasing” (Trent & Monczka, 1998), “warehousing” (Rouwenhorst, et al., 2000), “transportation” (Çetinkaya & Bookbinder, 2003) and “third party logistics” or “3pl”s (Yan, et al., 2003; Knemeyer & Murphy, 2004). This step is followed by a review and assessment of the material followed by a content analysis of the final material. The first data collection phase focused on the top five ranked journals for research with keyword searches on the body of the text of articles based on a general literature review (figure 6). This first extraction was then assessed and only articles that discussed consolidation were selected and submitted for a first content analysis. Following this first selection of articles and their analysis, new coding categories were established and coded for.
Figure 6  First selection of articles based on entire text.

This first review of the literature created a more in depth knowledge of the topic at hand and a need to expand the scope and depth of the literature. This was done through the addition of journals as well as with the addition of key words (figure 7). In this second selection of material, journals that deal with disasters as well as humanitarian logistics were added to the list of top ranked journals for logistics and supply chain research; the content search was done on the abstract only. This second extraction of articles was also filtered on the basis of their discussion of consolidation related to material consolidation. At the end of the second round of iteration there were a total of 87 articles coded through content analysis.
Journals

- Decisions Sciences (1540-5915) (January 1998 to June 2013): no relevant articles
- Disasters (1467-7717) (January 1998 to June 2013): no relevant articles
- Disaster Prevention and Management: An International Journal (0965-3562) (January 1994 to June 2013): no relevant articles
- International Journal of Disaster Resilience in the Built Environment (1759-5908) (January 1994 to June 2013): no relevant articles
- International Journal of Logistics Management (0957-4093) (January 1994 to June 2013): 2 articles
- International Journal of Operations and Production Management (0144-3577) (January 1994 to June 2013): no relevant articles
- International Journal of Physical Distribution and Logistics Management (09600035) (January 1994 to June 2013): 8 articles
- Journal of Business Logistics (2158-5922) (January 1998 to June 2013): no relevant articles
- Journal of Humanitarian Logistics and Supply Chain Management (2042-6747) (January 1994 to June 2013): 1 article
- Journal of Operations Management (0272-6963) (January 1995 to June 2013): no relevant articles
- Journal of Supply Chain Management (1745-493X) (January 1998 to June 2013): no relevant articles
- Transportation Research: Part E, Logistics and Transportation Review (1366-5545) (January 1995 to June 2013): 6 articles
- Supply Chain Management: An International Journal (1359-8546) (January 1994 to June 2013): 8 articles

Figure 7  Second selection of new articles based on abstract
3.1.2 Data analysis

To define the structural dimensions of the coding and explore the issues behind materials consolidation in humanitarian logistics, a coding scheme was developed (table 5). The coding is based on different categories, with the first category identifying the broad type of research method. The second category breaks down what are the different types of consolidation. The third category identifies the number of organizations involved in the consolidation. The fourth category identifies the type of network used for consolidation. These different categories pertain to the type of resources and decisions that are required in consolidating materials. To address the incentives and obstacles of consolidation considerations, there were two categories one for the incentives and one for the obstacles. These two categories are composed of indicators based on opportunities and impediments for logistics services providers to horizontal cooperation (Cruijssen, et al., 2007). Horizontal cooperation includes consolidation activities and the previous research by Cruijssen et al. offers a good basis to define indicators. Each indicator was first defined based on previous literature but additional indicators were added later to the categories based on the articles analyzed during the first content analysis helping to improve the coding scheme.

<table>
<thead>
<tr>
<th>Category</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of consolidation decision</td>
<td>Pure dispatch consolidation</td>
</tr>
<tr>
<td></td>
<td>Integrated inventory and outbound shipment consolidation</td>
</tr>
<tr>
<td></td>
<td>Purchasing external consolidation</td>
</tr>
<tr>
<td></td>
<td>Purchasing internal consolidation</td>
</tr>
<tr>
<td></td>
<td>Cross-docking hub</td>
</tr>
<tr>
<td></td>
<td>Consolidation centers</td>
</tr>
<tr>
<td>Type of consolidation network</td>
<td>Dedicated (1 to 1)</td>
</tr>
<tr>
<td></td>
<td>Multiplant (Multiple to 1)</td>
</tr>
<tr>
<td></td>
<td>Inverse Multiplant (1 to Multiple)</td>
</tr>
<tr>
<td></td>
<td>Multiplant to Multiplant (Multiple to Multiple)</td>
</tr>
<tr>
<td>Number of organizations involved</td>
<td>Inside a single firm</td>
</tr>
<tr>
<td></td>
<td>Multiple firms (including third party logistics)</td>
</tr>
<tr>
<td>Potential incentives of consolidation</td>
<td>Increased productivity of core logistics activities</td>
</tr>
<tr>
<td></td>
<td>Reduced cost of non-core activities</td>
</tr>
<tr>
<td>Potential obstacles to consolidation</td>
<td>Hard to find commensurable LSPs with whom it is possible to cooperate for (non-)core activities</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Hard to find a reliable party that can coordinate the cooperation in such a way that all participants are satisfied</td>
</tr>
<tr>
<td></td>
<td>When an LSP cooperates with commensurable companies, it becomes harder to distinguish itself</td>
</tr>
<tr>
<td></td>
<td>It is hard for the partners to determine the benefits or operational savings due to horizontal cooperation</td>
</tr>
<tr>
<td></td>
<td>Partners find it hard to ensure a fair allocation of the workload in advance</td>
</tr>
<tr>
<td></td>
<td>A fair allocation of benefits to all the partners is essential</td>
</tr>
<tr>
<td></td>
<td>Cooperation is greatly hampered by ICT-investments</td>
</tr>
<tr>
<td></td>
<td>When benefits cannot be shared in a perceived fair way, the larger players will always benefit most</td>
</tr>
<tr>
<td></td>
<td>Consolidation can increase delays</td>
</tr>
<tr>
<td></td>
<td>Consolidation can cause increase in costs</td>
</tr>
<tr>
<td></td>
<td>Reduced flexibility</td>
</tr>
<tr>
<td></td>
<td>Lack of information/uncertainty</td>
</tr>
<tr>
<td></td>
<td>Conflicting mission and principles and cultural differences</td>
</tr>
</tbody>
</table>
3.1.3 Validity and reliability

The coding was done dichotomously for each indicator and proper steps were taken to ensure reliability and validity (Spens & Kovács, 2006). To guarantee objectivity and transparency, the categories and indicators were clearly explained and developed. Validity has been ensured through the choice of literature coming from top journals as well as having 87 articles selected. To analyze the articles, a proper framework anchored in literature is necessary and as such has been used in the context of the incentives and obstacles. Furthermore, to complement the framework, fine tuning of the categories during the coding was also done (Spens & Kovács, 2006). To ensure reliability, the first step was to use two coders to code the data with the same coding scheme in parallel. To further ensure the reliability of the coding by both coders, the results were tested using Krippendorff’s alpha coefficient to evaluate the level of agreement between the coders. The final coding phase had a Krippendorff’s Alpha coefficient of 0.83 with inter-coder agreement of 95%.

3.2 Case studies

The articles B and C both share the same method: a case study. Case studies are well known research strategies in social sciences as they are suitable for a range of different disciplines from economics to sociology (Yin, 2003). Case studies are also appropriate for supply chain management and there is a high number of rigorous case studies published in this field (Seuring, 2008). Case studies can often take a qualitative or quantitative approach (Spens & Kovács, 2006) as such they are quite flexible. Another benefit of case studies is the in-depth study of problems they allow (Seuring, 2008; Yin, 2003; Stuart, et al., 2002). Case studies take a more interpretive approach than standard rational and quantitative methods (Meredith, 1993) and can contribute to theory generation, theory testing and theory elaboration (Ketokivi & Choi, 2014). For both article B and C, theory elaboration in relation to dynamic capabilities is put forward with a focus on an exploratory research approach. Each case study article goes in depth into the phenomenon to be studied in relation to the context following qualitative data collection.

3.2.1 Data collection

The data for case study B and C were collected at the same time from the same organization: UNICEF. UNICEF plays an important role in responding to humanitarian issues through the different programmes it operates. These programmes include young child survival and development, basic education and gender equality, child protection, policy advocacy and HIV/AIDS (UNICEF, 2013). To support its programmes and the implementing partners it works with, UNICEF supplied implementing partners with material goods and services which amounted to $2.84 billion in 2013 (UNICEF Supply Division, 2014). This procurement is comprised of material and services that UNICEF funds and that are delivered to their implementing partners (governments and NGOs) and material funded by their partners and procured through UNICEF procurement services. The procurement services for partners procure for more than 100 countries for a value of $1.36 billion in 2013 (UNICEF Supply Division, 2014). One part of the total material procured and delivered are kits of which UNICEF uses a wide variety; at its global warehouse alone it fulfilled orders 362,000 kits in 2013 (UNICEF Supply Division, 2014).
The data on UNICEF consolidation activities were gathered from the 4th of November to the 22nd of November 2013 at UNICEF Supply Division Headquarters in Copenhagen. It consists of multiple different type of materials. The main source of material is 11.5 hours of interviews with different employees in various positions across the organization who dealt with kits and procurement (see annex A for interview questions). To study the topics at hand, broad open-ended questions were used in each interview until the data was repeating itself from interview to interview if required. The interviewees were also sent the transcripts of the interviews to review the data collected. There was also a collection of internal documents on procedures and processes as well as documents produced by UNICEF available publically. In the case of the consolidation via kits, questionnaires (see annex B) were sent out to country offices to gather more data. In the case of the procurement consolidation, more data was available on vaccine procurement activities through medical scientific literature. Articles B and C were also reviewed by key informants and management at UNICEF Supply Division before being finalized for this thesis.

3.2.2 Data analysis

The important amount of data that can be found from multiple sources in qualitative research can represent a daunting task of analysis. To parse through these sources in an efficient manner, researchers can use a wide range of different tools for analysis. The analysis for both articles B and C was done with a template. Template analysis is a way to organize the interpretation of information through coding (Crabtree & Miller, 1999). This approach to coding has also been proposed as a qualitative analysis tool in the context of management and organizational studies (King, 1998). Template analysis in essence:

[...] relies upon the coding of text in a thematic way to produce a given structure, or template. The key component of template analysis is the design of a template into which different chunks of data can be categorized. The process through which the initial template is designed depends upon the approach of the researcher and is influenced by issues such as epistemological preferences, and the extent to which the study has structured research questions.

-Source: Cassell, 2008

Study B and C follow King’s approach in which pre-defined codes as well as some codes that came from the exploration of the data are used to help understand the relationships in the data. The pre-defined code was centered on the type of material group that make up the kits as well as the organization’s activities: either disaster preparedness, disaster response, and development or reconstruction. The open coding categories centered on steps in the supply chain, resources, capabilities, problems and performance. These themes were influenced by the underlying theme of supply chain activities and dynamic capabilities with its resources and competencies. These additional attributes allowed a more in depth understanding of the data and the activities of the organization. Pre-defined coding categories were coded in a hierarchical manner while open coding was done in parallel. These different coding approaches help develop a structured presentation of the findings (King, 2004). It should be noted that the reduction of data into coding can sometimes create a reductionist stance towards the data (Cassell, 2008).
3.2.3 Trustworthiness

Trustworthiness of qualitative case studies can be ensured by multiple different approaches. The approach in article B and C is saturation where each interview follows the other until the information inside the interviews repeats itself from one interview to another. The use of other sources of data such as questionnaires, internal and external documents allows ensuring that the findings can form adequate constructs. The constructs are improved through a comparison of the data between the different sources to ensure that the findings are appropriate internally. To further improve this internal trustworthiness through comparison, a specific template analysis tool was developed which organizes the data and enables easier coding and pattern matching. These two activities allow a better understanding and interpretation of the underlying logic (Yin, 2009; Bak, 2005) behind the consolidation phenomenon studied in article B and C. Each article also had units of observation that were related to the activities of consolidation of materials to allow for comparison based on the differences in the general characteristics of the units. Materials played a role in defining the unit of observation with types of materials being the unit in article B and types of kits in article C. The unit of observation for each article offers a good overview of the different materials handled by the organization in the context of its global supply chain. For article C, the trustworthiness improves through the use of five different cases to cross-compare the data. These different cases are the four individual kits (Inter-Agency Health Kit (IEHK), School-in-a-box kit, adult hygiene kit and a health kit customized to serve country programmes) and general kitting activities.

It is also important to ensure trustworthiness during the actual gathering of materials. In the case of written documents, this was easy to assess as the documents have been created by members of the organization. However, interviews do not form a specific document that can be easily analyzed. To improve the trustworthiness of the interview material, interviews had interview notes written up and were also recorded and typed up as transcripts. This transcript was sent to the interviewees for review and a review of articles B and C was done by representatives of the organization. Finally, there are limits in the section relating to the supply chains. The supply chain focus was set on the specific organization and was limited from their procurement through to their deliveries in targeted countries. Furthermore, template analysis allows cross checking of the data, easy management of information through a database and an extensive coding which was reviewed multiple times to ensure consistency across the coding.
4 FINDINGS OF THE ARTICLES

The findings highlight the ways that each paper adds to the body of scientific literature. This section starts with a discussion of the contribution of each article towards a greater understanding of dynamic capabilities. Following this discussion are three separate sections, one for each article that put forward the specific findings for the model in article A and for the phenomenon studied in article B and C. Furthermore, the sections for article B and C include propositions derived from the research that offer guidance for assessing the findings of each article.

4.1 Contributions to dynamic capabilities

This thesis goes beyond understanding of how performing supply chains are achieved in humanitarian organisations. Indeed, all three articles help contribute to dynamic capabilities as they push forward the relevance of dynamic capabilities in a context different from rapid technology change with a focus on wealth creation. Instead of profits, the ultimate objective of humanitarian organizations is to alleviate suffering and improve the situation of the aid recipients (Tatham & Hughes, 2011). Through their supply chain, humanitarian organizations move goods to achieve this goal and, as such, the performance of these supply chains is also relevant with delay cost, volume of cargo, critical commodities, equality in reaching beneficiaries and reaching vulnerable population (Gralla, et al., 2014; Huang, et al., 2015). Humanitarian organizations do not seek profit neither do they compete through their supply chains and instead sometimes cooperate and coordinate to improve aid delivery. This thesis further contributes to dynamic capabilities as it identifies a result that can be expected from the lower supply chain competition and interest in coordination and cooperation by humanitarian organizations: facilitating access to competencies in between organizations through specific consolidation activities. This thesis offers insights for managers of humanitarian organizations on consolidation of materials through different means. It presents certain issues about consolidation and how organizations can address them with the appropriate resources to build their internal competencies. These competencies in turn can help achieve the performance levels the organizations aim for in their supply chain.

Article A sets the stage for the two others and develops a middle level abstraction model that explains a limited set of phenomena (Wacker, 1998) and it focuses on descriptions of relevant concepts (Meredith, 1993). From the point of view of dynamic capabilities, consolidation would be the process supported by the different resources that define the position of the organization while the focus and location of the organization represents the path of the organization. The disaster context and stakeholder environment represent potential sources of disruptions. From the point of view of humanitarian logistics literature, the paper answers a call for more theory building according to the dimension of network, coordination and structure (Jahre, et al., 2009) and offers a more in-depth understanding of potential resource use to support the process of consolidation. This study highlights the different resources and impediments related to consolidation for humanitarian organizations and can help managers understand what the basic resource requirements for consolidation are and how different issues in humanitarian organizations might be obstacles to achieving it.

Article B addresses a specific type of consolidation put forward in the framework of paper A: procurement consolidation. It offers both insights on dynamic capabilities as
well as on the phenomenon of procurement consolidation. Paper B puts forward that dynamic capabilities can be used in a non-profit setting and that procurement consolidation can help share competencies when their objectives are aligned. It shows a way for certain organizations to address the resource related obstacles of consolidation by relying on another organization to manage a range of procurement activities. When it comes to procurement consolidation paper B contributes an in-depth understanding of public procurement. It highlights the competency aggregating role of a purchasing group as well as the importance of supplier relationships programs. This study identifies the resources to obtain procurement leverage through global procurement consolidation. The findings can offer the opportunity for managers to understand what knowledge and relationships they need to develop in order to support partners and achieve their goals.

Article C addresses a type of material consolidation that can be done through procurement, transportation and warehousing: kits. Kits represent a specific approach that is often used by humanitarian organizations to address timeliness in disasters and, in effect, address one of the disruptions to which they must face. The pre-assembly and definition of kits is often done in a context of preparation where there is an opportunity to plan as is suggested in paper A. Furthermore, the competencies that offer organizations the option to manage multiple kit that have complex use allows them to respond to dynamic disaster situations. The study also contributes to the understanding of kitting in general as it goes beyond the kit assembly and discusses planning and preparation of kits. It also contributes to literature on kits by discussing the case of kits outside of standard assembly lines. This study identifies the required resources for organizations to manage kits for emergency and development situations and offers an understanding of how a specific performance is achieved. The findings can act as a checklist for managers interested in developing their own kitting activities.

4.2 Findings of paper A

Article A is based on a literature review of material consolidation. The findings on consolidation focus on the incentives and obstacles to consolidation in humanitarian logistics. To effectively manage material, consolidation requires different resources identified in the literature and their presence or absence can create an obstacle or an incentive to consolidate. The resources for consolidation consists of appropriate infrastructure such as warehouse and trucks, knowledge of consolidation decisions and relationships to manage the networks in which consolidation takes place.

The lack of resources can be an obstacle as well as the increase in cost related to the higher volume of material handled. Another issue that might prevent consolidation relates to the disaster phases. When disasters have a fast on-set there might be less opportunities to consolidate. Indeed consolidation often requires goods to be held for a certain period of time; this creates delays and is unacceptable for beneficiaries. However, the preparation, reconstruction phase or a slow on-set disaster might offer the opportunity to plan for consolidation.
Table 6  Potential impediments or opportunities to cooperate

<table>
<thead>
<tr>
<th>Potential impediments or opportunities to cooperation</th>
<th>Opportunities</th>
<th>Impediments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access</strong></td>
<td>Multiple organizations operate in the same area and have access to the beneficiaries which creates more opportunities to consolidate.</td>
<td>Only one organization has access to the beneficiaries which reduces its opportunity to consolidate materials with partners.</td>
</tr>
<tr>
<td></td>
<td>The high security threat limits the window of time to access the beneficiaries creating more incentive to consolidate during that time window.</td>
<td></td>
</tr>
<tr>
<td><strong>Number and size of actors</strong></td>
<td>An important number of organizations creates more opportunities to find appropriate partners with whom to consolidate.</td>
<td>A small number of organizations reduces the number of organizations that would be compatible for consolidation.</td>
</tr>
<tr>
<td></td>
<td>Organizations with important amount of materials can more easily implement consolidation practices with less disruption to their supply chains.</td>
<td>Organizations with small amount of materials would not gain as much from consolidation.</td>
</tr>
<tr>
<td><strong>Organizational mandate and cultural context</strong></td>
<td>An organisation with a mandate open to cooperation will help it find appropriate partners with whom to consolidate.</td>
<td>An organisation with a mandate that limits cooperation reduces the number of organizations that would be compatible for consolidation.</td>
</tr>
<tr>
<td></td>
<td>Cultural similarities allow for a better understanding and communication between organisations, this can support consolidation.</td>
<td>Cultural differences hinder communication between organisations which impedes potential consolidation activities.</td>
</tr>
<tr>
<td>Humanitarian goods</td>
<td>Well known standard materials and standard packaging makes managing materials together for consolidation easier.</td>
<td>Items with specific handling considerations (dangerous, cold chain, etc...) or non-standard packaging make regrouping materials together for consolidation difficult.</td>
</tr>
</tbody>
</table>

Two other factors are relevant for consolidation and consist of the stakeholder environment and the focus and location of the organization (table 6). These two factors are potential impediments or opportunities to cooperate. Issues relevant to access, the number of size and actors, the organizational mandate and the types of goods can enable or prevent consolidation depending on the context in which the organizations evolve. Despite these obstacles, humanitarian organizations can also benefit from consolidation and the main incentives that make consolidation attractive are cost reductions, increased performance and increased efficiency (figure 8).
Figure 8  Framework for consolidation in humanitarian logistics
4.3 Findings of paper B

Article B is a case study that focuses on the use of procurement consolidation and its finding on this phenomenon adds both to the humanitarian topic as well as to procurement literature. Literature has shown that there are two main strategies to achieve procurement consolidation: regrouping of suppliers and centralization of internal activities. These strategies are supported by three activities: preferred suppliers, electronic procurement and purchasing groups. The addition of the specific context of the organization that takes into account its legal mandate as well as its humanitarian operations has led to interesting findings. The first finding is the influence of the use of preferred suppliers through a contracting approach called long term agreements (LTA). These LTA allow answering the needs of transparency and cost accountability all the while reducing the number of suppliers to only rely on two or three suppliers for a type of commodity. Contractual agreements with private partners are relevant for humanitarian logistics for planning purposes (Banomyong, et al., 2009). The second finding is that consolidation is also achieved through the use of purchasing groups that are standardized and organized by the organization through either its programme activities or through procurement services for its implementing partners.

The context of humanitarian logistics does play a role in defining the organization’s procurement consolidation on a global scale. Indeed, its procurement consolidation activities follow commercial practices as they are done mostly for long term projects with sudden disasters being relatively small when taking into account their overall activities. The organization still procures kits and safety stocks specifically for emergencies. The organization’s partners have specific needs that are assessed through their in-country activities which creates knowledge of procurement needs. These needs are then evaluated by procurement specialists with knowledge of the materials and their markets at the supply headquarters before being consolidated with the needs of other countries and ordered according to minimum order quantities. These quantities are either shipped directly or sent to a centralized warehouse that holds safety stock and consolidates items with other items through custom packaging or standard kits. The propositions that can be derived from the findings of paper B are:

Proposition 1: Consolidation procurement competencies can be shared by multiple organizations through links in their supply chains in order to improve all non-profit actors’ performance.

Proposition 2: Consolidation procurement competencies require an increase in knowledge and relationships to improve dynamic capabilities as organizational goals widen.

Proposition 3: Intergovernmental humanitarian organizations can manage procurement consolidation and develop it in order to attract and support partners that adhere to its goals.

Proposition 4: Supplier relationship programs in intergovernmental humanitarian organizations require in-depth knowledge and partnerships to mitigate the tradeoffs between flexibility and accountability.
4.4 Findings of paper C

Article C studies a specific type of material consolidation: the use of kits. Kit management and creation are explored through a case study examining various types of kits. Kits in the context of humanitarian activities allow similar benefits that are observed in the use of kitting for private sector line management. However, to obtain the different types of benefits while taking into account the difficult operating conditions, the characteristics of the supply chain and the items managed requires different resources to properly manage the kits. The kits are built along specific guidelines which can be defined by the organization during a kit planning phase. This planning phase will impact the consolidation of items into kits at the different kit consolidation points in the supply chain (figure 9). The supply chain for the kits in this organization has multiple consolidation points, one at the supplier, one at a hub in Shanghai, one at the central warehouse in Copenhagen and one at specific in-country warehouses. At each of these points planning, assembly or storing activities improve quality, flexibility and timeliness. These performances are mostly ensured in the preparedness phase of activities as kits are often used for response in disasters. However, in development activities, the benefits of kits palliate for the poor local capacity for supply chain management as well and custom kits can be prepared as a specific way to respond to a country’s specific need.

The benefits of kitting are obtained through different resources that are available to the organization at different steps. During the planning of kits, the knowledge of the staff as well as the relationships with other organizations allows to design a specific kit and ensure that it performs adequately according to the requirements it needs to fulfil. This in-depth knowledge of the markets, the materials and the local needs are supplemented by the knowledge of the staff assembling the kits. The steps of assembly are also greatly helped by the standardization of handling material as well as the highly automated warehouse infrastructure in the central warehouse. Figure 9 presents the various kitting points of the organization. Altogether these resources offer the organization the competence to kit effectively for its different needs. The propositions that can be derived from the findings of paper C are:

Proposition 1: Consolidation through kits in humanitarian organizations allows sharing the performance gains of one organization with other organizations further down the supply chain.

Proposition 2: Consolidation through kitting offers the possibility to support performance in supply chains without a full infrastructure or material management capability at the point of use in both disasters and development contexts.

Proposition 3: The consolidation of items in kits requires organization to face trade-offs between flexibility and simplicity when designing a kit and performance and costs when establishing a portfolio of kits to fit with their goals.
Figure 9  Kit consolidation points across the organization
5 CONCLUDING DISCUSSION

This thesis and all three articles it presents aim to understand the competencies and underlying resources for consolidation of materials in supply chains by humanitarian organizations. Even though standard logistics practices include consolidation, the humanitarian context has some specific considerations to take into account. Each article offers an insight into different considerations for material consolidation either through procurement, warehousing or transportation and the appropriate resources required for each of these activities. The thesis and articles develop theoretical considerations for better insight on consolidation which consists of a specific type of collaboration and coordination which other humanitarian logistics identify as relevant. The articles B and C also expands the knowledge of the phenomenon of procurement and kitting. The thesis as a whole elaborates considerations for the dynamic capabilities in a non-profit setting which is usually concerned with rent-seeking activities. Material consolidation offers the possibility to increase performance and obtain economies of scale. This is relevant for humanitarian organisations because of their important logistics costs, the important amount spent on humanitarian aid each year and the chronic underfunding of humanitarian appeals. With material consolidation, they can tackle the high logistics costs while also achieving other performance goals to improve the help given to beneficiaries whether it is for development activities or disaster response.

This thesis and the articles that make it up help further the understanding of dynamic capability in the non-profit sector. Indeed, the bundle of resources that is put together in the form of infrastructure, knowledge, networks and relationships offer the competence to achieve consolidation. In the context of humanitarian organizations, the competencies required for material consolidation can be configured to keep costs low, improve productivity as well as address delays and poor cooperation that might prevent consolidation. This thesis and the articles offers deeper understanding of an additional organizational competence: material consolidation. It is interesting to note that in article B and C, similar resources such as local partnerships and material knowledge can be used to achieve two different types of consolidation inside the organization. This points to the underlying idea of dynamic capability that resources can be reorganized inside different types of clusters to provide different types of competencies. However, in both articles each type of consolidation also rely on resources that are not used by the other, for instance the knowledge required to pack kits or the knowledge of public procurement procedures. This shows how organizational routines and competencies can be developed through a mix of internal resources.

Furthermore, these articles offer an overall portrait of consolidation practices for humanitarian logistics. Article A with its overview offers general considerations on the management of material consolidation. Material consolidation is then taken up by the two other articles in a more in-depth fashion through case studies. In effect, these case studies in article B and C examine in depth some of the points raised in Article A. Article B identifies the importance of resources in facilitating consolidation for procurement. As procurement delays are rather long for the organization studied, procurement consolidation focuses on impediments to cooperation through different approaches. Access to knowledgeable staff, a clear mandate and control of which actors it works with means the organization can reduce impediments to cooperation. To achieve this, it is supported by a centralized warehousing infrastructure and centralized procurement knowledge. Organizational knowledge of local needs and activities also
plays an important role and was not highlighted in the framework for consolidation in humanitarian logistics in article A.

Article C also contributes to a better understanding of material consolidation in humanitarian logistics by addressing the specific management of kits. Kitting allows the organization to address both delays and cooperation issues and thus addresses obstacles to consolidation. By consolidating through kits, increased productivity and performance is obtained in the following steps of the supply chains whether it is transportation, distribution or warehousing; both the aspect of timeliness and flexibility offer the performance required when delays are unacceptable. Quality testing in advance also helps to reduce delays and ensure that proper standards are met by the material before an emergency even occurs. Kitting also helps in reducing impediments to cooperation. Indeed, these impediments are addressed through the kitting of the right type of goods in the right quantity in a standardized manner. This standardization and choice of goods fit the mandates and needs of the organizations involved in the response; sometimes these kits are even designed through consultations with these organizations and this helps improve cooperation when deploying kits. For both kits and procurement, knowledge, infrastructure and relationships play an important role as resources. However, much of the knowledge of the markets and environment is not identified by the framework presented in article A. In this sense both article B and C have allowed a better understanding of the issues and offer complementary results to the framework for consolidation in humanitarian logistics (figure 10).

Figure 10 Article B and C’s complimentary results to article A.
5.1 Limits of the research

This thesis is limited in its scope and findings in part due to the limits that are present in all three articles that compose it. The most important limit is the exploratory nature of the articles even though this allows gathering data on a topic that is not well covered in the scientific literature. Exploratory research limits the generalizability of the findings. The findings are further limited by their data sources. The data for article A limits its findings to the literature reviewed while the findings in article B are limited in the use of a single case study. Nevertheless, the use of the units of observation for article B and multiple cases in article C allowed a cross comparison of goods that are of common use in humanitarian logistics. The organization from which the case studies stemmed is also a major actor in the field of humanitarian organizations and its activities affect numerous countries and implementing partners as well as suppliers.

Article A has others limits that are specific to its method through coding and content analysis. The analysis uses other framework which might constrain the data even with the addition of further categories. The discussion of knowledge of the environment as a resource is not a topic that was present in both article B and C yet it can help enrich the framework. Another issue in article A is the lack of an empirical test. To some extent, exploration was done in the context of article B and C and the underlying dynamic capability behind each article offers the possibility to better understand how the organizational competence to consolidate through procurement, warehousing and transportation can be organized.

Articles B and C have some similar limits as the data was collected from the same organization during the same time frame. One of these limits was the time frame as the data gathering took place from 4th of November to the 22nd of November 2013 and represents a point in time of an evolving organization. Indeed, researchers that analyze the organization at a later date might encounter different consolidation activities with consolidation being done closer to the suppliers or closer to the countries where the organization operates. Another limitation is the location of where the data was taken for the interviews. With the exception of one, all the interviews were done with employees working at the supply division headquarters which biases the point of view to a central location. However, this bias is somewhat addressed through other sources and having access to the supply division headquarters offers the possibility to understand the global supply chain and consolidation activities of the organisation as well as have access to some of the top experts in their field from the organization. Another issue that might come up is the applicability of the findings in another context as these articles focused on UNICEF. In the case of article B this might be difficult to replicate as not many other organizations implement programmes through partners and operate procurement services. If no other organizations have similar practices, this points to the uniqueness of the case study done in the article. For article C, the use of kits is quite common and at least 10 major aid organizations use them (Berger, 2013). Moreover, the four different kits examined in article C offer different considerations that would be relevant for other organizations which address similar needs in the field.

5.2 Further research

Even though all three articles together offer a good exploration of material consolidation, this thesis and the articles presented in it lead us to identify further research possibilities. A topic that would be interesting would be the role of consolidation in for-profit organizations that work in the same type of turbulent
environments as those involved in humanitarian logistics. As these types of environments resemble the ones in which private companies use dynamic capabilities (fast changing technological environments in this case), it could also be interesting to establish what the dynamic capabilities are for international NGOs that work in disaster response and development and how they relate to activities of supply chains. This would clarify the link between supply chain and accountability. Another research activity that would be useful for all three articles would be the addition of data. For article A, this data can come as empirical data gathered to test if the framework is consistent. While for article B and C, analyzing other humanitarian organizations that manage materials could offer some further insights on the practice of procurement and kitting. Thus each article can on its own be the basis of further research.

The framework in article A could be a good base to field-test how consolidation works and is managed in specific operations. Consolidation incentives and obstacles as well as their links should be tested to determine if they actually inhibit or prohibit material consolidation in organizations and in between organizations. A complete portrait of potential consolidation options with all actors would help better understand the underlying obstacles and how they are managed and help humanitarian organizations in improving their efficiency.

Article B would need more in-depth research centered on procurement in humanitarian organizations. Indeed the organization that was used in this research was unusual for humanitarian logistics bodies in the context of its mandate as a UN organization. This specific consideration implies little use of e-procurement as well as very high transparency requirements. These conditions might not be present in other organizations with less binding legal settings in which to operate their procurement activities. Further analyses would also be required for local procurement consolidation.

Further research could also be done on the basis of article C to discuss the management of kits. Kitting is discussed in management literature mostly in the context of line production. However, the use of kits in business to consumer and business to business supply chains is not unusual and more research could be done in the private sector on kits in supply chains. Since kitting in a humanitarian context can be done for a wide variety of goods, the analysis of different other kits that have different characteristics as the ones studied could be interesting. Thus winterization kits which are seasonal or kitchen kits which have a cultural dimension might have interesting differences that complicate the management of kits for humanitarian organizations and are worth studying.

5.3 Publishing strategy

Humanitarian logistics is a topic that addresses many issues related to the supply chain of goods used for humanitarian purposes. This topic has appeared in the literature recently and even though as of 2005 there was still a small number of articles (Kovács & Spens, 2011), the literature in humanitarian logistics has since evolved to cover various topics such as personnel, equipment, infrastructure, policy and others (Overstreet, et al., 2011). These recent advances in the literature have even led to the creation of a journal specific to the field of humanitarian logistics the Journal of Humanitarian Logistics and Supply Chain Management. The following publishing strategy has been followed for the three articles:
Article A was accepted with major revision by Journal of Humanitarian Logistics and Supply Chain Management on 02/08/2015 and was resubmitted on April 30th 2015.

Article B will be submitted to the International Public Management Journal by April 30th 2015.

Article C will be submitted to the journal Production and Operations Management by April 30th 2015.
REFERENCES


Huff-Rousselle, M., 2012. The logical underpinnings and benefits of pooled pharmaceutical procurement: A pragmatic role for our public institutions?. *Social Science & Medicine, 75*(9), pp. 1572-1580.

Huff-Rousselle, M., 2012. The logical underpinnings and benefits of pooled pharmaceutical procurement: A pragmatic role for our public institutions?. *Social Science & Medicine, 75*(9), pp. 1572-1580.


6 ARTICLE A

A THEORETICAL FRAMEWORK FOR CONSOLIDATION IN HUMANITARIAN LOGISTICS

Purpose

The aim of this study is to develop a theoretical framework to better understand incentives and obstacles to consolidation of materials in humanitarian logistics.

Methodology

This study uses a content analysis for its literature review method to code 87 articles related to supply chain and logistics and understand what are the incentives and obstacles to consolidation. It then discusses these issues from the point of view of humanitarian logistics.

Findings

Through the combination of a literature review and discussion, the framework developed in this conceptual paper identifies specific sources of delays and impediments to cooperation present in disaster response and development activities. These issues can be related to disaster type, the focus of the organization and the stakeholders as well as the resources required for consolidation themselves.

Research limitations

There are limitations to a conceptual paper, one being the lack of empirical proof for the findings. Another limitation is the use of coding; even though the coding grid was iterative to take into account the findings in the literature, there might still be shortcomings inherent to the categories.

Originality

This study offers a comprehensive review of consolidation activities in the last decades and offers an abstract model to further investigate consolidation in the context of humanitarian logistics.
INTRODUCTION

The environment in which humanitarian organizations operate offers a complicated set of challenges such as an unpredictable demand (for timing, location, type and size), sudden occurrences of large demands with short lead times for different supplies, the importance of timeliness in deliveries and a lack of resources (material, human, technology and financial) (Balcik & Beamon, 2008). Meanwhile, logistics represent an important cost, sometimes upwards of 80% (Trunick, 2005) of a programme budget for these organizations or up to 40% of operation costs compared to 15% for commercial sector logistics activities (Whiting & Ayala-Ostrom, 2009) depending on what is considered transportation costs. Since multiple humanitarian organizations can be involved with a response to an event and have the same overall goals of helping the affected population, there is an opportunity for them to combine their activities in order to offer a better response. Coordination in humanitarian logistics is a well-researched topic (Balick, et al., 2010; Jahre & Jensen, 2010; Akthar, et al., 2012) and one approach to coordination is to regroup materials together through consolidation. The aim of this study is to develop a theoretical framework to better understand incentives and obstacles to consolidation of materials in humanitarian logistics through a review of appropriate writings leading to the development of a theoretical framework.

Frameworks offer the possibility to simplify a representation of reality and help in the elaboration of theories (Meredith, 1993). The framework in this study not only addresses a topic understudied in the literature but helps present the different relevant issues at hand and how they interact with each other. An overall picture of the incentives and obstacles can lead to more empirical field work and to a better understanding of the relevant literature for humanitarian logistics. This can be done by offering new ways of interpreting data as well as defining research problems. It also offers practitioners a better understanding of the general considerations behind the management of consolidation materials and how they can address them depending on their own context. The framework in this research applies to a specific instance of coordination in context of humanitarian logistics. Disaster relief is identified as one setting that significantly affects supply chain design decision and features (Melnyk, et al., 2014). The precise specifications of the framework lead to a construction of a middle level abstraction model as it explains a limited set of phenomena (Wacker, 1998). As such it focuses on a conceptual description which identifies relevant concepts and propositions (Meredith, 1993) relative to consolidation in humanitarian logistics. This answers the call for more theory building according to three dimensions relevant in humanitarian logistics (network - coordination – structure) identified by Jahre et al. (2009) as consolidation essentially consists of the management of a centralized coordination structure. Finally, the type of challenges brought about by the context for humanitarian logisticians is based on a further model put forward by Kovàcs & Spens (2009). To study a topic as broad as consolidation, a content analysis method is used to examine relevant articles. The first section of this article briefly discusses consolidation in the business literature, coordination literature in humanitarian logistics as well as the general concepts put forward by different theoretical models developed by previous authors. The second section then presents the methodology behind the content analysis developed to analyze the literature discussing consolidation. The third presents the analysis of the results. Finally the fourth section discusses a theoretical framework that identifies how consolidation can take place in humanitarian logistics.
Humanitarian logistics coordination and frameworks

Consolidation of material is one of the possibilities that are available to organizations to gain economies of scale (Cooper, 1984; Gray, et al., 1992; Trent & Monczka, 1998) and other performance benefits in their supply chain activities. Consolidation is a topic that is generally understood in the business literature as combining certain activities or materials that have common attributes to improve the overall performance of firms. Consolidation can range from market consolidation in which companies combine their assets and activities (Zyl, 1992; Wu & Chou, 2007; Manuj & Mentzer, 2008), to information technology systems where companies integrate different software packages (Davenport, et al., 2004; Mahato, et al., 2006; Grosswiele, et al., 2013). For the purpose of this study, consolidation is viewed in the context of materials management where materials are regrouped together physically through management activities. This type of consolidation consists of inventory, transportation and purchasing activities (Brauner & Gebman, 1993). In this context, specific definitions of consolidation exist. Inventory consolidation is stocking items at a single facility which satisfies all demand (Wanke & Saliby, 2009). Transportation consolidation is the dispatch of small amounts of material in a single large more economic load (Çetinkaya, 2005). Purchasing consolidation occurs when purchases are regrouped to gain certain benefits (Monczka, et al., 1993).

Even though consolidation is present in humanitarian operations, there is little to no literature regarding the practice of consolidation of goods in humanitarian logistics with Schulz and Blecken mentioning it as a side effect of horizontal cooperation (Schulz & Blecken, 2010). Cooperation and coordination are well discussed topics in humanitarian logistics literature and consolidation can be considered as a specific sub topic. Balcik et al. discuss coordination in humanitarian logistics through the different coordination mechanisms that cover purchasing, warehousing and transportation and put forward the critical role of coordination as well as the increased partnerships found in humanitarian logistics (Balick, et al., 2010). Akthar et al. discuss the importance of tangible and intangible assets and how coordination is successful if coordinators are successfully matched (Akthar, et al., 2012). Jahre et al. develop a theoretical framework for humanitarian logistics that include both vertical and horizontal coordination (Jahre, et al., 2009). Jahre and Jensen further investigates the challenges of vertical and horizontal cooperation in humanitarian clusters where limited resources force tradeoffs between intercluster and intracluster coordination (Jahre & Jensen, 2010). Kovács and Spens put forward the importance of coordination and collaboration between regional and extra-regional actors at different steps of the disaster phase (Kovács & Spens, 2007). Stephenson and Schnitzer point out that coordination takes place within a relational network under conditions of competition and confusion (Stephenson Jr. & Schnitzer, 2006). Chandes et Paché put forward coordination as significant for cost savings in humanitarian logistics but limited because of the competition for funding (Chandes & Paché, 2010). Dolinskaya et al. offer some insights on strategies to facilitate coordination (through web-based systems, membership subscription, mechanisms to mitigate risk and costs allocation, easy to use sharing and information tools and feedback mechanisms to facilitate learning) as well as challenges for consolidation (large number and diversity of participants, urgency of relief and limited time for coordination, limited information sharing and communication, allocation of costs and benefits and limited personnel dedicated to coordination) (Dolinskaya, et al., 2011). The challenges to collaboration are also reviewed by Feng et al. who identify as challenges the number and diversity of actors, donor expectations, competition, effects of the media, unpredictability, resource scarcity or oversupply, cost, determining and dividing gains and lack of standardization (Feng, et al., 2010).
Schulz and Blecken assess the benefits and impediments of horizontal cooperation by basing themselves on research by Cruijssen et al. and whose findings were used for coding in this research (Cruijssen, et al., 2007; Schulz & Blecken, 2010). Finally, Moore et al. when investigating the 2000 Mozambique flood found that organisations with higher potential to cooperate had a higher, on average, number of beneficiaries (Moore, et al., 2003).

Logistics and supply chain analytical frameworks are common in the business oriented literature and address various topics such as integrated supply chains (Stank & Goldsby, 2000), build-to-order supply chains (Gunansekaran & Ngai, 2005) and supply chain vulnerability (Peck, 2005). There are different frameworks in humanitarian logistics (Kovács & Spens, 2009; Jahre, et al., 2009; Ertem, et al., 2010; Overstreet, et al., 2011) and they use different levels of abstraction in how they develop the various concepts. Jahre et al. (2009) put forward a high abstraction model which identifies theory development possibilities through different dimensions (Jahre, et al., 2009). These dimensions comprise types of structure (decentralized/centralized), coordination (vertical/horizontal) and network (permanent/temporary). This paper contributes towards fulfilling the identified need for theory development by putting forward that focuses on consolidation, representing a case of coordination from a centralized point of view when materials of multiple actors are regrouped together. This can be done in both permanent and temporary networks with permanent networks used for development activities while temporary ones are used for disasters and other emergencies. Overstreet et al. (2011) also suggest another framework for further research which puts a greater emphasis on the elements of humanitarian logistics where humanitarian relief is the primary driver of input and output while the secondary input consists of monetary resources with secondary outputs as plans, relationships, lessons learned and experience (Overstreet, et al., 2011). The humanitarian logistics elements include the organization’s personnel, equipment/infrastructure, transportation, information technology/communication, planning/policies/procedures, and inventory management (Overstreet, et al., 2011). In this paper, the output is consolidation and the inputs are resources. The most relevant conceptual framework for the discussion of this research helps in identifying challenges in humanitarian logistics and is developed by Kovács and Spens’s (2009). This model describes the challenges faced by humanitarian logisticians according to disaster types, focus and location of the organizational and the role of stakeholders. To identify the relevant indicators of resources, incentives and obstacles a content-analysis of the relevant literature was done.

Content-analysis methodology

Content analysis is a research methodology that uses coding to study the meaning and context of a pre-selected literature (Cullinane & Toy, 2000; Seuring & Gold, 2012). The type of literature that is analyzed is either an academic literature or other types of texts (Cullinane & Toy, 2000); this is done in both cases for the purpose of scientific analysis in a multitude of fields which leads to multiple types of content analysis (Seuring & Gold, 2012). Because of this, there is a need to define the general approach for the content analysis of this study which follows the approach proposed for supply chain research by Seuring & Gold based on previous works by Mayring (Mayring, 2008) and is composed of four different steps. These steps consist of the delimitation of the material, assessing the characteristics of the material, defining the structural dimensions of the coding to apply it to the material and finally the analysis of the material (Seuring & Gold, 2012). Each of these steps have different practical
considerations and activities (figure 1) that can be iterative and which are explained below.

Figure 1: Content analysis methodology steps in this study.

The relevant literature for this framework is academic publications on the topic of supply chain and logistics. A preliminary review of selected materials discussing the word “consolidation” and associated notions provided material to define the preliminary coding categories and help with the first selection of articles (figure 1). The keywords of “logistics” and “supply chain management” were chosen for their wide coverage of the topic while “humanitarian logistics” was chosen for its relevance to humanitarian activities. Other preliminary relevant articles included articles on “distribution” (Fein & Jap, 1999), consolidation in “purchasing” (Trent & Monczka, 1998), “warehousing” (Rouwenhorst, et al., 2000), “transportation” (Çetinkaya & Bookbinder, 2003) and “third party logistics” or “3pl’s” (Yan, et al., 2003; Knemeyer & Murphy, 2004). The search was based on a subset of journals identified as the most relevant periodicals for academics in the area of logistics and supply chain management (Gibson & Hanna, 2003; Menachof, et al., 2009). For the first phase of the content analysis, the five highest ranked periodicals from Gibson & Hanna and Menachof, et al. were chosen as well as the Journal of Humanitarian Logistics and Supply Chain Management for the relevance of its topic. The search was done on all text fields of the articles which yielded an important amount of material. This required the elimination of irrelevant articles and was done through reading the abstracts as well as searching through the documents for the passages discussing consolidation. If the article did not contain at least one paragraph discussing the consolidation of materials it was
removed. This led to a first set of 50 articles which were read to understand the context of the material consolidation as well as a description of the incentives and obstacles. This was followed by a first coding of the material as well as additions of indicators to preliminary coding categories.

The first coding category identifies the type of resources required for consolidation in the form of decision making knowledge or infrastructure usage. The indicators of knowledge for transportation are pure dispatch consolidation with time based or quantity based shipment withholding or integrated inventory with outbound or inbound shipment consolidation (Çetinkaya, 2005). The indicators of knowledge for purchasing consolidation are the consolidation of external purchasing through methods such as preferred suppliers or group purchasing (Monczka, et al., 1993) and the consolidation of internal purchasing activities through e-procurement, ERPs or other means of process standardization and control (Smart, 2010). The indicators for infrastructure for consolidation are cross-docking which plays a role in consolidation without the use of inventory and the use of consolidation centers such as distribution centers or depots to consolidate material without integrating this consolidation with shipments. The second coding category identifies the types of consolidation networks; these are: dedicated consolidation (one point of departure to one point of arrival), multiplant to single point (multiple point of departures to one point of arrival) and multiplant to multiplant (multiple point of departures to multiple points of arrival) (Miemczyk & Holweg, 2004). This approach left out one indicator that came up in the literature and that is the option of inverse multiplant (one point of departure to multiple points of arrivals) which was subsequently added. The third coding category measures the number of organizations involved in the consolidation defined as a single organization or multiple organizations which includes the use of third party logistics companies.

To understand the potential incentives for and obstacles to consolidation, the propositions put forward by Cruijsen, Cools and Dullaert were used (Cruijsen, et al., 2007). Their research focused on a large scale survey investigating opportunities and impediments in horizontal cooperation for logistics services providers. Even though logistics service providers are not the sole focus of this study, the authors’ findings through factor analysis offer a good start to understanding horizontal cooperation which is required to manage consolidation between organizations. Furthermore, logistics service providers often play the role of consolidators in supply chains as it is one of their main business activity. Indeed, consolidation is a common activity especially offered via third party logistics (Maltz, et al., 1993; Knemeyer & Murphy, 2004; Sohail, et al., 2006) where contracts and using incoterms (International Commercial Terms) offer clear definitions of activities to better manage cooperation issues. The categories for potential incentives from Cruijsen et al. (2007) were: increased productivity of core logistics activities, reduced cost of non-core activities, reduction of purchasing cost, specialization and broadening of logistics services, better quality of logistics services at lower cost, use of large shippers for large contract and cost reduction and/or economies of scale. The categories for obstacles from Cruijsen et al. (2007) were: 1) hard to find commensurable LSPs (logistic service providers) with whom it is possible to cooperate for (non-)core activities; 2) hard to find a reliable party that can coordinate the cooperation in such a way that all participants are satisfied; 3) when an LSP cooperates with commensurable companies, it becomes harder to distinguish itself; 4) it is hard for the partners to determine the benefits or operational savings due to horizontal cooperation beforehand; 5) partners find it hard to ensure a fair allocation of the workload in advance; 6) a fair allocation of benefits to all the partners is essential; 7) cooperation is greatly hampered by ICT-investments and, 8)
when benefits cannot be shared in a perceived fair way, the larger players will always benefit most.

The coding scheme is based on a diverse literature that discusses consolidation; it develops categories which indicate through which resources consolidation is achieved and identify what are the potential incentives or obstacles. To these literature-based categories were added certain specific indicators that were identified while reviewing the first selection of articles expanding certain coding categories that were not previously included in the coding. This might be construed as grounded theory since the new coding indicators were “discovered” from the data and “Grounded theory is an indicative, theory methodology that allows the researcher to develop a theoretical account of the general features of a topic (...)” (Martin & Turner, 1986) p 141. However, the methodological goal of this paper is not to combine qualitative data analysis with grounded theory since this erodes grounded theory research (Glaser & Holton, 2007). Indeed, as put forward by Suddaby (2006), grounded theory does not consist of only content analysis (Suddaby, 2006). The theory building exercise in this article uses theoretical concepts already developed in humanitarian logistics to orient theory development for material consolidation. With this in mind some indicators were added based on themes present in the literature. In the context of resources these new indicators included infrastructure such as consolidation centers and cross-docks. For the network, indicators on the number of organizations involved as well as inverse multiplant configurations were added. Finally, there were some fine-tuning made to the categories related to incentives and obstacles. Five other indicators of potential incentives for consolidation also come out from the literature and were added to the coding categories: cost reductions through economies of scale; the reduction of CO2 gas emissions; increased speed of delivery; increased security of supply; and flexibility and responsiveness to change. Six other indicators of negative consequences also came out from the literature and were added to the coding category: an increase in delays; an increase in costs; reduced flexibility; a lack of information and uncertainty; conflicting missions and principles; and cultural differences.

After the first content analysis and addition to coding categories, there was an expansion of the selection criteria done in the light of multiple and broader descriptions of material consolidation in the literature; this was done with a second selection of articles that used both more journals and more terms used to describe consolidation (Figure 2). The additional journals were also identified as relevant periodicals for academics in the area of logistics and supply chain management (Gibson & Hanna, 2003; Menachof, et al., 2009) while journals known to publish on topics relevant to disasters were also added. This second search was done on the keywords and abstract field to ensure a better relevance to material consolidation. The exclusion of the material followed the same approach done in the first material retrieval with the additional step of removing duplicate articles which led to 37 new articles coded in detail for a total of 87 articles coded in the end.

Finally, to ensure reliability in content analysis the coding was done by two coders independently in parallel. When one coding indicator was added by a coder both coders would review all articles based on this new indicator. To further ensure reliability, the coding results were tested with Krippendorff’s alpha coefficient. Krippendorff’s Alpha coefficient offers a statistical measure of the extent of agreement among coders. After the final coding analysis, Krippendorff’s alpha coefficient was 0.8316 with 95% inter-coder agreement slightly above the threshold put forward by Krippendorff (Krippendorff, 2004). To compute Krippendorff’s Alpha coefficient, the SPSS macro version 1.1 provided by Andrew Hayes was used (Hayes, 2005).
Figure 2: Selection of articles.
Analysis of the literature

The content-analysis led to interesting findings. The type of consolidation decision was rather varied with consolidation centers (51) the most discussed approach and purchasing consolidation, external (6) and internal (3), being the least discussed form of consolidation. The research in the articles centred mostly on describing consolidation that involves more than one firm (68) instead of consolidation for a single firm (11). Furthermore, the more common type of consolidation network is the multiplant to multiplant network (31). These results seem to indicate that the literature is particularly concerned with complex activities of consolidation that involve multiple organizations within large networks. Nevertheless, all the categories related to type of consolidation, the number of organizations involved and the type of network were present across the literature. These findings point to the different types of resources that are required to achieve consolidation: networks of business relationships between or within organizations (dedicated (12), multiplant (6), inverse multiplant (12) and multiplant to multiplant (31)), consolidation knowledge (pure dispatch consolidation (26), integrated inventory and outbound shipment consolidation (16), external (6) and internal (3) purchasing consolidation)) and infrastructure (cross docking hubs (51) and consolidation centers (21)) to manage the material itself. The four types of networks are relevant for any of the types of consolidation and as such they are related to all of the incentives and obstacles. The other resources required for consolidation are relevant to specific types of consolidation incentive and obstacles that sometimes overlap (figure 3).

Some organizations will integrate resources together to take decisions that often include both warehousing infrastructure and purchasing and transportation knowledge across their networks. Together these different resources create a specific competence for organizations to enable the consolidation of material goods. This competence can be understood as the management of the interrelation of physical resources, human resources, processes and knowledge to create a combination of resources that will support organizational competence and routines in the supply chain. In effect, they will be creating a network where different types of consolidation can take place depending on the resources available internally as well as the resources and materials of potential partners. Certain companies that do not have access to these resources will instead resort to outsourcing their material consolidation activities to third party logistics provider who specialize in this sort of activity. For the potential incentives and obstacles, the results of the coding show very clearly that consolidation in the private sector literature has both positive and negative impacts. However, the negative aspects seem to be less emphasized in the literature since there was a total of 253 mentions of potential incentives discussed as opposed to 88 obstacles.

The potential incentives emphasize foremost the productivity (72) and cost reductions (78) with a reduction of non-core logistics costs (8) and purchasing costs (17). Productivity gains in the supply chain are thus one of the main reasons why companies seek out consolidation of goods. In terms of productivity, improvements in efficiency are present in the literature through cost reductions and performance increases while better customer service is also there in the form of increased speed of delivery (18), increased security of supply (12) and flexibility and responsiveness to change (27). It is interesting to note that there is a difference between the transportation and the warehouse and purchasing focused literatures for different incentives and obstacles. For instance, consolidation in warehousing often relates to centralization of warehouses in distribution centers and cross-docking activities. By consolidating
materials in fewer physical locations, the required safety stock is pooled from multiple locations and mitigates stock-out risks while increasing the number of items shipped. This can end up increasing the responsiveness of transportation through improving the management of a few consolidated depots and guaranteeing a better service to customers. There is one indicator that stands out of these categories: the reduction of CO2 gas emission. This indicator is quite important to mitigate the effects of global warming and can be achieved partly by transforming less than truck load shipments into full truck loads in transportation.

Consolidation for transportation and purchasing increases efficiency (productivity of core logistics activity, improving logistics services and using large contracts) while consolidation for transportation, warehousing and purchasing reduces a range of costs (through economies of scale, for non-core activities, for purchasing, or through better quality logistics service at lower costs). As logistics costs can be high for humanitarian organizations, this constitutes one argument for the importance for humanitarian organizations to address the issue of consolidation. Moreover warehouse consolidation not only improves productivity from better use of the facilities and helps reduces cost but it also offers the benefit of improving performance (through flexibility, security of supply and speed of delivery). These performance improvements are all important when it comes to support the response to the needs of the beneficiaries and this would constitute a second argument for the importance of consolidation. These arguments are reflected in three overarching incentives that came up from the literature review: costs reductions, increased efficiency and improved performance (figure 3).
Figure 3: Consolidation type and links to resource, potential incentives and obstacles
For the obstacles, the most important comes from an increase in delays (26). This affects transportation since consolidation can be linked to the decision of dispatch which relies on time delays or on waiting for a shipment to fill up; delaying for consolidation can lead to issues of poor service for customers in the form of increased uncertainty in delivery times. This effect of withholding policies can also reduce flexibility in shipments (6) while purchasing consolidation also reduces flexibility of sourcing options. Transportation consolidation was also identified as creating a lack of information and uncertainty (10) and this can be related to the unknown delays created by withholding policies or by outsourcing consolidation activities to another company. Together these obstacles represent the lowering of performance during consolidation.

Another issue that is interesting to bring up are the impediments to cooperation, even though individually each of Cruijssen et al.’s classification mentioned previously did not come up often in the literature but totalled 35 instances combined. Impediments to cooperation can affect all three types of consolidation and reduce the propensity of an organization to consolidate. Moreover, cooperation for consolidation is important and can constitute an impediment since poor cooperation can wipe out potential savings from consolidation.

One finding that was counter-intuitive for potential obstacles is the fact that consolidation can increase cost (10) as consolidation is often seen as a way to reduce cost. An increase in cost can be explained by the consolidation of multiple depots into a smaller number of depots which leads to an increase in distance traveled and the related transportation costs. Other explanations for this cost increase are standardizing resources in between partners to facilitate consolidation, implementing ERPs and increasing the frequency of shipments for transportation. As such cost increases could happen in any type of consolidation. Another issue that might come up is the lack of resources to consolidate. Indeed, if there is no knowledge or infrastructure to consolidate materials, consolidation would be seriously impaired. The last potential obstacles are conflicting mission and principles and cultural differences which came up once but stood out as being in an article on humanitarian logistics. This implies that the conflicting mission and principles as well as their cultural differences of non-profit organization might create an impediment to cooperation and prevent them from consolidating their activities. The three overarching obstacles are thus, impediments to cooperation, lower performance and resource related issues (table 1).

Table 1: Coding results: number of articles per indicator for each category

<table>
<thead>
<tr>
<th>Category</th>
<th>Resource</th>
<th>Indicator</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of consolidation decision</td>
<td>Knowledge</td>
<td>Pure dispatch consolidation</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
<td>Integrated inventory and outbound shipment consolidation</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
<td>Purchasing external consolidation</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Knowledge</td>
<td>Purchasing internal consolidation</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>Cross-docking hub</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>Consolidation centers</td>
<td>51</td>
</tr>
<tr>
<td>Type of consolidation network</td>
<td>Network</td>
<td>Dedicated (1 to 1)</td>
<td>12</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------</td>
<td>-------------------</td>
<td>----</td>
</tr>
<tr>
<td>Network</td>
<td>Network</td>
<td>Multiplant (Multiple to 1)</td>
<td>6</td>
</tr>
<tr>
<td>Network</td>
<td>Network</td>
<td>Inverse Multiplant (1 to Multiple)</td>
<td>12</td>
</tr>
<tr>
<td>Network</td>
<td>Network</td>
<td>Multiplant to Multiplant (Multiple to Multiple)</td>
<td>31</td>
</tr>
<tr>
<td>Category</td>
<td>Indicator</td>
<td>Count</td>
<td></td>
</tr>
<tr>
<td>Number of organizations involved</td>
<td>Inside a single firm</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Multiple firms (including third party logistics)</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Potential incentives of consolidation</td>
<td>Increased productivity of core logistics activities</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduced cost of non-core activities</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduction of purchasing cost</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specialization and broadening of logistics services</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Better quality of logistics services at lower cost</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use of large shippers for large contract</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cost reduction and/or economies of scale</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduction of gas emission</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased speed of delivery</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased security of supply</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flexibility and responsiveness to change</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Potential obstacles to consolidation</td>
<td>Hard to find commensurable LSPs with whom it is possible to cooperate for (non-)core activities</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hard to find a reliable party that can coordinate the cooperation in such a way that all participants are satisfied</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When an LSP cooperates with commensurable companies, it becomes harder to distinguish itself</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>It is hard for the partners to determine the benefits or operational savings due to horizontal cooperation</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Partners find it hard to ensure a fair allocation of the workload in advance</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A fair allocation of benefits to all the partners is essential</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooperation is greatly hampered by ICT-investments</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>When benefits cannot be shared in a perceived fair way, the larger players will always benefit most</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consolidation can increase delays</td>
<td>26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consolidation can cause increase in costs</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced flexibility</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lack of information/uncertainty</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conflicting mission and principles and cultural differences</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Discussion of a theoretical framework for consolidation in humanitarian logistics**

In a for-profit context, consolidation can be understood as a way to develop a competitive advantage with supply chains via cost reductions, productivity and increased efficiency while trying to avoid being affected by delays, increased costs, a lack of resources and issues with cooperation. Consolidation is made possible through the development, in a wide range of combination of network of relationships supported by infrastructure and knowledge of consolidation decisions (figure 3). These resources represent organizational decision making, activities and physical attributes that can be combined in multiple ways to create the competences to consolidate goods. In the case of humanitarian logistics, competition between organizations is largely focused on obtaining funding sources. However these sources can be leveraged through consolidation to procure and transport more goods and services to reach beneficiaries and increase the organisation’s impact. This performance can then be used to increase their reputation with actual and future donors and secure more funds.

Even with the specific finding of the obstacle stemming from conflicting mission and principles and cultural differences, the very small number of articles addressing humanitarian logistics (2) prevents a comparison between commercial and humanitarian consolidation activities. However, to better understand the considerations related to consolidation of goods in humanitarian logistics it is possible to take an overview of the findings of the mostly commercial literature review and interpret them through the use of another framework derived from humanitarian logistics research. The framework for consolidation in this study is partially based on a conceptual model that identifies challenges for humanitarian logisticians developed by
Kovács and Spens (Kovács & Spens, 2009). This model identifies different challenges faced in the context of the field research in Ghana: disaster types, the focus of organizations as well as the stakeholder environment. The theoretical framework in this discussion section (Figure 4) touches on these challenges but has additional dimensions to take into account the incentives and obstacles to consolidation identified in the content-analysis.

The disaster type context is characterized by the phases of a disaster, usually separated in preparedness, response and reconstruction (Beamon, 2004; Jahre & Height, 2008; Bedini, et al., 2009) and the speed of the disaster, with fast onset and slow onset disaster (Van Wassenhove, 2006; Kovács & Spens, 2009). When disaster strikes, the most important factors in the response by humanitarian organizations is the time frame; indeed in certain disasters, the response time is critical to reach affected communities (Yi & Özsamar, 2007; Kovács & Spens, 2009). In the case of the response phase for a fast onset disaster, the risk of delays and loss of flexibility of transportation consolidation might create an obstacle to consolidation. Purchasing consolidation is not linked to delays however, a reduced number of suppliers can affect flexibility but in the context of a disaster, sourcing could be organized with local suppliers (Gustavsson, 2003). If local suppliers are overwhelmed by the disaster, humanitarian organizations will ship pre-purchased goods from their warehouses. Warehousing consolidation would be another option as they bring in performance benefits although large consolidated warehouses are usually established prior to the response to a disaster (Schulz & Blecken, 2010). Sudden-onset disasters can also destroy or greatly destabilize the current infrastructure (Kovács & Spens, 2007) which would delay access by organizations to infrastructure such as warehouses required for consolidation. The disaster context will thus create obstacles to transportation and purchasing consolidation in situations where delays and lack of flexibility are unacceptable (figure 4).

The other disaster phases include preparedness and reconstruction. These phases as well as development activities in which humanitarian organizations engage are planned in advance. The preparedness phase is well suited for consolidation when organizations are pre-positioning and keeping safety stock of goods. Indeed, the goods for multiple operations as well as of multiple organizations can be warehoused at the same site (Beresford & Pettit, 2009; Schulz & Blecken, 2010). Since there might be multiple warehouses for worldwide, regional and country levels disasters (Beresford & Pettit, 2009), each of these warehouses acts as consolidation infrastructure with the potential for multiple organizations to be involved with warehouse management (Ishii & Nose, 1996; Strack & Pochet, 2010; Hariga, 2011). The warehouses stocked with the goods of multiple organizations can also manage the consolidation of the procurement for these organizations (Schulz & Blecken, 2010; Balick, et al., 2010). These warehouses also play an additional role of consolidation through kitting by creating specific kits containing different types of items that respond to a specific type of need (Schulz & Blecken, 2010). Nevertheless, disasters that can be better predicted and have a slow-onset (droughts for instance) can be better prepared for in advance as well (Wilhite, 2002; Moe & Pairote, 2006; Kovács & Spens, 2009) and the response phase can be stretched out during the duration of the disaster allowing for better planning. Disaster contexts where planning is possible are best suited to arrange organizational resources for consolidation.

Regardless of the disaster context, the focus and location of the organization may also affect the network available for consolidation either through the offer of resources or of material to consolidate. Organizational mandates play a role in preventing cooperation as it could be defined for a specific disaster phase or type; often organizations receive
funding for short-term disaster relief (Gustavsson, 2003). The political or apolitical characteristics of an organization can decide how much it can work with other organizations to consolidate goods (Pettit & Beresford, 2005). Cultural issues might also lead to differences in needs and preferences for types of goods as well as create language issues which will impair adequate distribution (Long & Wood, 1995) and potential for consolidation. The type of goods is also an issue, often one type of goods cannot be mixed with another (water treatment and food for example) while other goods require special handling such as cold chain vaccines for example). Another problem that affects cooperation is the lack of standards (Murray, 2005). As non-standard documentation and handling material is not easily transferable in between organizations, this increases the cost and reduces the possibility of cooperating.
Figure 4: Framework for consolidation in humanitarian logistics
Additionally, the stakeholder environment affects consolidation depending on the number of organizations operating in an area and their size. On one hand, consolidation with a larger number of organizations or a large organization is complex and time consuming which can increase the cost of consolidation. In this case the number of actors would act as an impediment to cooperation On the other hand, consolidation is easier to achieve with the presence of multiple partners. These partners offer the possibility to increase the amount of material handled and achieve consolidation of volume and they can also share their resources increasing the possibilities to achieve consolidation. Access to an area is also important. The costs related to reaching areas in need of assistance and the capacity of organizations can play a role with certain organizations not having the financial, human or material resources to operate in certain regions. Access to areas in need might also be limited because of the presence of security issues. These security issues can create an impediment to cooperation with only certain organisation being given access or with the belligerent forces trying to control the flow of aid. However, aid organization can use security disruptions that prevent deployments to plan for improved cooperation and consolidation activities while waiting for the security situation to improve (Tomasini, 2012; Beamon & Kotleba, 2006).

Together the focus and location of the organization and the stakeholder environment can create potential impediments or opportunities to cooperate for organizations and thus affect the network of resources available for consolidation, the number of potential participants as well as the amount of material. The focus of organizations combined with the multitude of stakeholders can make it hard to identify with whom to cooperate or who should coordinate the cooperation and what type of benefits are possible without creating a lack of information and uncertainty during consolidation. The satisfaction of all parties (by being fair with allocating benefits and workloads) is also hard to achieve to maintain cooperation. Moreover, smaller organizations might not want to associate with larger organizations as this might make it harder for them to distinguish themselves or they might receive fewer benefits than larger organisations from cooperating.

**Conclusion and further research**

This study develops a theoretical framework to better understand incentives and obstacles to consolidation of materials in humanitarian logistics. Through the combination of a literature review and discussion based on previous frameworks related to humanitarian logistics, the framework highlights the role of resources as well as the contextual challenges of humanitarian logistics in relation to potential incentives and obstacles. The elaboration of this framework ties into the overall theoretical framework put forward by Jahre et al. (2009) and contributes a relevant framework specifically for consolidation that consists of centralized coordination. The framework can also be understood through the factors influencing supply chain design put forward by Melnyk et al. (2014). Indeed, the stakeholder environment, focus and location of the organization as well as disaster context are broad environmental influencers of the supply chain. Design decisions represent how an organisation organizes its resources to achieve a network for material consolidation while the building blocks are required to address the resource related obstacles through specific investments. The concepts and their relationships put forward in this framework are supported by a thorough literature review and create further avenues of inquiry to address the lack of literature on consolidation in humanitarian logistics as an emerging area of study for humanitarian logistics. The conceptual nature of this paper brings certain limitations
to the development of a theoretical framework, the most glaring one being the lack of empirical support for the findings. Another limitation is the use of other frameworks for the purpose of coding; even though the coding grid was modified to take into account the findings in the literature to offer a more complete picture, there might still be shortcomings in the coding scheme used.

In light of the important incentives to save costs through economies of scale and the lack of literature covering the subject this study presents different considerations for consolidation by humanitarian organizations in the form of a framework. Consolidation of activities would offer organizations the possibility to reduce their high logistics cost and procure more materials for the beneficiaries in need. Control of costs and the logistics performance is relevant for humanitarian organizations when considering that most funding appeals by the UN are usually unmet; in 2013 around 19 consolidated funding appeals for humanitarian operations were submitted through OCHA (Office for the Coordination of Humanitarian Affairs) were funded at best at 77% and at worst 21% (Smith & Swithern, 2014). Furthermore, the framework puts forward a summary list of resources that might be required as a basic requirement to be able to achieve consolidation. This can help logisticians in humanitarian organization evaluate if they have the potential to be able to consolidate materials inside their supply chains or with other supply chain members. A lack of certain resources or capability in resolving obstacles could push the logistics group to work with other organizations to resolve this internal capacity issues. A good example of this would be to join simple purchasing services to benefit from some of the economies of scale available through consolidation such as the UNICEF Procurement Services (UNICEF, 2014). Moreover, the obstacles to consolidation highlighted in this study also can help logisticians in organizations to reflect on potential solutions in advance to facilitate consolidation inside and in between organizations for both development and emergencies. One such example are kits which are prepared in advance. A good example of this type of kitting activity is the inter-agency-health-kit (World Health Organization, 2014). Alternatively they could work with organizations with bigger logistics capacity such as the World Food Program (WFP) which organized a worldwide network of shared warehouses called the United Nations Humanitarian Response Depot that coordinates a wide range of services for procurement and warehousing (UNHRD) (WFP, 2014). Consolidation activities are also sometimes put in place through logistics clusters. The cluster approach has been put forward by OCHA in 2005 and aims to increase coordination (United Nations Office for the Coordination of Humanitarian Affairs, 2014) between UN and non –UN agencies in the humanitarian sector. Different options are available to support consolidation but logisticians must be able to understand what the potential causes of obstacles are to choose the right approach to consolidation and benefit from it. These different activities put forward by humanitarian organizations also offer potential empirical avenues for further research based on this framework.

REFERENCES


Reasoning Communities and Collaborative Decision Making: Cooperative Approaches, pp. 252-271.


Huff-Rousselle, M., 2012. The logical underpinnings and benefits of pooled pharmaceutical procurement: A pragmatic role for our public institutions?. Social Science & Medicine, 75(9), pp. 1572-1580.


PROCUREMENT CONSOLIDATION IN GLOBAL HUMANITARIAN SUPPLY CHAINS

The aim of this article is to understand and explore how intergovernmental humanitarian organizations consolidate materials through their global procurement activities. To explore this topic a unique in-depth case research of the procurement activities at UNICEF Supply Division is done. Global procurement for goods is simplified by the relationships on the ground with other humanitarian partners which allows for a better understanding of the needs and a better fit with the programme objectives. This activity leads UNICEF to consolidate the procurement needs of many organizations worldwide ensuring reduced costs and goods of high quality for its partners with the help of the technical and market knowledge available for procurement activities.
INTRODUCTION

Procurement activities play an important role in many organizations and, with the current level of globalized trade, it can take on a strategic role. One of the ways that organizations manage their procurement activities in a globalized world is through the consolidation of material sources. Consolidation in a wider perspective is often defined as the regrouping of activities, entities or items together in order to gain some form of leverage through the increase in importance (volume, size, use etc...) of what is regrouped. Many types of consolidation can be done, some of them are financial (Manuj & Mentzer, 2008; Zyl, 1992; Wu & Chou, 2007) and some of them might be technological (Davenport, et al., 2004; Grosswiele, et al., 2013; Mahato, et al., 2006). One strategy that is often used in the context of international procurement is the consolidation of suppliers sometimes through supplier relationship programs (Lanier Jr., et al., 2010). Procurement consolidation has also been made much easier with the development of electronic procurement activities and the internet through the use of centralized contracting services that manage the flow of information related to product data, catalogs and prices; these activities are commonly known as E-procurement (Angeles & Nath, 2005). Another way to consolidate procurement is through group purchasing where organisations join forces to consolidate their procurement (Rolfstam, 2012).

Consolidation of supplier base and consolidation of activities are worth considering for both public (Thai, 2009) and private procurement activities (Croom, 2000). In the private setting, companies might consolidate their procurement activities and be affected by the consolidation activities of their clients (Uлага & Eggert, 2006). In the public sector, there are some differences in the processes put in place for procurement. Sometimes the lack of customers with strong leveraging power in the public procurement setting creates imbalances with suppliers that facilitate corruption; to counteract this, specific laws are put in place. This may make the public procurement process less efficient when measured by the costs of unit of purchase than the private one or the public one unencumbered by such laws, as the taxpayers require transparency and accountability from governments (Tadelis, 2012). These two objectives are usually achieved with open competitive bids adjudicated to the lowest cost supplier. This approach is taken in public procurement on an international level at the United Nations (UN Procurement Division, 2013). The United Nations is a unique combination of a public governmental international organization that also has massive supply chains of goods and services spreading across the world with a procurement value of 15,372 billion US$ with 44% towards goods and 56% towards services in 2012 (UNOPS, 2013). The UN addresses issues of both development and humanitarian assistance. Globally, in 2011, $12 billion was awarded for humanitarian aid and $156 billion was awarded for development activities (Global Humanitarian Assistance, 2014).

In recent years, there has been a steady stream of literature studying and analyzing the context of public procurement (Tadelis, 2012; Thai, 2009; Edler & Georghiou, 2007). This context has, in some cases, also been examined in humanitarian organizations which have some of the same procurement characteristics as those of public procurement (Ertem, et al., 2010; Wild & Zhou, 2011; Bagchi, et al., 2011). However, there has been little written on the role of consolidation of procurement activities in humanitarian supply chains from a global perspective. This study seeks to add to the current literature by offering an insight on specific consolidation activities in procurement by a humanitarian agency in its global procurement. The aim of this study is to understand and explore how intergovernmental humanitarian organizations can
consolidate materials through their procurement activities. The research question for this study is: How do humanitarian organizations manage the consolidation of global procurement needs?

The study is based on an in depth case study centered on a unique single case that incorporates different aspects of procurement consolidation. This case is a specific UN agency which procures items from multiple global suppliers while following public procurement guidelines. The data were collected from a series of interviews and document gathering activities at the supply division headquarters of the organization. This research offers new insights on the subject of consolidation in procurement by adding the context of international public procurement in a humanitarian setting. The findings are limited by the use of a single case study. However, the organization studied offers a good example of a large humanitarian organization and examining it offers an opportunity to expand the understanding of procurement consolidation for global procurement. Following the introduction, the study presents a literature review of procurement consolidation; this is followed by a description of the method and data, a discussion of the results and a conclusion to the study.

**Procurement consolidation in different contexts**

**Procurement consolidation**

There are many options for organizations that wish to rationalize their procurement activities and obtain savings. One way to obtain these gains is through procurement consolidation. This activity has been identified by Trent and Monczka as one of the major 1990’s trends in procurement (Trent & Monczka, 1998). To consolidate activities in procurement, there are two strategies that are commonly discussed in the literature: 1) the regrouping and reduction of suppliers to reduce the amount of sources for materials; and 2) the centralization of internal activities for procurement. The first strategy addresses the relationship with an organization’s suppliers. The general objectives of implementing programs that have the strategy of reducing the size of the supplier base is to gain leverage with respect to the supplier and offer it one or several of the following benefits: a bigger volume of sale in exchange of better prices, better quality of service through improved delivery capacity, improved service capacity and more efficient order processing which lead to reduced ordering costs (Song, et al., 2014). The second strategy affects how an organization manages its internal procurement activities; the centralization of these activities aims at reducing the internal transaction costs of procurement management (Smart, 2010). Sometimes organizations can aim for a mix of each of these, putting an emphasis on one or the other objective. Procurement activities are then used to facilitate consolidation; the most common tools that are used are supplier relationship programs, electronic procurement and purchasing groups (figure 1). Implementation of these strategies and changes in procurement activities can be done independently of each other or in a complementary fashion as well partially or completely depending on the need of the organizations.
Supplier relationship programs

The first activity is the consolidation of material through supplier relationship programs; it aims to reduce the number of suppliers and thus increase the volume of purchases from each supplier. A few special suppliers can be identified by an organization and help achieve the goals of consolidating incoming materials procured from suppliers. Supplier relationship programs are part of a continuum of options for managing suppliers. Gosling, et al., (2010) offer a useful breakdown of potential types of different supplier relationships. These are: approved suppliers with a loose relationship and high sourcing flexibility; preferred suppliers with a moderate relationship and medium sourcing flexibility; and framework agreements with close relationships and low sourcing flexibility (Gosling, et al., 2010). As per this classification, consolidation of suppliers is performed with different degrees of integration but material consolidation will have to take place especially for preferred suppliers and framework agreements (Gosling, et al., 2010). However, preferred suppliers relationship is identified as being a relatively common type of supplier interaction (Choi & Krause, 2006; Gosling, et al., 2010; Angeles & Nath, 2005; Cox, et al., 2005) which often revolves around the development of long-term sourcing strategies (Cox, et al., 2005) to help support the organization’s objectives. One such objective is responsiveness which can be improved through supplier relationship programs as the procuring organization can communicate more effectively its needs (Choi & Krause, 2006). The clear communication of the needs allows both organizations to benefit through the reinforcements of interactions and know-how of each other’s operations (Ulaga & Eggert, 2006). Sometimes supplier relationship programs can also play a crucial role in the development of new products for their clients (De Toni, et al., 1994).

Furthermore, the use of supplier relationship programs have also been identified as a way of reducing procurement risks (Snider & Walkner, 2009) and of obtaining volume leverages from fewer suppliers (Pollitt, 1998; Croom, 2000). Suppliers in relationship programs can also play the role of consolidators by aggregating items required by their
clients from suppliers at an upstream position (De Toni, et al., 1994) and thus increase the overall level of consolidation of the supply chain. The higher volume of sale also offers the possibility of reduced costs through shipment consolidation practices which can make use of full container shipments (Crujssen, et al., 2007). The use of partnerships in suppliers can also influence internal activities of the purchaser as the management and enforcement of policies and contracts that support supplier relationship programs is usually done via a central system. (Smart, 2010; Croom & Brandon-Jones, 2009). In the context of public procurement, it is important to note the need for transparency and accountability through the bidding process; this drives requirements of competitive bidding (Tadelis, 2012) and might preclude the use of supplier partnerships (Snider & Walkner, 2009). However, certain practices might mitigate the impact of this need when additional procurement conditions are put into place such as past performance (Snider & Walkner, 2009; Onderstal & Felsö, 2009), grandfather clauses in contracts and benchmarking (Onderstal & Felsö, 2009).

E-Procurement

The second activity used to support strategies that push towards consolidation activities indirectly targets materials through an improvement of the procurement process via E-procurement. This change in the procurement process and centralization of the activities was facilitated through the development of new information technology tools such as ERPs and the Internet. These technologies allow for improved information and analysis of procurement activities (Croom, 2000). This has led many organizations to push for an implementation of so called E-procurement solutions that aim to cover a whole range of procurement activities and can include E-Tendering, E-Marketplace, E-Auction/Reverse Auction, and E-Catalogue/Purchasing, E-sourcing and E-MRO (Vaidya, et al., 2006; Bruno, et al., 2009; Doherty, et al., 2013). E-procurement encompasses activities that integrate and streamline procurement processes using information technology to obtain various benefits (Vaidya, et al., 2006; Luigi & Kim, 2010). Such benefits can increase consolidation as E-procurement helps to implement a strategy to reduce the number of suppliers through analysis of procurement data (Smart, 2010; Croom & Brandon-Jones, 2009). Consolidation can also occur through ensuring that internal procurement policies and processes are respected and ensure ease of access to contracted suppliers via E-procurement tools (Smart, 2010; Croom & Brandon-Jones, 2009). E-procurement also has other benefits which can include efficiency in process with lower internal transaction in costs, price reductions and the development of better relationship with the suppliers (Essig & Arnold, 2001; De Boer, et al., 2002; Holland, 1995; Croom, 2000). These benefits are applicable in the context of business activities but E-procurement is also of interest in public procurement (Luigi & Kim, 2010).

Governments are not only interested in reduction of costs through E-procurement but also by the availability of better information which helps meet legal requirements and improve transparency, quality of services and compliance (Leipold, et al., 2009). However, the implementation of E-procurement does have drawbacks which are linked to the implementation of IT systems; they include the cost of implementation, the difficulty in procuring technically complicated items (Doherty, et al., 2013), the difficulties in managing the integration with the suppliers, resistance to change and lack of uptake by users as well as poor support from top management (Vaidya, et al., 2006). Other drawbacks that are present for E-procurement in the context of public procurement are the legal requirements or strategic priorities of public organization that want to promote a specific market activity. Indeed, for the UN, E-procurement
goes against some of its principles as suppliers in developing countries are not able to
cross the digital divide and participate into e-supplier schemes easily (Sakane, 2009; Walker & Harland, 2008).

However, previous research shows that E-procurement is not a common practice in
intergovernmental humanitarian organizations (Sakane, 2009; Walker & Harland, 2008). Not only would this practice preclude suppliers in developing countries from
bidding for contracts but the data from the study indicates that local procurement can
support sustainability and allows shortened lead times to respond to needs if the
markets have the capacity and proper quality of materials.

**Group purchasing**

The third activity that enables consolidation and indirectly targets materials through an
improvement of the procurement process consists of handing over the process to an
entity outside of the organization, usually a purchasing group; purchasing groups are
also known as cooperative purchasing and consortium procurement. These types of
groups manage the process of procurement for multiple but similar organizations with
the goal of increasing their market share to obtain leverage with respect to suppliers
when negotiating (Rolfstam, 2012; Huff-Rousselle, 2012). In effect, this strategy is
often used by different public and private organizations to help manage their
procurement costs or gain other benefits such as better service levels (Schotanus, et al.,
2010). Group purchasing for materials in the context of supply chains is often discussed
for the purpose of healthcare procurement practices or other government activities
such as education (Nollet & Beaulieu, 2005; Stefan & Santiago, 1989). Public sector
organizations are more prone to such regrouping than private for-profit organizations.
This difference stems from the lack of competition between the organizations procuring
from the same market segments and thus the lack of risk of transferring strategic
information to competitors since none are present (Nollet & Beaulieu, 2005). Nollet
and Beaulieu identify an exhaustive list of advantages (price reduction, transaction cost
reduction, knowledgeable personnel, savings, increased negotiating power and
communication about common preoccupations) and drawbacks (price focus instead of
quality, potential for oligopolistic behaviors and the costs to maintain cohesion)
resulting from joining purchasing groups (Nollet & Beaulieu, 2005). The evolution of
the purchasing group can also be affected by certain factors such as the extent of the
benefits received, the nature of the benefits, the size of the groups, the potential
conflicts in between members, the structure of the group, supplier resistance and anti-
trust issues (Hendrick, 1997; Doucette, 1997; Nollet & Beaulieu, 2003). There are other
important factors to take into account when managing purchasing groups to see them
succeed which are: the lack of enforcement by group members for the participation,
cooperation, commitment and internal support, the allocation of gains and costs and
communication between the group members (Schotanus, et al., 2010). Group
purchasing arrangements centralize the internal procurement process by having a
single external source for procurement by the organization and they are effective tools
to support a strategy of rationalization of supplier sources.

**Procurement in the humanitarian context**

Humanitarian organizations operate in a specific context that affects their supply
chains. These supply chains incorporate flows of materials and information that
sometimes span the world as they must be suited not only for supporting development
in the long term in certain countries to help achieve the millennium goals (United Nations, 2014) but also be flexible enough to react to disasters. These disasters can have different characteristics with some disasters being man-made, others being natural, with either fast or slow onsets (Kovács & Spens, 2009; van Wassenhove, 2006). These different types of disasters make planning very difficult as location, timing and intensity of disasters are unknown until they occur (Balcik, et al., 2010). Additionally to these disasters and development activities, humanitarian organizations might be called upon to respond in the context of wars or conflicts. Security will then become an important factor in humanitarian supply chain activities (Hilhorst & Schmiemann, 2002).

**Procurement and humanitarian coordination**

Procurement in the humanitarian context is a subject which has been developed in the recent literature with articles focusing on mostly quantitative models. These models can be stochastic, mixed-integer or holistic and usually focus on ways to improve competitive bidding and auctions for humanitarian organizations (Ertem, et al., 2010; Falasca & Zobel, 2011; Trestrail, et al., 2009; Bagchi, et al., 2011). Another focus of research in humanitarian procurement is the implications of procurement practices on ethical practices in line with their organizational goals (Walker & Harland, 2008; Wild & Zhou, 2011). Procurement activities are also discussed when discussing overall humanitarian activities. Blecken makes a distinction between the tasks related to strategic, tactical and operational procurement activities (Blecken, 2010). Framework agreement negotiations and supply strategies which might incorporate consolidation of materials through supplier rationalization or centralization of activities would be done at the level of strategic procurement. The two drivers of material consolidation in procurement for humanitarian organizations might be coordination and cooperation between purchasers. However, there are some issues that might prevent cooperation such as competition for funding or the different mandates of the organizations (Pazirandeh & Herlin, 2014). Even though this cooperation is not always fruitful, organizations are usually non-profit and should have an interest in cooperating to maximize their impact on beneficiaries. There are two agencies that try to address coordination issues in this field: the Inter-Agency Standing Committee (Inter-Agency Standing Committee, 2013) and the United Nations Office for the Coordination of Humanitarian Affairs (OCHA, 2014).

There are also instances of group purchasing which can be organized through warehouses and distribution centers which manage the procurement activities of other organizations. Indeed the UN humanitarian resource depots, IFRC (International Federation of Red Cross and Red Crescent Societies), regional logistics unit and ECHO (European Community Humanitarian Office) humanitarian procurement centers initiative offer such services for emergency response. This offers the potential to save on cost and improve quality of supplies (Schulz & Blecken, 2010). Other consolidation of procurement projects are also undertaken by funding organization such as the Global Fund to Fight AIDS, Tuberculosis and Malaria, The Clinton Foundation and Global Alliance for Vaccines and Immunization.

**Procurement and disaster response**

Humanitarian response to disasters is usually split in three different phases described as preparedness, response and recovery (Beamon, 2004; Bedini, et al., 2009; Jahre &
Heigh, 2008; Schulz & Heigh, 2009; Thomas, 2002). The first phase of preparedness is usually the phase where supplies that will be deployed in the second phase are prepared in advance with suppliers identified, goods purchased, transported and pre-positioned in warehouses (Balcik, et al., 2010). These activities are crucial in determining the outcome of the response phase (Tatham, et al., 2012; Jahre & Heigh, 2008) however lack of funds sometimes can hinder this phase of disaster response (Balcik, et al., 2010; Schulz & Blecken, 2010). Nevertheless, the preparedness phase is well suited for consolidation of material as organisations plan their procurement activities for pre-positioning goods.

The second phase comes into play when disaster strikes and goods are delivered to the victims; this phase can be affected by infrastructure disruption, lack of resources and timeliness of deliveries (Day, et al., 2012; Safran, 2003; Balcik & Beamon, 2008). The emphasis on the speed of intervention might lead actors responding to the disaster to consider distributing money to people in need instead of goods (Farrington & Slater, 2006). Sometimes framework agreements and contracts are put in place in advance to help cope with the new demand (Balcik & Beamon, 2008; Schulz & Blecken, 2010). The unpredictable nature of disasters and the reliance on external assistance often precludes humanitarian organizations from having long term relations with their suppliers for their procurement (Balcik, et al., 2010). Procurement activities in response to disasters depend mostly on the assessment process of needs done when disaster strikes (Blecken, 2010) and respond as best as possible to the many unpredictable factors that might shape the demand in disasters (Kovács & Spens, 2007). Disaster phases in general, but response in particular, are also complicated by the number of actors (Kovács & Spens, 2007) that can be involed with the mission or objectives that vary from phase to phase making their coordination (Balcik, et al., 2010; Schulz & Blecken, 2010) difficult especially in the response to major disasters.

The third phase, reconstruction, is better suited for long-term procurement activities because of the known needs and resources available from development aid and humanitarian organizations (McEntire & Myers, 2004; Regnier, et al., 2008). The process thus shifts from a push supply chain in the response phase to a pull supply chain in reconstruction making procurement activities easier. This relative ease of procurement can also be found in the context of development activities: with the reduced emphasis on time, the implementation of procurement strategies that facilitate material consolidation becomes an option.

Research Method

The overall research approach for this study is a case study. Case studies are a research technique that is applicable to a multitude of disciplines and can be used in many different research activities ranging from economics to sociology (Yin, 2003). Supply chain management is an area of management research that is suitable for case studies and multiple case studies have added to the literature of this topic (Seuring, 2008). For specific research in logistics, case studies can use either quantitative or qualitative data (Spens & Kovács, 2006); this shows the flexibility and variability of case studies to study contemporary problems in depth (Seuring, 2008; Yin, 2003; Stuart, et al., 2002). The research approach in this study is an exploratory single case study (Yin, 2003; Seuring, 2008). The description and understanding of the phenomenon determined the content of the literature review which helps identify the means by which material consolidation is undertaken in the context of businesses and public organizations.
Case study as a research method is often put forward as an interpretive approach in contrast with a more standard rationalist approach (Meredith, 1998). Case studies offer the possibility to explore for theory development, theory building, theory testing and theory extension or refinement (Voss, et al., 2002). A different categorization presents the role of case study as being one of theory generation, theory testing and theory elaboration (Ketokivi & Choi, 2014). In the context of this exploratory case study the approach of theory elaboration is taken where the case study “(...) focuses on the contextualized logic of a general theory.” (Ketokivi & Choi, 2014, p. 236). For this specific case study the general concept of dynamic capabilities, with its resources and organizational processes that support the core competencies of organizations to deliver performing products and services offers a frame to understand the way the organization studied manages its materials (Teece, et al., 1997). Dynamic capabilities arise from resources and competencies and allow organizations to adapt to their environment. In the context of humanitarian logistics and the unpredictability of disasters to which organizations need to respond on top of their development activities, dynamic capabilities offer an interesting theory to elaborate on.

The data collection for this case study took place during a three week research visit from the 4th of November to the 22nd of November 2013 at UNICEF Supply Division Headquarters in Copenhagen. UNICEF operates a variety of programs that cover young child survival and development, basic education and gender equality, child protection, policy advocacy and HIV/AIDS (UNICEF, 2013). These programs operate in the context of development, disasters and conflicts; UNICEF also has the role of leader for the water, sanitation and hygiene cluster (UNICEF, 2013). In 2013, total expenditures at UNICEF were $4.22 billion with $3.78 billion going to development activities and programmes (UNICEF, 2014). To support these projects UNICEF must provide it’s implementing partners with a wide variety of materials by procuring them from suppliers. UNICEF Supply Division procured products and service worth upwards of $2.84 billion in 2013 (UNICEF Supply Division, 2014). UNICEF also offers procurement services to more than 100 countries and procures over $1.36 billion through these services (UNICEF Supply Division, 2014).

When carrying out a case study, supply chains which usually comprise multiple activities that link different organizations are difficult to define (Seuring, 2005). The definitions of supply chain can be more or less comprehensive but it is usually understood as a transfer of information and material between different actors (Mentzer, et al., 2001) and sometimes these flows also include money. In this study, the supply chain comprises one purchaser, UNICEF and its suppliers while data reflect the internal point of view of the employees that manage these flows at the headquarters although some of them regularly do field visits. The data sources for this research take into account the activities to manage procurement and supplier relations as well as some of the activities done for the procurement services. For these general procurement activities, the unit of analysis of the case study helps set the context of the supply chain and determines the limits of the case (Koulikoff-Souviron & Harrison, 2005; Bak, 2005). A single case study is used with one unit of observation centered on specific material groups: education, medicine and water sanitation and hygiene (WASH). These different materials cover a broad range of potential responses in both disasters and development contexts and exhibit differences in the procurement requirements. The procurement activities for these materials are managed by teams of technical specialists in specific field and designated contract managers.

The main approach for data gathering was interviews using broad open-ended questions with each interview snowballing from an interviewee to another until the
data started repeating itself and interviewees referred for certain topics to previous interviewees until data was saturated. In addition to the interviews, publicly available external and internal material of the organization on procurement was retrieved to help in the comparison of differing information from multiple sources. The interviews dealt with the types of commodities for which the procurement activities were done (table 1) as well as an overview of the procurement activities and the specific procurement services activities. The interviews were transcribed and provided to the interviewees for them to review and revise if needed. Certain interviewee requested not to be recorded but interview notes were taken, written up and sent in for review by the interviewees. It should also be noted that the Haiyan (named Yolanda in the Philippines) typhoon on November 8, 2013 became an important priority for the organization and disturbed some of the data gathering; however it allowed for an interesting talking point for procurement activities during emergencies.

Table 1: List of Interviews, UNICEF supply headquarters, November 2013

<table>
<thead>
<tr>
<th>Material area</th>
<th>Title</th>
<th>Procurement related activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>All materials: Interviewee A, B C, D and E</td>
<td>Planning Specialist</td>
<td>Demand planning and determining reorder points</td>
</tr>
<tr>
<td></td>
<td>Warehouse Assistant – Supervisor</td>
<td>Internal procurement client for replenishment</td>
</tr>
<tr>
<td></td>
<td>Country Focal Point</td>
<td>Internal procurement client for shipping</td>
</tr>
<tr>
<td></td>
<td>Knowledge Management Specialist</td>
<td>Management of coordination of procurement services with local government</td>
</tr>
<tr>
<td></td>
<td>Procurement Services Specialist</td>
<td>Management of procurement service requests at headquarters</td>
</tr>
<tr>
<td>Medical supplies and equipment: Interviewee F, G, H and I</td>
<td>Emergency Coordinator</td>
<td>Internal procurement client for emergency responses</td>
</tr>
<tr>
<td></td>
<td>Technical Officer, Health Technology Centre</td>
<td>Evaluation of suppliers and management of materials standards</td>
</tr>
<tr>
<td></td>
<td>Technical Specialist, Essential Medicines</td>
<td>Evaluation of suppliers and management of materials standards</td>
</tr>
<tr>
<td></td>
<td>Contracts Officer, Medicines &amp; Nutrition Center</td>
<td>Evaluation of suppliers and management of supplier performance</td>
</tr>
<tr>
<td>Education: Interviewee J and K</td>
<td>Contracts manager, Contracting center</td>
<td>Evaluation of suppliers and management of supplier performance</td>
</tr>
</tbody>
</table>
Technical Specialist, Education, Water Sanitation and Education Center

Evaluation of suppliers and management of materials standards

Water and sanitation: Interviewee L and M

Contracts Manager, Water, Sanitation and Education Centre

Evaluation of suppliers and management of supplier performance

Technical specialist, Water, Sanitation and Education Centre

Evaluation of suppliers and management of materials standards

The data were evaluated with template analysis. Template analysis is a method that allows organizing important amount of qualitative data and can be used for a wide range of studies (Waring & Wainwright, 2008). It was put forward by King and Crabtree and Miller (Crabtree & Miller, 1999; King, 1998); this study follows King’s approach in which pre-defined codes as well as some codes that came from the exploration of the data were used to help understand the relationships in the data. The pre-defined codes were centered on the type of material group or product as well as the context of humanitarian activities involved (preparedness, response, and development/reconstruction) while the open coding categories centered on competences, resources, problems and performance. The pre-defined categories were used in a hierarchical manner while open coding was done in parallel. These different coding approaches create a better understanding of the organization of the data and help build a structured account in the findings (King, 2004). This case study uses different sources of information: internal and external documents and recorded interviews. The interviewees were sent the transcripts for review and made any amendments when required. The case study work was reviewed by key informants and staff in the organization supervising the research project as well as management. Furthermore, template analysis allows cross checking of the data, easy management through a database and an extensive coding which was reviewed multiple times to ensure consistency across the coding.

Findings

One way the organization consolidates its procurement is through supplier relationship programs that are defined by its specific legal and material requirements. The organization needs to cope with a lot of uncertainty relating to its regular field of activity of development and disasters response. Suppliers are managed through long term agreements (LTA) for a standard item; they will usually last 3 years and are done for 2 or 3 suppliers for a specific item. This approach allows a reduction in the number of suppliers. In this time frame, the LTA has fixed prices and fixed terms which focus on a minimum order quantity from the supplier. The LTA approach is used for standard materials at the global level administered by the Supply Division headquarters. In each country LTAs will also be used and managed locally. The LTAs are also negotiated on the volume of estimated purchases which allows the organization to obtain some reduction of cost as it aggregates the demand for materials from around 100 different countries. LTAs for globally procured standard materials are done with the idea of procuring standard items in large quantities to be consolidated into warehouses of the organization to be then redistributed in smaller sizes through kits or
normal shipments. Apart from LTAs, goods can sometimes be procured as a one-time procurement through purchase orders. This is often the case for requests that require non-standard materials for which no LTA’s are in place.

The long term arrangements are generally a three year agreement with a supplier or suppliers, generally we have more than one, for each item to supply those items at a specific price under specific terms and conditions. So instead of us going out for retender each and every time we have to buy something we have an LTA.

-UNICEF respondent J

[...] pharmaceutical, of course we have big requirements, but a lot of the time a country may only want say 100 packs of paracetamol which is also part of the reason why we have to have a warehouse because you could never go to a manufacturer and say I want to order 100 packs of paracetamol, [...] the orders are in thousands of thousands which then reach the warehouse and then from there we can dispatch those smaller quantities.

-UNICEF respondent I

The LTA does not make procurement by the organization mandatory but instead serves as a commitment to work with two to three different suppliers to ensure availability of the stock and performance. Transparency and cost in public procurement requirements entails tender cycle and bidding rounds to ensure the lowest costs from the suppliers. LTAs are developed in a way to act as a tradeoff between the need for lengthy bidding and tender processes in public procurement activities and the need for timeliness from the humanitarian context. With the LTAs, the entire public tendering process is not required for each purchase made from the supplier which saves time and the number of suppliers to work with is low; this allows consolidating the volume of material to lower the price, reduce the number of interactions and thus reduce transactions costs and put more pressure on the supplier for timeliness while following public procurement procedure and ensuring transparency. Past performance in regards to timeliness can also be an issue and poorly performing suppliers may be excluded from the next invitation to bid. Another approach to manage timelines is done through the negotiation of minimum order quantity which focuses on order size adequate for the planned needs and which can also help manage items with constraining shelf life. The LTAs allow a possible change of supplier partnerships over time as the markets and needs of the organization evolve. Another important issue for procurement is the quality of the material which must meet high levels of standards. Quality is ensured before the establishment of the LTA. Suppliers must first have a product that meets technical quality standards and then they are evaluated on their cost. In the case of medicines, the supplier must first be qualified by the World Health Organization (WHO) for the specific dosage and delivery form of the medicine. In the case of other types of goods, samples are sent and tested for both the product and the packaging by technical specialists according to the required specifications.

The benefit is that you streamline the procurement, if we didn’t have the LTAs then every time we had some request in order to go buy our rules and regulations because we are dealing with public procurement, we have to always document how we spend the donors money, once you have done your tender clauses and you have an LTA in place then you can feed as many orders into that LTA that you want and you will know that due process has been followed.

-UNICEF respondent I
[...] when we are looking at who to establish an LTA with. First everything has to go through technical and quality control or evaluation first. [...] once it reaches us we do look at price, price of course has a big say in who we will contract with but we also look at delivery times and minimum order quantities and things like that. That suits our needs and then we started looking more and more at the past delivery performance[...].

-UNICEF respondent I

To define the appropriate LTAs for its needs, the organization relies on two major resources: internal knowledge and partnerships with other organizations (figure 2). There are four types of knowledge: technical knowledge of the goods and materials, market knowledge of the available suppliers, knowledge of the public procurement process and knowledge of the requirements from the field. The different resources of the organization create organizational routines and competences to develop and manage LTA’s that are relevant and which offer benefits for cost, quality, timeliness and transparency. To obtain more information from the field, the organization carries out monitoring and evaluation research and discusses the use of the goods and materials with their partners. The organization’s presence through offices in each country where it operates creates local knowledge and offers better understanding of the context and of the process with their partners allowing knowledgeable staff to manage information transfers between parties. From these partnerships and internal organizational knowledge, it is possible to create the appropriate standards for the goods to be procured through an LTA. Partners are also involved in exchanging global market knowledge with the organization. For example, in the case of medical goods and supplies, suppliers must first be approved by the WHO before they can even apply to be considered for an LTA. This creates a combination of technical knowledge required to define the items in the LTA and partnerships in between organization. This knowledge and partnerships help monitor the impact in the field and help in understanding the material and supplier market. Moreover, these two resources improve the organization’s competencies when establishing LTAs that are relevant for their partners through procurement services and standard programme activities (figure 2).

M&E [Monitoring and Evaluation] mission for health and education kits. So the protocol that they go with to see the teachers and the end users and we have these so called points discussion and interview questions and then eventually what is going to happen they are going to hold a workshop here [...] to see what changes need to be done.

-UNICEF respondent J

I would definitively ask my colleagues in the field if they could give me some feedback if they have any sort of clinical backgrounds to look at both quantification and selection of drugs.

-UNICEF respondent H

You should see the WHO as a normative guidance provider, they are the ones who guide us in many ways [...] WHO has an essential medicine list which is updated every second year and it contains drugs to give the best possible cost benefits and treatment profiles of drugs.

-UNICEF respondent H
The data from this case study also show that there are some differences in procurement according to disaster response phases and development activities. Indeed, the organization works both in development and emergencies with emergencies accounting for $127 million in procurement value out of $2.84 billion (UNICEF Supply Division, 2014). These activities are reflected in the procurement strategy that focuses on high quality, low cost and timeliness from their suppliers. In the context of an emergency, the organization is mandated to react in 72 hours. To achieve these delays for events with an unknown demand, it pre-positions and keeps in safety stock at various central warehouses, pre-defined levels of emergency goods and assembles premade kits. The kits are designed and assembled by staff with practical, technical and market knowledge as well as stored in a highly automated centralized warehouse. These activities are done in advance to respond to specific needs and are composed of standard items that are procured as part of regular procurement activities by the organization. As the organization is head of the WASH cluster, it needs to be able to support WASH needs in emergencies and has included this in its LTAs which include safety stock at the supplier as well as the procurement of ready-made hygiene kits. The kits help ensure timeliness for emergencies to help alleviate medical, educational and WASH disruptions. In certain emergencies, the local market might still be able to respond which might decrease the need for education and WASH kits or eliminate it entirely. Standard kits are sometimes directly procured but the procurement process follows the same process of tenders and LTAs since the material in kits is often the same as stand-alone standard materials. The impact of disasters is thus seen in the
disaster preparedness phase through additional procurement for safety stocks which can cover the requirement of timeliness in response. The LTAs are also helpful in an emergency context to replenish stocks of materials as the tender process is already done.

It is especially beneficial when you have emergencies then you can act quickly, you don’t have to go and do the whole tender process you can immediately place orders with your supplier.

-UNICEF respondent I

Suppliers that are in different geographical locations, so you are closer to the destination, helps you in respond faster [in emergencies, the knowledge of...] what challenge usually you have, usually helps you in creating contingency plans, and contingency stocks that are pre-positioned in different geographical locations to help respond faster.

-UNICEF respondent M

we meet the emergency by having the items in stock for instance now in the Philippines they [...] came with a request for some of our items [...] so by having these long term arrangements in place which enable us to fill our stock all the time [...] we aim at meeting those emergencies. But essentially the strategy is that we have our emergency items covered by an LTA which again ensures that we can have recurrent stock replenishment and have the stocks readily available when an emergency hits for at least the first wave of sending goods out.

-UNICEF respondent I

Another interesting finding from the data was that the organization partakes in a strategy of group purchasing and gains additional leverage from suppliers by consolidating the needs of multiple partners. The organization consolidates procurement with group purchasing activities through two means. First, through procurement services which are open to government, NGOs and other UN agencies; in this case the partners will arrange their own funding source. And second, through its internal programme activities where the organization finds funding and distributes material across multiple partners. In the case of procurement services, the organization actively organizes procurement for its partners worth $1.36 billion in 2014 (UNICEF Supply Division, 2014); the main type of material procured is vaccines which represents 75% of the total value and for which the consolidation activities and the preeminent role of UNICEF in that market is well documented. Indeed, articles mostly from medical journals looking at development issues identify the role of the organization which vaccinates around 40 to 50% of the children around the world as a shaper of the vaccine market through the use of a security premium on prices to guarantee continuous availability (Batson, 1998; Hardon & Blume, 2005; Srinivas, 2006; Huff-Rousselle, 2012). The knowledge and partnership which help define relevant LTAs attract other organizations or governments that seek these competences but don’t necessarily have them.

It’s [an order] not necessarily coming from UNICEF, it could be coming from a partner so it could be coming from a ministry of health, for example, in that country [...] Procurement Services [...] allows other organizations to use UNICEF as a procurement entity. So in that sense anyone can buy through us really, any Ministry of Health any other UN agency and they frequently do.

-UNICEF respondent A

[...] for education [...] Procurement Services it’s not really done [...] you are talking pens and paper and most government are actually capable of doing that.

-UNICEF Respondent J
In the case of internal programme activities, the partners, unless requesting non-standard materials, will receive goods procured through the LTAs and which are usually standard for the whole organization. The organization acts as a consolidator of the demand for its implementing partners and regroups the demand of multiple organizations across approximately 100 countries. By managing this demand in a centralized manner, the organization achieves its goals through the support of partners that work with beneficiaries but also derives multiple performance benefits by aggregating the demand of partners through LTAs. These benefits are then passed on to the beneficiaries through the work of their partners. Implementing partners benefit from the organization's centralized procurement (figure 2). UNICEF also gains the benefit of working with their partners and develops a knowledge base inside countries which helps the organization acquire knowledge and create LTAs which are the most relevant for its partners.

D. Pursuant to a Basic Cooperation Agreement dated DATE OF THE BCA (the “Basic Cooperation Agreement”) and the Country Programme Action Plans under that Agreement UNICEF and the GOVERNMENT work together to develop and facilitate the implementation of programmes designed to assist the children and women of NAME OF THE COUNTRY, and those programmes are realized within the context of the Country Programme for NAME OF THE COUNTRY developed by UNICEF in collaboration with the GOVERNMENT and approved by the UNICEF Executive Board.

- UNICEF Memorandum of Understanding

The presence on the ground helps to create country knowledge, logistics knowledge, quality management and transparency of the process. Country Offices have an ongoing direct working relationships with the partner governments as well as with other partners in the programme countries.

-UNICEF Respondent E

Discussion

This study addresses a unique case in the context of intergovernmental organizations and NGOs that operate in development or disaster response activities. The findings have both implications for theory elaboration in relations to dynamic capabilities as well as in relation to the phenomenon of purchasing consolidation in global humanitarian chains. Dynamic capabilities have been developed with the idea of competition and rent seeking as the underlying goals of organizations (Teece, et al., 1997). However, non-profit organizations still need to build their competencies to achieve their social goals. This study demonstrates that the broad concepts of dynamic capability can offer a certain theoretical support in humanitarian logistics where theory is scarce. This study also points to the role of competency sharing and alignment in between non-profit organizations with similar social goals when interacting inside a supply chain. Indeed, supply chain actors would theoretically align the competencies to extract the highest amount of value. However, for non-profit organizations no rent seeking activities is done when exchanging materials; this allows some organizations in an upstream position to develop capacities that respond to the goals of every actors that follows them. As the scope and goals of the upstream organizations widen, it will need to reconfigure its competences according to these goals and how they change over time thus requiring dynamic capabilities. The upstream organization that manages procurement activities will thus need to manage its for profit supplier in a way that supports its own goals and the other organizations it partners with. When it comes to downstream organizations that directly address the needs of populations that receive materials, they can align with an organization upstream with shared goals and benefit
from that organization’s competencies and at the same time influence the requirements for dynamic capabilities through the elaboration of specific needs. Thus in the context of intergovernmental organizations and NGOs linked by a not for profit supply chains, competencies and dynamic capabilities can be shared and align themselves on similar goals.

When it comes to the specific phenomenon of purchasing consolidation this study offers some additional insights to research on purchasing groups. Indeed, the study presents a unique case in which an organization acts as a group purchaser for many other organizations either attracting other organizations through its competence in global procurement and the performance it brings or by supporting partners through local offices. This differs from other purchasing group activities where organizations come together to create a new entity. In this case, the organization already existed and its procurement competence allows it to align its group purchasing services with its organizational goal (Figure 3).

Figure 3: Procurement group activities and material consolidation

Source: Author

The ability to choose its support partners or simply attract organizations that have similar goals points to a different approach than normally discussed in the literature where multiple organizations come together. This different configuration of purchasing
group activities is supported by specific competences and underlying resources that offer to partners the opportunity to obtain performance levels they might not be able to obtain through their own purchasing activities. This study also contributes by adding more depth on the research related to the practice of purchasing consolidation through supplier relationship programs. Indeed, the study highlights the underlying tradeoff between flexibility and accountability when dealing with suppliers relationships. Through the different resources and competencies an organization can attenuate this tradeoff through relevant partnerships activities and knowledge which support decisions to create the right supplier purchasing relationships.

Conclusion

The topic of material consolidation which is well developed in business literature is not well developed in the context of humanitarian logistics. This study explored the role of procurement consolidation in the context of intergovernmental humanitarian organizations through a case study at the supply headquarters of a large organization that works in this field. The aim of the study was to understand and explore through which process and activities do intergovernmental humanitarian organizations consolidate their procurement needs. Although based on a single case, its unique nature offers insights that are relevant to further develop an understanding of procurement consolidation. Through theory elaboration, the study shows that dynamic capabilities are a relevant frame of reference even in a non-profit setting. The study also demonstrates that competencies can be shared and aligned on common goals in between different members of a non-profit supply chain through consolidation procurement activities. This however leaves the question of how organizations that depend on the dynamic capabilities and competencies of another can build its own capacity to achieve their goals, thus skipping a step in the supply chain and improving performance further. The findings in relation to dynamic capabilities enhance the understanding of the role of competencies for procurement and leads to two propositions to evaluate in further research:

Proposition 1: Consolidation procurement competencies can be shared by multiple organizations through links in their supply chains in order to improve all non-profit actors’ performance.

Proposition 2: Consolidation procurement competencies require an increase in knowledge and relationships to improve dynamic capabilities as organizational goals widen.

When it comes to the phenomenon of procurement consolidation it is important for intergovernmental humanitarian organizations that deliver directly to partners to offer procurement competencies and performance for both partners that receive the goods and funders that require transparency and cost efficiency. The study shows that supplier relationship programs allow balancing the requirements of public procurement while offering some flexibility in the sourcing of their standard material. The study also highlighted the role of the knowledge base used in the centralized procurement activities and the importance of interactions with in-country activities to access the knowledge developed at this level. These procurement activities offer the organization strategic competence to achieve its objectives and act as a broker to consolidate the procurement needs of multiple partners which share similar goal. These findings related to procurement consolidation by intergovernmental humanitarian organizations lead to two other proposition to evaluate at later research.
Proposition 3: Intergovernmental humanitarian organizations can manage procurement consolidation and develop it in order to attract and support partners that adhere to its goals.

Proposition 4: Supplier relationship programs in intergovernmental humanitarian organization require in-depth knowledge and partnerships to mitigate the tradeoffs between flexibility and accountability.

The findings suggest an interesting approach for other intergovernmental humanitarian organizations which might seek to create flexible procurement arrangements while respecting the requirements of public procurement. Procurement consolidation through coordinated supply chain activities such as procurement services is also a subject of interest for different organizations and this study offers an insight of the resources required to be grouped together to give the organization the competence to manage international consolidation of a variety of goods through public procurement. This competence can then support the capability of the organization to demonstrate to donors the efficient and effective use of goods.

This study is limited by the scope of the data which has been focused on the activities at the supply headquarters of the organization. As the organization manages most of its global procurement activities there, this gave the author very good access to key staff members but further research is required with respect to local procurement activities to evaluate the extent of procurement activities inside a country. This study is also narrow in its scope as it relies on a single organization; however the unit of analysis with its different materials offers different point of views from different data sources to build a portrait of procurement of materials with different sources and considerations. This study can help managers or organizations in assessing if they have the required internal knowledge and external partners to obtain procurement leverage when procuring globally for multiple partners. In a sense it can offer an overview or a checklist for what is required in terms of resources to develop international procurement capabilities in a humanitarian context.

Acknowledgements

The author would like to acknowledge the Finnish Cultural Foundation and the Resilience in Disaster Relief and Development Supply Chains – Managing Challenges of Climate Change, Urbanization and Security project for their financial support in this research.

REFERENCES


Huff-Rousselle, M., 2012. The logical underpinnings and benefits of pooled pharmaceutical procurement: A pragmatic role for our public institutions?. Social Science & Medicine, 75(9), pp. 1572-1580.


The aim of this research is to understand and explore how consolidation occurs through the use of kits in humanitarian supply chains. The method used is a multiple case study using information on four different kits and general kitting activities that are managed by UNICEF. Kits offer the possibility to combine both the knowledge and skills from technical specialists and local country office staff to consolidate needs either in a standard way or in a customized manner. Warehousing activities help transform the incoming material into kits in a way to properly ensure supply flows through kits. This study offers insights in the management of kits which can be useful to NGOs looking to understand the resources required to manage kiting activities in an effective manner. It also helps expand the literature in humanitarian logistics by examining a practice that is not well documented but is used regularly in supply chains of multiple organizations for procurement, warehouses or in the field in a variety of situations with a variety of supplies.
INTRODUCTION

With the continuous growth in world population, increasing disruptions due to climate change and resurgence in conflicts around the world, global humanitarian organizations are hard pressed to improve both their development activities and disaster response. Such operations require the ability by humanitarian organizations to react to a wide range of situation and this is reflected in their supply chains. In supply chains, consolidation is often used to improve efficiency; it is understood as the act of regrouping activities, entities or items together to obtain some form of benefit linked to economies of scale. One consolidation method that is used throughout the supply chain to improve efficiency is kitting. In the context of manufacturing, this approach is used to aggregate components to feed an assembly process (Brynzer & Johansson, 1995; Günther, et al., 1996; Ramachandran & Delen, 2005). However, in humanitarian supply chains, kits are delivered directly to be used or consumed either by individuals, family units or by responders directly in the field (Chandes & Paché, 2010; Kovacs & Spens, 2007; Redmond, 2005).

Current literature on kits focuses mainly on kits in the context of manufacturing for feeding assembly lines while humanitarian logistics literature does not examine the use of kits in depth. The aim of this research is to understand and explore how consolidation occurs through the use of kits in humanitarian supply chains. The research question is as follows: what are the required resources to organize kits and what do they offer to humanitarian organizations? The research is based on a case study with analysis of four specific types of kits: the inter-agency health kit (IEHK), the school-in-a-box kit, the hygiene kit and a health kit customized to serve country programmes. The data comes from interviews with respondents from the UNICEF Supply Division headquarters as well as internal and external documents and questionnaires. The paper is divided into four sections: literature review; research method; discussion and conclusion.

Literature review

Kits and consolidation activities

There is a fair amount of literature addressing kits in the context of assembly lines especially when considering the differences between kitting and line stocking. Bozer and McGinnis define kits in this context as “a specific collection of components and/or subassemblies that together (i.e., in the same container) support one or more assembly operations for a given product or “shop order.”” (Bozer & McGinnis, 1992). Following this seminal paper, some of the articles dedicated to kitting have focused on the operational activities related to assembly examining quantitative studies and models to optimize kitting activities (Chen & Wilhelm, 1993; Günther, et al., 1996; Ramachandran & Delen, 2005). Another strand of literature focuses on qualitative aspects of kitting through case studies and conceptual frameworks (Bozer & McGinnis, 1992; Brynzer & Johansson, 1995; Ding & Puvitharan, 1990). When kitting is compared to line stocking, there are few guidelines on optimizing their use and content for organizations (Brynzer & Johansson, 1995; Hua & Johnson, 2010). Some of the main considerations to obtain improvements in kitting are: the role of shop configuration, the role of workstations and the impact of kit plans in which different kit designs might have tradeoffs between them (Bozer & McGinnis, 1992). In the process of kitting to feed assembly lines, it is important to prepare the kits at a pre-assembly line point. This step in effect acts as a
consolidation point for material to be regrouped and assembled in a specific set of items with a specific purpose before being brought to the line or being stored. These activities of preparation will be required regardless if the kit is being fed to an assembly line or if the kit is sent out to be consumed by another organization or individual later in the supply chain.

The kitting preparation is a step in the supply chain where multiple items are assembled together and thus acts as a consolidation point. The shift of kit assembly to different points in the supply chain can be facilitated by third-party logistics provider who offer specialized kitting services (Bagchi & Virum, 1996; Gripsrud, et al., 2006; Mortensen & Lemoine, 2008). These services would usually be offered in specialized distribution centers operated by these providers which, through standardization and visibility of processes, reduce transactions cost through consolidation (Zacharia, et al., 2011). Moreover, suppliers can manufacture the kits instead of single components or send the pieces for kits to sub assemblers that will put them together for the user of the kits (Bernstein & DeCroix, 2004; Doran, 2006; Nagarajan & Sosic, 2009). Kitting at different point of the supply chain influences how kits are transported and warehoused and may lead to different options of consolidation that in turn lead to economies of scale and costs reductions (Aertsen, 1993; Higginson, 1995; McGinnis, 1992). However, these benefits are traded-off against the timeliness of deliveries and service level (Bagchi & Nag, 1991; McGinnis, 1992; Mohammed Zain, 1990) as consolidation necessarily implies the retention of items or kits until enough time has passed or enough material has accrued.

During the preparation of the kit, items are consolidated together based on the downstream needs after the point of kitting; kit preparation usually includes time allocated for picking and assembling each kit (Brynzer & Johansson, 1995). Some of these activities for preparing the kits regroup non-value adding activities and concentrate them at one specific step; these include the manual handling as well as the picking of items of the kit (Hanson & Medbo, 2012; Kilic & Durmusoglu, 2012). In the case where kits are prepared and used at another location, this would also require an additional step for transportation which does not add any value (Hanson, et al., 2012). However, the value of kits comes out in the subsequent step when the kit is being used. Indeed, kits allow for more efficient space usage and material handling (Bozer & McGinnis, 1992; Caputo & Pelagagge, 2011; Hua & Johnson, 2010; Kilic & Durmusoglu, 2012) than other assembly methods. They improve quality for the final user by allowing for quality control during the kitting preparation process (Brynzer & Johansson, 1995; Caputo & Pelagagge, 2011; Kilic & Durmusoglu, 2012), permit a reduction of the time spent fetching and picking parts when using the kit (Hanson & Medbo, 2012; Kilic & Durmusoglu, 2012) and increase flexibility through the mix of items presented at the next step in the supply chain (Caputo & Pelagagge, 2011; Hua & Johnson, 2010). These are the main advantages that are derived from kitting that also interest other organizations that do not operate an assembly line but would want to gain some of those performance benefits in their supply chain by distributing kitted items. It is important to note that kits also have some downsides; the main one is kit preparation which is labor intensive, requires space, time and extra management and planning (Bozer & McGinnis, 1992; Caputo & Pelagagge, 2011). Apart from these problems related to the preparation of the kit, other issues might arise related to the quality of the materials linked to the kits. Indeed kit pieces that are defective can create part shortages on the assembly line and force the cannibalization of kits and stock outs (Bozer & McGinnis, 1992). Defective materials might also lead to incomplete kits being stored as work in progress increasing inventory space required, increasing lead times and risking sending incomplete kits (Caputo & Pelagagge, 2011).
Kits in the humanitarian context:

In every disaster, there are different phases which are usually classified as preparedness, response and recovery (Beamon, 2004; Bedini, et al., 2009; Jahre & Heigh, 2008; Schulz & Heigh, 2009; Thomas, 2002). The first phase is centered on planning for emergencies and can have an impact on the second phase (Jahre & Heigh, 2008; Tatham, et al., 2012). In the case of preparedness, the time to prepare for disasters allows to consolidate relevant materials for different types of needs into kits, concentrating non-value adding activities (the need for extra space, time and management for the kitting assembly) and quality assurance as part of pre-positioning and planning of materials. These activities allow humanitarian organizations to focus on rapid delivery as all picking and fetching of materials required to respond to a specific type of need has been already done in advance and thought out thoroughly.

The second phase of the reaction to a disaster is the response that occurs when goods are delivered to the people in need: at this stage, the supply chain can be disrupted through infrastructure problems (Day, et al., 2012; Safran, 2003), as well as through other challenges such as an unpredictable demand or a very large and sudden demand, an urgency for deliveries and a general lack of resources (Balcik & Beamon, 2008). In the response phase, kits can also increase reliability of the aid delivered by being created or modified for particular needs (Charles, et al., 2010), improving standardization (Maon, et al., 2009) and being sent out rapidly during the first phase of the response (Kovacs & Spens, 2007). The response might focus on different needs and thus there exists a multitude of kits: medical, educational, water and sanitation, household, winterization and others. Kits offer benefits in supply chains for humanitarian organization since they match the flexibility required for establishing distribution of the appropriate goods rapidly in a sometimes turbulent environment (Scholten, et al., 2010). The third phase of reconstruction after the disasters aims to bring back the situation as it was previously and involves development aid and agencies (McEntire & Myers, 2004; Regnier, et al., 2008). In this situation kits might be used but not for the purpose of fast response.

During an investigation of procurement practices in humanitarian logistics, Berger identified ten major humanitarian organizations in the field of disaster response which distribute kits (Berger, 2013). Some articles which present the preparation of kits mention their importance for supply chain reactivity to events (Chandes & Paché, 2010); the use of kits also enables the postponement of inventory allocations to specific countries (Scholten, et al., 2010). Kitting is also identified as part of tasks undertaken in strategic procurement and warehousing operations (Blecken, 2010). In military deployment, kits also play an important role and must be prepared and stored in advance to ensure readiness and responsiveness of troops; these kits are wide ranging and can include hazardous material response, maintenance of fighter planes or simple test kits (Blazer, 1988; Carter, 2010; Blenek & Charlton, 2011). Kits are also used in the medical context for different purposes such as medical tests or surgeries (Ouma, et al., 2012; Schlanser, 2003; Wilson, et al., 1997).

Research method

The research approach for this study is a case study. Case studies are a relatively common research strategy in the context of social sciences for a wide range of different disciplines from psychology to community planning (Yin, 2003). Case studies differ from traditional rational research because of their interpretive nature (Meredith, 1993).
However, case studies with their in-depth approach can contribute to theory generation, theory testing and theory elaboration (Ketoviki & Choi, 2014). For this case study the approach that is put forward is one of theory elaboration where the contextual logic of a theory is the focus. In this research, dynamic capabilities and its underlying concept with resources, organizational processes, core competencies and product and services (Teece, et al., 1997) are put forward to explore the management activities behind each kit. Dynamic capabilities are relevant to the humanitarian context and kits as they represent a way for organizations to adapt to rapidly changing environments. Organizations that deal with development and disaster response as well as kits often deployed during emergencies have to address similar unpredictable environments. This study is also based on the previous literature put forward in the context of kit management.

The information gathering processes started as an interview process with broad open-ended questions, but as the interviews went from one to the other more specific questions were added in relation to the interviewees’ work activity until saturation of interview data. These interviews took a total of 615 minutes (10 hours 15 minutes) (table 2). Additionally, certain interviews, due to technical problems or at the request of the interviewee, were not recorded thus interview notes were taken, compiled and sent for review. All interviews were based on open-ended semi structured questions in face to face meetings with the exception of one interview that was organized via skype with staff outside of Copenhagen to gain the insight specific to health kits customized to serve country programmes. To supplement the interviews, questionnaires were also sent out to other personnel of the organization not on site as well as a visit with a key informant and observation of kitting facilities and activities. Furthermore, specific case material produced inside the organization and used internally was also retrieved from interviewees. External material published and available online was also retrieved.

There are five different cases in this case study in the form of the specific management of four kits and general kit management activities. This allows for both internal case comparison and cross case comparisons (Koulkoff-Souviron & Harrison, 2005; Seuring, 2005). The different specific kits were the following: Inter-Agency Health Kit (IEHK), School-in-a-box kit, adult hygiene kit and a health kit customized to serve country programmes (specifically health clinic distributions in Zimbabwe). The material gathered was coded to identify the underlying logic behind how kits and consolidation are managed in the humanitarian context at UNICEF. The data was coded and reviewed using a template analysis method. This method put forward by King and Crabtree and Miller (Crabtree & Miller, 1999; King, 1998) can be used in a wide range of qualitative analysis situations (Waring & Wainwright, 2008). In the context of this analysis, there were pre-defined codes which related to identifying to which case it relates with an added category for the context of humanitarian activities involved (preparedness, response, and development/reconstruction). These were developed as first and second level of coding categories, followed by open coding based around management considerations relative to kits such as processes, resources, performance and any other relevant codes. The use of template analysis offers the possibility of hierarchical coding and parallel coding to help interpret the data; this allows to build a structured account of the data (King, 2004).

The data reviewed involves multiple sources of information, with questionnaires, interviews recorded mechanically, internal and external documentation. Additionally to these sources, interview transcripts were sent to be reviewed by the interviewees to make amendments when required. Then the preliminary report for the case study was reviewed by the key contacts inside the organization before review by managers at the
organization. The template analysis was revised multiple times to ensure that the coding was relevant. The template analysis also offers the possibility to cross-check results in between each case and in between cases, organize and document the data as well as develop an abstract representation to summarize information.

Data collection

The organization for which this case study was undertaken is UNICEF; more specifically, the interviews and data gathering took place during a three week research visit from the 4th of November to the 22nd of November 2013 at UNICEF Supply Division Headquarters in Copenhagen. The Haiyan (Yolanda in the Philippines) typhoon, on November 8, 2013, disrupted some of the activities of the research but was also brought up as a talking point when discussing the response phase for disasters. UNICEF is one of many UN agencies and it plays a leading role in humanitarian activities in the area of children’s rights and has a wide variety of different programmes and activities in place that reach out to the most vulnerable children in the context of both development and emergencies. The Supply Division of UNICEF, in 2013, procured supplies and services worth $2.84 billion dollars. These deliveries included a large number and a wide variety of kits (table 1) with 3 620 000 kits packed in 2013 (UNICEF Supply Division, 2014).
Table 1 Kit distribution by UNICEF, 2013

<table>
<thead>
<tr>
<th>Type of supplies</th>
<th>Kits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical supplies and equipment</td>
<td>13.7 million malaria rapid diagnostic test kits</td>
</tr>
<tr>
<td></td>
<td>13.2 million HIV rapid diagnostic test kits</td>
</tr>
<tr>
<td></td>
<td>110,500 health kits in 62 countries</td>
</tr>
<tr>
<td>Water and sanitation</td>
<td>212,000 adult hygiene kits</td>
</tr>
<tr>
<td></td>
<td>41,000 family water and sanitation kits</td>
</tr>
<tr>
<td>Education supplies</td>
<td>24,000 classroom kits</td>
</tr>
<tr>
<td></td>
<td>14,000 Early Childhood Development kits</td>
</tr>
<tr>
<td></td>
<td>32,000 recreation kits</td>
</tr>
<tr>
<td></td>
<td>140,000 country-specific classroom kits</td>
</tr>
</tbody>
</table>


The unit of observation is an important part of case description as it allows defining what the cases are especially in the context of the supply chain (Bak, 2005; Koulikoff-Souviron & Harrison, 2005). There were two units of observation in this study that were relevant for data gathering, the first one was specific kits and the second one was general kitting activities. The context of these kits and kit management by humanitarian organization in general was explored through interviews with different respondents interacting with kits either for procurement, design, planning, warehousing, transportation and deployment to countries (table 2). To achieve all these activities, there are different expertise centers focused either on general activities that involve kits or on types of commodities. Technical personnel and contracts managers will work as a team and oversee the procurement, design and planning of the required items for specific kits. Once received from the suppliers, the items will be managed by the different expertise centers responsible for the management of the materials through warehousing and assembly, transportation and deployment to countries. To simplify the process with the different interviewees, discussions focused on either specific kits in their area of expertise or the overview of multiple different kits depending on their role in the management of kits (table 2). For specific kits, the discussions centered on the Inter-Agency Health Kit (IEHK), School-in-a-box kit, adult hygiene kit and a health kit customized to serve country programme. The kits chosen for this research were selected based on the quantity of kits shipped, the different type of materials and number of items in the kits in order to offer the widest overview of management considerations of kits.
### Table 2: List of interviews

<table>
<thead>
<tr>
<th>Kits/Interviewee</th>
<th>Title</th>
<th>Kit-related activities</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overview of kits: A, B, C, and D</strong></td>
<td>Planning Specialist</td>
<td>Mgt. of material needs and safety stocks</td>
<td>80 min</td>
</tr>
<tr>
<td></td>
<td>Logistics Assistant</td>
<td>Mgt. of shipping of kits</td>
<td>25 min</td>
</tr>
<tr>
<td></td>
<td>Inventory Task Team</td>
<td>Mgt. of deployment of kits on the ground in emergencies</td>
<td>25 min</td>
</tr>
<tr>
<td></td>
<td>Warehouse Assistant – Supervisor</td>
<td>Mgt. of kit assembly</td>
<td>65 min</td>
</tr>
<tr>
<td><strong>Custom Health Kit: E and F</strong></td>
<td>Essential Drugs Manager - Zimbabwe Field Office</td>
<td>Mgt. of in country kit activities</td>
<td>20 min</td>
</tr>
<tr>
<td></td>
<td>Country Focal Point</td>
<td>Coordination of delivery of offshore kits</td>
<td>90 min</td>
</tr>
<tr>
<td><strong>IEHK kit: G, H, I and J</strong></td>
<td>Emergency Coordinator</td>
<td>Mgt. of deployment of kits on the ground in emergencies</td>
<td>55 min</td>
</tr>
<tr>
<td></td>
<td>Technical Specialist, Essential Medicines</td>
<td>Mgt. of design of kits</td>
<td>40 min</td>
</tr>
<tr>
<td></td>
<td>Technical Officer, Health Technology Centre</td>
<td>Mgt. of design of kits</td>
<td>55 min</td>
</tr>
<tr>
<td></td>
<td>Contracts Officer, Medicines &amp; Nutrition Center</td>
<td>Mgt. of contracts with suppliers for items related to kits</td>
<td>60 min</td>
</tr>
<tr>
<td><strong>School in a box kit: K and L</strong></td>
<td>Contracts manager, Contracting center</td>
<td>Mgt. of contracts with suppliers for items related to kits</td>
<td>25 min</td>
</tr>
<tr>
<td></td>
<td>Technical Specialist, Water Sanitation and Education</td>
<td>Mgt. of design of kits</td>
<td>25 min</td>
</tr>
<tr>
<td>Hygiene kit: M and N</td>
<td>Contracts Manager, Water, Sanitation and Education</td>
<td>Mgt. of design of kits</td>
<td>25 min</td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------</td>
<td>-------------------------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>Technical specialist, Water, Sanitation and Education</td>
<td>Mgt. of contracts with suppliers for items related to kits</td>
<td>25 min</td>
</tr>
</tbody>
</table>
Findings

In the context of this organization, kits are assembled at multiple points of the supply chain. The kits can be entirely assembled in house (IEHK and health kits customized to serve country programmes), outsourced (hygiene kit) or assembled at a different facility (school-in-a-box) than the UNICEF warehouse in Copenhagen. Sometimes assembly activities for other kits are undertaken in the country of use of the kit leading to an overall versatility in the choice of assembly point in the supply chain. However, this is not entirely the case for health kits since these kits cannot easily be prepared at different steps of the supply chain because of the type of materials included and the need to follow the strict pharmaceutical quality guidelines. The knowledge of these guidelines and other practical considerations such as shelf life management and cold room storage are managed in the central warehouse by the organization. The organization will outsource kits for materials that it does not stock as standard items at its main warehouse as there is no value in stocking these items individually to later kit them. This implies good market knowledge and relationships to identify and work with a supplier that has the capacity to manage the kits. Kits that are assembled by the organization are thus standard items that can be shipped in bulk as well as being consolidated in kits; this approach gives the additional benefit of consolidating procurement activities. Even though kits can be assembled at different steps in the supply chains, there were no differentiating between the different kits when it came down to packing (figure 1). The picking and packing is done to be efficient for transport, handling and warehousing across the supply chain with the knowledge of staff at the central warehouse (IEHK and health kits customized to serve country programmes), at ancillary facilities (school-in-a-box) and by the supplier (hygiene kit). The warehouse activities for kit packing in the preparedness phase will be different if the kit is customized or not. Indeed, health kits customized to serve country programmes are assembled for a specific activity either related to a large order or long term activity for development purpose and not a disaster phase; the needs they serve are known in advance as they usually are prepared according to a pre-arranged schedule.

[...], when you are outsourcing your kits it’s more challenging than doing it here because you need to ensure that you have the right supplier that can not only pack but also source what you need with the quality level that you expect and [...] for the duration of the LTA.

-UNICEF respondent M

Custom kits are often forecastable because they match a very precise strategy, so a back to school or distribution, like right now in Mozambique, on health kits.

-UNICEF respondent G

Kits are packed according to standard practices with the knowledge of warehouse employees, some of whom have been deployed in the field from the headquarters and thus also have practical knowledge of the humanitarian context. Space usage in the supply chain for kits is minimized during the assembly stage by proper packing, using standard handling material such as euro pallets, standard box sizes and stacking each pallet optimally. This optimisation of space use is maintained at later steps of the supply chain until the pallet is broken up to deploy the kits. This combination of knowledge, standard material and infrastructure allows the facilitation of consolidation for transportation and warehousing. Consolidation is also common for all types of goods and not only kits for emergencies when the response requires the chartering of air freight by the organization. When transportation consolidation is managed by the organization, consolidation into full loads happens for certain kitting activities while
kits and normal goods shipments can also be consolidated together. In the case of the large shipments for the health kits customized to serve country programmes, kits are assembled in a quantity that will match a specific number of full containers to optimize transport cost. The issue of cost will also be addressed for the transportation of large shipments of hygiene kits with full containers from the supplier to the central warehouse. Usually, from the warehouse to the country port of arrival, shipments, regardless if kits or regular items, will be sent based on a time withholding policy whereas a container will be filled up to capacity or will leave partially consolidated if staying at the warehouse will create a delay in the target arrival date. In the context of emergencies, kits are transported by air and could be consolidated with other items in full charter flights.

[...]if we take for example Zimbabwe where one batch is 1152 and that is equivalent to 6 containers, so in this case the batch is defined by the number of containers.

-UNICEF respondent D

When it is a kit they have never kitted before they will look at the material and do the setup following their experience [...]and basic packaging rules [...]

-UNICEF respondent D

Of course we optimize the packing [...]to make sure we have enough space the capacity of that is optimized. If it’s one of our own standard boxes we have the measurements so it fits on the pallets.

-UNICEF respondent C

Another important step that improves the response are the activities linked to the preparation of kit content. In the context of assembly and manufacturing in the private sector, the content of kits is relatively easy to design and produce as the final products and the inputs for each are known, especially in a just-in-time context. Knowing the demand in the context of emergencies can be difficult; this leads to the need for safety stocks of kits but also requires that kits are designed to cover a certain range of needs. As these needs increase in complexity, the number of items and the mix of items are increased to help cover a range of possibilities. For simple kits such as the hygiene and school in a box kit, the knowledge comes from the programme activities as well as the collection of field experiences to make the items relevant for the partners using the kit. For the IEHK and health kits, coordination and exchange of knowledge from various individuals as well as organizations with different backgrounds, from scientific knowledge to field evaluations, are required to ensure an adequate response and create a kit that follows standards understood by the different actors in the response. Programme activities with kits customized to serve country programmes use standard items already approved by the appropriate specialists inside the country, according to their technical and practical knowledge. The knowledge of the quantity and type of items required in the kits comes from an extensive review of the activities to be achieved according to the specific country. This review relies on local knowledge, programme knowledge and good partnerships with local implementing partners and funders to organize a kit that responds to the specific context of a country. Sometimes a country that repeatedly requests the same set of items will be offered to create a kit customized to serve country programmes to simplify order management activities for the country. A precise understanding of the country needs achieved by coordination with partners on the ground offers the opportunity to schedule kit distribution and ensure that appropriate items are used to match the demand.
[...] for each standard kit [...] you see what intervention is covered. Interventions are a sum of activities [...] because you have consumables that serve once but also hospital equipment. [...] you describe procedures taking into account good practices, safety for patient and staff and the environment (lack of electricity etc...) and from there you identify the products you require for your intervention.

-UNICEF Respondent I

[...] there is an inter agency working group working together so we went to Geneva and had meetings with WHO, UNFPA, ICSC and other partners so there is a common consensus on the content. There was discussion back and forth for process and introduction of new drugs.

-UNICEF Respondent H

Standard utilisation, in a way where you talk with your partners, you speak the same language. [The IEHK] is a kit that has been approved by the WHO, MSF, by different humanitarian actors in health and is recognized as a one fit all. Certain detractors say there are goods we don’t need. Yes, but it is easier to have more than less and it is easier to speak the same language as partners. When the partners will tell you: “We are opening a field clinic, we need three kits.” We speak the same language; everybody knows what the content of the kit is.

-UNICEF respondent G

The benefits of kits are relevant in the context of disaster response as well as for development activities (Figure 1). For regular kits in emergencies, the quality of the items is achieved through control of samples from the supplier as well as control of the quality of goods on arrival at the central warehouse. For the IEHK and any other health kits, the quality is further ensured by procuring only from pre-approved suppliers from the World Health Organization with special attention to follow first-expired first-out procedures. The IEHK is flexible also through its item mix and quantities planned in advance that offer a broad coverage of medical issues and through the use of sub kits which can be ordered individually during immediate response in disasters. The timeliness is ensured by the pre-positioning and safety stock of items. The broad range of standard health kits allows the organization to be flexible in its response as each kit fulfills a wide range of situations through its product mix and quantities. For the hygiene kit, flexibility is attainable through the common basic needs it is designed to address and which will be present in most emergencies as well as the mix of items in the kit. For the school-in-a-box, its flexibility comes not only from the product quantity and mix that helps cover different relevant school topic but also from the design of the material which does not favor any language or gender and makes it usable worldwide. Furthermore, for all three kits, their packing in a specific manner simplifies the handling and distribution of the goods to the beneficiary or implementing partner which can reduce delays in deploying them. Timeliness is also improved by having a standard kit in the context of transactions with partners. The knowledge of this kit and the ease of ordering it without reviewing all potential materials needed for a specific activity reduces order management complexity. The proper assembly and choice of items is crucial to obtain kits that achieve the best results for beneficiaries. It is important to note that for the school-in-a-box and hygiene kits, when the kits are not required for an emergency response or when emergency conditions allow it, the organization can arrange for these basic items to be acquired locally if the local market has the capacity to supply it.
Some of the kits we have in our warehouse are packed and which means that for some of the kit, if it’s an emergency kit we can respond faster because it would normally take time to pack these kits and also because it consists of so many components and from so many different suppliers. To get that bit requires logistic but also requires time to get that so if we have these components that’s the advantage and disadvantage of having these kits.

-UNICEF Respondent C

Note: As a general rule, the Complete Interagency Emergency Health Kit 2011 should be ordered in line with programmatic requirements. The ability to re-order pre-packed kits separately gives the necessary flexibility to adapt supplies to needs, limits the risk of overstocking equipment and running short of consumables, and allows for fast replenishment in the early phase of an emergency. After the acute phase of an emergency is over and basic health needs have been covered by the basic and supplementary units, specific needs for further supplies should be assessed as soon as possible.

-UNICEF Technical Bulletin 11

[...] first we look at the pre-approved list we also go inspect and check quality but we cannot choose a supplier which is not on the WHO list. [...] 

-UNICEF Respondent G

Standard kits are used in the context of emergencies and the requirement of a response in less than 72 hours for an unforeseen number of people drives the need for a safety stock of kits to be kept in the warehouse. The assembly of those stocks is done with the same warehouse infrastructure which must adapt to the requirements of both regular programme with clear objectives and the unknown factors of emergencies. In the case of an emergency, the activities of the central warehouse are geared towards speed and quality to support the response while, for normal programme needs, these activities are geared towards cost and quality. These supply chain objectives are taken into account in the central warehouse where the automated infrastructure interacting with the information technology systems allows a degree of flexibility. Flexibility in assembly is also achieved through the knowledge of staff at the warehouse which can change the size of the batches. Smaller batches with the ensuing higher setup cost are prioritized in emergencies to respond to last minute requests or interruptions and, in calmer periods, larger batches with less setup costs are favored. These setup and production arrangements also require proper management of human resource to ensure the appropriate capacity to respond to the ongoing needs of the organization.

In WMS the following work centers for picking/packing are defined [...]Once the allocation of materials has taken place in WMS and the work center determination and scheduling has been determined, the production orders are released to the individual work centers.

-UNICEF: Business Process Procedure document

For example at the moment we have a lot of emergencies. With the Philippines, obviously, and Syria we have emergencies requested day to day so we won’t block our line for 3-4 days in a row because it could happen that today we need to produce something for tomorrow as there will be a plane available. So we do smaller batches at the moment.

-UNICEF Respondent D
Figure 1: Kit consolidation points: performance and resources
Customized kits are not used for emergency response but they can still offer benefits when they are deployed for response to development needs. For the health kits customized to serve country programmes, the quality is ensured through the use of standard medical goods similar to the IEHK; flexibility for the kit is ensured by the right product mix for its objectives and to cover the scope it requires while timeliness is achieved through easy ordering, packing in a way that simplifies distribution and planning ahead of the schedule of the deliveries. However, the use of a push system for distribution to local health clinics also hinders quality as certain items will have expired before their use by the clinic. Other items might not be restocked and thus may not be available when needed for treatments since clinics will only wait every quarter for new arrivals instead of restocking more frequently.

We get in touch with the countries and when it is big projects like this one we ask them what they want. Currently what they want is per three months.

-UNICEF respondent D

But here we design the kits together with the country office we propose them the components or the quantity of the component so it makes sometimes easier for us to pack.

-UNICEF respondent C

Once kits have been assembled and packed, ready to be transported to be used in the field, their use is reviewed and evaluated on a regular basis and kits can be updated anytime from once a year to once every 5 years. All kits are reviewed by the parties involved in their preparation to adapt to policy changes, technical changes to the material or to changes in the field demand. This aspect of monitoring and evaluation (figure 1) is done for all kits and can lead to modifications in current kits or the identification of gaps that require new kits. These developments create a feedback loop and the modification of kit consolidation can be considered to play a role in the preparedness phase of the process. This preparation helps define the needs the kits respond to, choose the type and amount of items and choose their procurement source. When the country level knowledge is incorporated with headquarters level knowledge and partner knowledge and linked with the knowledge and infrastructure to assemble kits, it gives to the organization the competence to either respond to a broad range of emergencies or specific development needs for a country. This entails the management of a known or unknown demand, with different levels of quality and timeliness requirements as well as varying degree of complexity in the kits to be assembled and deployed.

Otherwise what we do, if protocols change, if policies change, because medicine evolves, we have to adjust the kit content. So we regularly review if there are new products needed because of changes of the description of interventions. If it is an intervention covered by a kit you need to readjust the kit consequently.

-UNICEF respondent I

This year, we did an analysis, a monitoring and evaluation of our kits. So we have worked with program division, the WASH unit, in reviewing our kits talking to the WASH community and see what are the challenges and the recommendations on the kits and the suitability for the end user and we also looked into how it is structured.

-UNICEF Respondent N
Discussion

This study offers an interesting insight on dynamic capability in relations to competencies and how they are managed in between firms in a non-profit sector. Organizations with social goals have similar supply chain performance considerations than private organizations however, when they are transferring materials from one non-profit organization to the other, organizations are not doing so for rent-seeking activities but instead to achieve their social goals. Kits, through their dissociation between assembly and point of use, allow one organization with the right competencies to manage kits to benefit from the associated performance improvement and make subsequent partners benefit as well until final use. In essence, the performance benefits from the competencies and resources which define what materials are consolidated into a kit are transferred throughout the supply chains until kit consumption. This shows that non-profit organizations will share their competencies and dynamic capabilities in order to support their social goals. Furthermore, since the material is consolidated into a single kit, this facilitates transfer of competencies in between organizations as they are reflected in the material choices for the kits. The combination of kits and the non-profit activities in effect reduces the transfer and transactions costs of competences as kits might be donated and once they are assembled they are managed like any other type of material.

The wide variety and complexity of items needed to address emergencies and country development policies worldwide require a special emphasis on proper preparedness to maximize the benefits obtained as well as the performance of kits deployed especially in the context of emergencies where the exact needs are unknown. Kits are based on knowledge such as field experience, scientific and technical knowledge and involve inter organizational cooperation with multiple actors to determine which items will be put together. This knowledge and relationships located at different points of the supply chain are supplemented by an infrastructure that allows the possibility to be flexible and accommodate different supply chain requirements. Together with physical assets this knowledge and relationships with different partners represent a set of competencies organized through routines and processes at different steps in the supply chain and offer the capability to consolidate items into kits. The different resources available allow to modify and adapt the processes and competence of the organization to create the dynamic capability to respond to a wide range of situations with kits according to the organization’s goal. Kitting in the humanitarian context thus acts as a consolidation point in the supply chain that involves preparation, packing, assembling and stocking to offer benefits of quality, flexibility in timeliness in a context of emergency or development where and when the local capacity to manage these activities or ensure the proper service levels might be disrupted or non-existent.

When it comes to the phenomenon observed, this study contributes to a more in depth understanding of the management of kitting activities. One distinction between previous research and these cases is the final use of the kits. Indeed, most kit literature focuses on kits in manufacturing processes while this study highlights a different role for kits. This role consists of kits that deliver material support for a service; in this case, these services are health and education delivery as this is the focus of the organization studied. This service support has implications for kit management activities and creates a tradeoff between simplicity and flexibility. Given the definition of the needs that the kits must meet, the wider the definition of the needs in terms of intervention and population size and thus the flexibility required of the kit, the more complex the mix and amount of items the kit needs to contain. Another trade-off occurs in relation to the performance and goals of the organization. Indeed specific performance requirements
might require investment in specialized resources and competencies to support kitting. Indeed, an increase in the portfolio of kits to be more flexible in response to diverse situations requires a wider range of resources organized into competencies. These considerations that stem from tradeoffs are important for organizations in the kit planning phase when it decides to invest in the resources required to manage the kits as well as define what kit composition is required. However, a well-defined kitting strategy and comprehensive kits help in addressing the tradeoff that humanitarian organizations face in emergencies between acquiring an accurate knowledge of the demand and an appropriate timely response.

It is important to note that the competencies for kit management that allow a response to changes are a mix of standard resources found in logistics and specific knowledge and partnerships that help define kit content. Thus organizations that have a basic set of resources can manage kits, but to offer dynamic capabilities for a wide range of kits requires more complex resources. In this specific case study, the scale and goals of the organization leads it to develop the resources required for complex kitting activities as these resources are also relevant for other activities that the organization undertakes. Smaller organizations with more constraints on available resources need to take into account these tradeoffs and focus on kits and kitting management that can support their goals through appropriate performance levels. This can be done through the use of private firms to assemble kits which is a common 3rd party logistics service as well as through imitation of known standards for kits. However, developing relevant new kits or managing complex kits requires competencies that would be difficult as they require on-going learning and feedback activities with in-depth knowledge.

**Conclusion**

The aim of this research is to understand and explore how consolidation occurs through the use of kits in humanitarian supply chains. The study of five different cases related to kits helps in developing a more in-depth understanding of the issues relating to kits. Theory elaboration and coding with the underpinnings of dynamic capabilities helps to understand how humanitarian organizations can transfer their performance and competencies through kits by consolidating relevant materials together. This allows organization that share goals to also share improvement in performance in their supply chains when working in development or disaster response. This leads to a first proposition for further research:

**Proposition 1:** Consolidation through kits in in humanitarian organization allows sharing the performance gains of one organization with other organizations further down the supply chain.

The findings also enhance the understanding of the phenomenon of kitting. The study confirms that consolidation through kitting offers benefits in handling and inventory management and quality, flexibility and timeliness in the context of supply chains of humanitarian organizations where kits are consumed directly by different types of end-users and outside of the context of an assembly chain. The evidence of this study points to the complexity of managing kits for a wide range of needs and different types of response in the humanitarian context. As the complexity and number of kits increase, the organizational resources and competencies required to gain the competence to manage kits become more complex as well. An organization that wants to develop kits will be faced with a series of tradeoffs depending on the specific kits it needs for its goals. Propositions that can be put forward for further studies are the following:
Proposition 2: Consolidation through kitting offers the possibility to support performance in supply chains without a full infrastructure or material management capability at the point of use in both disasters and development contexts.

Proposition 3: The consolidation of items in kits requires organization to face tradeoffs between flexibility and simplicity when designing a kit and performance and costs when establishing a portfolio of kits to fit with their goals.

Humanitarian supply chains can gain from kits benefits similar to those found in private manufacturing. Even though kits are commonly used by many humanitarian organizations, this topic was previously understudied and this study offers an understanding of the reasons behind the use of kitting in this context. Indeed, beyond assembly of kits, there are numerous considerations that need to be taken into account to achieve the right performance objectives for the kits. In this sense the preparation of kits and the required knowledge is not a topic highlighted in the literature centered on kits in assembly lines. In this context, activities preceding the kit are seen as non-value adding activities. This study has shown that proper management of kit preparations allows to ensure achieving certain performance objectives with the kits. The findings also shed further light on the type of resources required to manage the planning of kits and obtain feedback to improve them. This study is limited in its scope by the use of a single organization, however this organization responds to a wide variety of needs which are well represented by the different cases. Another limitation is the analysis of the supply chain from a headquarters’ perspective. This gap leaves room open to analyze in more depth the roles of standardized kits in humanitarian supply chains in the last mile as well as to explore the practice of kitting done directly in countries with local or imported supplies. As there are different organizations that use kits, another research avenue would be to compare the activities of organizations with similar kits as well as with kits that were not included (such as shelter kits or kitchen kits). The findings in this study can be useful for other organizations or managers working in a similar setting who would be interested in assessing their kitting needs and capabilities. The findings in the article can act as a checklist of different resources and activities required to obtain benefits from kitting.

REFERENCES


gility of supply chains: building on humanitarian experience. *International
Journal of Physical Distribution & Logistics Management, 40*(8/9), pp. 722-
741.

components to kits in small-lot, multi-echelon assembly systems. *The

Crabtree, B. F. & Miller, W. L., 1999. A Template Organizing Style of Interpretation. In:
B. F. Crabtree & W. L. Miller, eds. *Doing Qualitative Research*. Thousand Oaks:


*International Journal of Physical Distribution & Logistics Management, 35*(9),
pp. 654-663.


printed circuit board assembly. *International Journal of Production Economics,


Hanson, R., Medbo, L. & Medbo, P., 2012. Assembly station design: a quantitative
comparison of the effects of kitting and continuous supply. *Journal of

Higginson, J. K., 1995. Recurrent decision approaches to shipment-release timing in
freight consolidation. *International Journal of Physical Distribution & Logistics
Management, 25*(5), pp. 3-23.

Hua, S. Y. & Johnson, D. J., 2010. Research issues on factors influencing the choice of
kitting versus line stocking. *International Journal of Production Research,


APPENDIX 1  CASE STUDY INTERVIEWS FOR ARTICLE B AND C

Demographic questions:
1) What is your position at UNICEF and what materials/kits do you take care of?
2) What are your past experiences?

Procurement questions (article B):
1) Could you summarily describe the procurement process from start to end?
2) Could you describe the decision making behind choosing suppliers
3) How do you manage the consolidation of purchasing from multiple suppliers?
4) How do you manage the consolidation of purchasing from multiple sales orders?
5) How do you integrate demand forecast activities with procurement?
6) What are the resources that help you achieve the goals in procurement?
   - Material resources
   - Skills
   - People
   - Capabilities
   - Training
   - Information
   - Infrastructure
1) How are these resources unique or rare for your organization?
2) Valuable
3) Rare
4) Appropriable
5) How do these resources translate into capabilities for procurement and what would those capabilities be?
6) How do these capabilities related to procurement help you in addressing disruptions in your supply chain?
7) What are the problems you encounter on a regular basis?
8) What are major problems such as disasters that might happen occasionally?
9) What tools and practices do you use to manage your problems?

10) How do procurement services work for your materials?

11) When working with partners:
    - Whose supplier are used?
    - Whose standards are taken?
    - What are the interactions that take place between the different parties?
    - What are the benefits and inconvenient of working with other entities?

1) What are your performance indicators?

2) How does the disaster type (fast-onset vs slow-onset) or environment influence procurement?

3) How does the disaster phase (preparedness, response and reconstruction) influence procurement?

4) What are the different vulnerabilities in the supply chain in relation to disasters?

**Kitting questions (article C):**

1) Could you describe the activities that you work on related to kitting?
   - What sort of items are distributed and warehoused?
   - How do your activities and roles work in the context of the overall objectives of UNICEF?
   - What are the objectives of UNICEF kitting?
   - How do you measure the results?

2) What are the resources that help you achieve the goals behind kitting for the UNICEF supply chain?
   - Material resources
   - Skills
   - People
   - Capabilities
   - Training
   - Information
   - Infrastructure
3) How are these resources unique or rare for your organization
   - Valuable
   - Rare
   - Appropriable

4) How do these resources translate into capabilities for kitting and what would those capabilities be?

5) How do these capabilities related to kitting help you in addressing disruptions in your supply chain
   - What are the problems you encounter on a regular basis?
   - What are major problems such as disasters that might happen occasionally?
   - What tools and practices do you use to manage your problems?

6) How did kitting start at UNICEF

7) What are the decision behind the creation of a new kit?

8) How do you manage to consolidate all the items required for kits from multiple suppliers?

9) How do you manage the demand for kits from your partners and UNICEF combined when purchasing materials?

10) How do you manage the relationship with your suppliers in relations to kits?

11) How do you manage the creation of kits in the Copenhagen warehouse?

12) How do you manage kit stocks and safety stock in the Copenhagen warehouse?

13) How does kitting help you achieve efficiency in reaching the beneficiaries?

14) What are your performance indicators?

15) How does the disaster type (fast-onset vs slow-onset) or environment influence kit shipping?

16) How does the disaster phase (preparedness, response and reconstruction) influence kit shipping?

17) What are the different vulnerabilities in the supply chain in relation to disasters?

18) What would make you more or less inclined to consolidate your warehousing resources and capabilities?

19) How do you distribute the material through your network to reach the final destination either of UNICEF or partners?
Additional questions

1) Would it be possible to obtain example of documents you use to manage kits and could you explain summarily how they are used?

2) Who else should I meet to discuss these topics?

3) Thank you
APPENDIX 2  QUESTIONNAIRES SENT OUT FOR KITTING IN ARTICLE C:

General kiting questionnaire:

### General Questions: fill in as required

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years of experience in humanitarian logistics?</td>
<td></td>
</tr>
<tr>
<td>Years of experience in UNICEF?</td>
<td></td>
</tr>
<tr>
<td>Does the country office engage in local set packing?</td>
<td></td>
</tr>
</tbody>
</table>

If yes to above, please write a short description of the most common kit in the cell below and fill in column "Local set pack/kits" in the more detailed questions below.

### Kit Related Questions: pick the 2 kits you are most familiar with from the list (question A: click on the cell B9 or C9 for a dropdown list of the kits) and specify their context (question B: click on the cell B10, C10 and D10 for a dropdown list) before answering the questions.

### Instructions: Use the dropdown list for questions 1 to 15 (click on each cell to access) to indicate how much you agree or disagree with the statement.

#### A Type of kit:

<table>
<thead>
<tr>
<th>Inter-Agency Health Kit (IEHK 2006)</th>
<th>full</th>
<th>School in a box 40 students</th>
<th>Local set pack/kits</th>
</tr>
</thead>
</table>

#### B Context of the kit:

1. Kits are easier to order than individual items
2. Kits usually arrive in full truck loads/full containers
3. Kits are easier to control for quality than individual items
4. Kits are easier to warehouse than individual items
5. Kits are easier to pick than individual items
6. Kits are easier to find in the warehouse than individual items
7. Kits reduce fetching times in the warehouse
8. Kits are easier to transport than individual items
9. Kits offer a faster response in emergencies than individual items
10. Kits are easier to consolidate with other kits rather than individual items
11. Kits are easy to consolidate with individual items for transportation
12. Kits have lower amount of defects than individual items
13. Kits help keep material flows simple to manage
14. Kits increase flexibility in responding to emergencies
15. Kits are useful in situations where beneficiary needs are unknown

Specific kit questionnaire:

**School-in-a-box, 40 students (s9935098)**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Could you describe the supply activities that you work on related to the School-in-a-box, 40 students kit for:</td>
<td></td>
</tr>
<tr>
<td>ordering?</td>
<td></td>
</tr>
<tr>
<td>transporting?</td>
<td></td>
</tr>
<tr>
<td>warehousing?</td>
<td></td>
</tr>
<tr>
<td>distributing?</td>
<td></td>
</tr>
<tr>
<td>What are the common challenges with the School-in-a-box, 40 students kit encountered for:</td>
<td></td>
</tr>
<tr>
<td>ordering?</td>
<td></td>
</tr>
<tr>
<td>transporting?</td>
<td></td>
</tr>
<tr>
<td>What are the challenges of the School-in-a-box, 40 students kit in the context of major disasters for:</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>ordering?</td>
<td></td>
</tr>
<tr>
<td>transporting?</td>
<td></td>
</tr>
<tr>
<td>warehousing?</td>
<td></td>
</tr>
<tr>
<td>distributing?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What tools and practices do you use to manage these challenges for:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ordering?</td>
<td></td>
</tr>
<tr>
<td>transporting?</td>
<td></td>
</tr>
<tr>
<td>warehousing?</td>
<td></td>
</tr>
<tr>
<td>distributing?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What are the different vulnerabilities in the supply chain created by the School-in-a-box, 40 students kit?</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>What are the different vulnerabilities in the supply chain that the School-in-a-box, 40 students kit can help address?</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>What are the knowledge, skills and infrastructure that help you manage the School-in-a-box, 40 students kit?</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>What are the benefits the School-in-a-box, 40 students kit offers to reach the beneficiaries and fulfill their needs?</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>What are the benefits of the School-in-a-box, 40 students kit in the context of normal programme activities:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ordering?</td>
<td></td>
</tr>
<tr>
<td>transporting?</td>
<td></td>
</tr>
<tr>
<td>warehousing?</td>
<td></td>
</tr>
<tr>
<td>distributing?</td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>What are the benefits of the School-in-a-box, 40 students kit in the context of major disasters for:</td>
<td></td>
</tr>
<tr>
<td>ordering?</td>
<td></td>
</tr>
<tr>
<td>transporting?</td>
<td></td>
</tr>
<tr>
<td>warehousing?</td>
<td></td>
</tr>
<tr>
<td>distributing?</td>
<td></td>
</tr>
<tr>
<td>How does the disaster type (e.g., fast on-set earthquakes vs slow on-set droughts) influence the use of the School-in-a-box, 40 students kit?</td>
<td></td>
</tr>
<tr>
<td>How does the disaster phase (preparedness, response and reconstruction) influence the use of the School-in-a-box, 40 students kit?</td>
<td></td>
</tr>
<tr>
<td>How is the demand for the School-in-a-box, 40 students kit forecasted?</td>
<td></td>
</tr>
<tr>
<td>How do you prioritize and organize the School-in-a-box, 40 students kit distribution?</td>
<td></td>
</tr>
</tbody>
</table>


273. DHANAY MARÍA CADILLO CHANDLER: The Role of Patents in Latin American Development: 'models of protection' of pharmaceutical patents and access to medicines in Brazil, Chile and Venezuela. Helsinki 2014.


ALAIN VAILLANCOURT
CONSOLIDATION IN HUMANITARIAN LOGISTICS

Major disasters, conflicts and poverty afflict many millions of people around the world. To address the needs of these people, humanitarian organizations deploy a vast array of resources supported by material, financial and information flows. Some of these resources need efficient logistics support to achieve their goals and through vertical or horizontal coordination, humanitarian organizations can improve the way to respond to a situation. A specific approach to coordination is consolidation which this thesis explores in depth. The thesis and its articles aim to understand the competence and underlying resources for consolidation of materials in supply chains. This thesis covers material consolidation concepts and humanitarian logistics activities such as warehousing consolidation, procurement consolidation and transportation consolidation.

The research presented in the thesis is composed of three individually authored articles, the first one is a conceptual paper based on a literature review entitled “A Theoretical Framework for Consolidation in Humanitarian Logistics”. The second article is entitled “Procurement Consolidation in Global Humanitarian Supply Chains” and the third article is entitled “Kit Management in Humanitarian Supply Chains”; both these two articles are based on empirical case studies. This thesis further contributes to dynamic capabilities as it identifies a result that can be expected from the lower supply chain competition and interest in coordination and cooperation by humanitarian organizations: facilitating access to competencies in between organizations through specific consolidation activities. Humanitarian organizations do not seek profit neither do they compete through their supply chains and instead sometimes cooperate and coordinate to improve aid delivery.