Received 7 July 2017
Revised 9 October 2017
15 December 2017
Accepted 16 December 2017

Humanitarian supply chain management responding to refugees: a literature review

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Abstract

Purpose – The purpose of this paper is to map and analyse the literature from 1989 to 2016 on humanitarian supply chain management (SCM) responding to refugees. This literature review systematically assesses existing literature, thereby highlighting gaps, challenges and directions for future research.
Design/methodology/approach – The authors apply a structured content analysis method which has been recognised as a traceable, systematic and reproducible research tool to analyse qualitative and quantitative aspects of existing literature.
Findings – The relative scarcity of literature implies that the interface of the fields of Humanitarian SCM and refugees has been rarely addressed. More specifically, the quantitative content analysis highlights a dearth of research that focusses on both fields in a well-balanced manner. In particular, empirical, practice-led studies, as well as research on development aid operations are under-represented. The qualitative analysis finds that further research on logistics models as well as technological innovations is necessary to increase data availability, forecast accuracy and the efficiency of (local) supply network operations during disasters.
Research limitations/implications – The review suggests a number of areas in need of future research, proposes possibilities of collaborations between different actors and provides a research agenda for Humanitarian SCM in the context of refugees.
Originality/value – This review is the first to analyse the literature on Humanitarian SCM related to refugees.

Keywords Content analysis, Literature review, Forced migration, Refugees, IDPs
Paper type Literature review

1. Introduction

> The tragedy of forced migration and displacement affects millions, and is fundamentally a crisis of humanity, calling for a response of solidarity, compassion, generosity and an immediate practical commitment of resources. From Lesbos, we appeal to the international community to respond with courage in facing this massive humanitarian crisis and its underlying causes, through diplomatic, political and charitable initiatives, and through cooperative efforts, both in the Middle East and in Europe (Pope Francis).

Although disasters are becoming less common according to the Centre for Research on the Epidemiology of Disasters (2017), their impact on human safety, health and environment increases continuously (FAO, 2016; Kovács *et al.*, 2010; UNHCR, 2017). In particular, the Arab Spring led to a growing instability and violence in several Mediterranean countries, which

Journal of Humanitarian Logistics and Supply Chain Management
Vol. 8 No. 3, 2018
pp. 398-426
Emerald Publishing Limited
2042-6747
DOI 10.1108/JHLSCM-07-2017-0029

resulted in hundreds of thousands of people being forced to leave their homes and seek refuge in a safer place. This paper refers to these people as refugees, which include both people who had to leave their country and internally displaced people who had to move within the country. Since 2011, the number of refugees has been doubling. It is estimated that by the end of 2016 more than 65 million persons worldwide have had been forcibly displaced due to persecution, conflict, violence or human rights violations (UNHCR, 2016a).

Providing aid to vulnerable people is at the core of humanitarian supply chain management (SCM) (Tatham, 2009). Humanitarian SCM aims to ensure the prioritisation of needs, and hence to respond to affected people by using given resources efficiently during and after a disaster (Van Wassenhove, 2006). In other words, Humanitarian SCM strives to mitigate the suffering of vulnerable people to the greatest extent possible (Thomas and Kopczak, 2005). Humanitarian SCM is a new and challenging research field because of the high uncertainty and complexity that characterises disasters (Day *et al.*, 2012; Kovács and Spens, 2007; Holguín-Veras *et al.*, 2012). Disaster management is composed of four different phases: mitigation, preparedness, response and rehabilitation (Van Wassenhove, 2006). The first two phases happen before the occurrence of a disaster and take the necessary precautions to avoid or rather minimise the negative impacts in the case of a disaster. The latter two phases deal with the short-term response after a disaster has occurred, and the long-term reconstruction to bring the affected community back to its pre-disaster condition (or better).

Humanitarian SCM comprises the management of different functions, such as evacuation, health care, food and water provision or refugee camps. This paper focusses on this latter application. In case of conflict or political instability, certain population groups may be particularly targeted because of their ethnicity, religion or political opinions. When these people do not feel safe to stay in their home area, they flee and seek refuge in another region or country, and thus become refugees. In large-scale conflicts such as the current war in Syria, the number of refugees is so high that they cannot be integrated into existing communities. As a result, they have to be hosted in dedicated camps, commonly known as refugee or safety camps, which are managed by humanitarian organisations. Managing such camps is a challenging task and requires the use of several SCM principles. Indeed, the displaced people living in these camps cannot sustain themselves and have to be provided with food, medicines, energy, health care, etc.

In recent years, there have been various literature reviews in the field of Humanitarian SCM (e.g. Altay and Green, 2006; Kovács and Spens, 2007; Pettit and Beresford, 2009; Kunz and Reiner, 2012; Leiras *et al.*, 2014; Banomyong *et al.*, 2017). However, none of these reviews has focussed on Humanitarian SCM literature applied to the context of refugees. Our paper aims to fill this gap by conducting a review of Humanitarian SCM literature related to refugees in order to identify future research directions for this field.

The remainder of the paper is structured as follows. Next, the research design is described and methodological decisions are explained. Then, the findings of the content analysis of the literature sample are presented and discussed, before the paper closes with suggestions for future research.

2. Methodology

An extensive review of research on Humanitarian SCM in the context of refugees is conducted, leading to a map of the intellectual territory in the field. Such a condensed overview summarises the state-of-the-art of existing research and critically carves out gaps and challenges that can be indications for further academic research in this particular field (Seuring *et al.*, 2005; Banomyong *et al.*, 2017). For this purpose, the method of structured content analysis is applied representing a traceable, systematic and reproducible research tool, and incorporating qualitative and quantitative aspects that complement each other (Brewerton and Millward, 2001; Seuring and Gold, 2012). In this paper, the four-stage process model for content analysis proposed by Seuring *et al.* (2005) is followed (see Figure 1).

First, the manifest content is quantitatively analysed through developed mathematical measurements and the application of the software Atlas.ti. Second, a systematic qualitative analysis gains deep understanding of the underlying meaning and interpretation of the research papers (cf. Kirca and Yaprac, 2010; Mayring, 2000).

2.1 Material collection

As research at the interface between Humanitarian SCM and refugees is scant, a complete sample of relevant literature published between 1989 and 2016 is collected through a systematic keywords search in the Web of Science and Scopus databases. The search terms were defined inductively, after reading multiple papers in the fields of SCM and refugees. We finally used the following keywords and Boolean operators:

- Forced Migration AND Supply Chain.
- Refugee Camp AND Health Care AND Operations.
- Refugee Camp AND Logistics.
- Refugee Camp AND Operations.
- Refugee Camp AND Optimisation.
- Refugee Camp AND Supply Chain.
- Refugee AND Logistics.
- Refugee AND Logistics Planning.

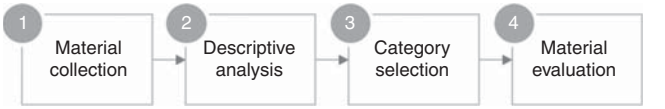
Our search yielded a total of 143 articles. We considered two criteria when selecting the papers: first, a paper has to be peer reviewed. Second, it has to include keywords from both fields SCM and Refugees. As 90 of these papers have not fulfilled both criteria, we only kept 53 peer-reviewed papers as valid and relevant. We subsequently read through all these papers to ensure that they actually deal with Humanitarian SCM and refugees in a substantial manner, thus checking for the validity of the literature search outcome.

2.2 Descriptive analysis

The descriptive analysis assesses formal aspects of the paper sample (see Section 3.1), i.e., the number of papers published per year; the geographic focus of papers (continent and country); and location and home institutions of authors (academia, NGO, governmental or multilateral institutions). Specific collaborations between these types of research institutions are assessed as well. Furthermore, the number of papers published in each journal cluster is presented. Journals are clustered based on their academic disciplines, i.e., economics, operations, technology, refugee, human rights, development, health and other.

2.3 Category selection

Content analysis is based on an analytical framework comprising different dimensions and categories, derived in a combined deductive-inductive way (Table I) (Mayring, 2000). The categories within each dimension are mutually exclusive, meaning that a paper can only be classified into one single category for each dimension.



Source: Seuring *et al*. (2005)

Figure 1.
Process model for content analysis

Dimension	Category
(1) Main focus of paper	1 SCM
	1.1 Performance measurement
	1.2 Logistics and operations
	2 Refugee
	2.1 Public health
	2.2 Human rights and refugee protection
	3 Balanced
(2) Type of operation	1 Disaster relief
	2 Development aid
	3 Both
(3) Type of research approach	1 Quantitative
	2 Qualitative
	3 Combined
	4 Conceptual

Table I. Dimensions and categories used for the quantitative content analysis

2.3.1 Main focus of paper. This dimension is of particular interest for our study for two reasons. First, this categorisation is used for the quantitative analysis in order to identify if papers are rather concentrating on SCM or refugees. Second, the inductively derived sub-categories within each category are essential for our qualitative content analysis, allowing a more in-depth characterisation and comparison of the paper content (see Section 3).

2.3.2 Type of operation. This dimension follows a common categorisation used in Humanitarian SCM research (Besiou *et al.*, 2014). We distinguish if a paper focusses on disaster relief operations, development aid operations or both. This categorisation helps us to understand current trends of research, to analyse research gaps and to derive essential future research in regard to the type of operation.

2.3.3 Type of research approach. This dimension is a common categorisation used in previous related literature reviews (Kunz and Reiner, 2012; Natarajarathinam *et al.*, 2009). It differentiates whether the selected papers follow qualitative, quantitative, combined qualitative-quantitative or conceptual research approaches. Thus, conclusions can be drawn which research methods have been neglected and could be promising for future research.

2.4 Material evaluation

The objective of this step was to analyse the papers in order to assign them to the three dimensions and their subjacent categories. Because reading through each paper and using academic judgement are highly subjective, we developed an automated quantitative approach for which we used the auto coding function of Atlas.ti, a software that can be used for content analysis. We selected Atlas.ti because it has an auto coding function that was particularly helpful for this automated analysis of papers. We defined a number of codes for the two first categories in each dimension (which we further denote as Group 1 and Group 2). For the dimension Main focus of paper, for example, we have one group SCM and another group Refugee. At this stage of the coding, we did not include the category Balanced because there is no keyword that indicates a balanced focus. Each time the software finds one of the words related to SCM or refugee, it assigns the relevant code to that word. Table AI lists the full selection of keywords we used for this process. For the dimension Type of research approach, we removed the reference sections, running titles and appendices from the analysis because these sections did not accurately represent the research approach used in the papers. For all other dimensions, we assessed the entire content of the papers. Once all papers have been coded, we added up the number of occurrences of codes from each group in each paper.

Because each paper has a different length and therefore different number of words, we cannot compare the absolute number of codes between the different papers. We address this by normalising the occurrences of codes. We do this by counting the number of times codes from each group appear in each paper i. Then for each paper i, we calculate the percentage of codes related to Group 1 and the percentage of codes related to Group 2, as described in the following equations:

$$\text{Percentage Group } 1_i = \frac{\sum \text{Codes Group 1 in paper } i}{\sum \text{All codes in paper } i} \tag{1}$$

$$\text{Percentage Group } 2_i = \frac{\sum \text{Codes Group 2 in paper } i}{\sum \text{All codes in paper } i} \tag{2}$$

Because we use only two groups of codes in each dimension, the percentage of codes from each group in a paper i always add up to 1, as described in the following equation:

$$\text{Percentage Group } 1_i + \text{Percentage Group } 2_i = 1 \tag{3}$$

We then allocate a paper i based on the percentage of codes it has in one or the other group, as described in the following equation:

$$\text{Allocation paper}_i \begin{cases} \text{Group 1 if Percentage Group } 1_i > \text{Percentage Group } 2_i \\ \text{Group 2 if Percentage Group } 1_i < \text{Percentage Group } 2_i \end{cases} \tag{4}$$

In order to capture more nuances and represent our results with more granularity than simply assigning a paper to Group 1 or Group 2, we added a category in between both groups. This category represents the papers that use a similar share of Group 1 and Group 2 keywords. For the dimension Main focus of paper, we have defined the categories presented in Figure 2.

Figure 2 shows that the category Refugee contains all papers with a share of less than 33 per cent of keywords related to SCM and hence, more than 66 per cent of keywords related to refugees. The category SCM contains all papers with a share of more than 66 per cent of keywords related to SCM and therefore less than 33 per cent of keywords related to refugees. The papers assigned to the category Balanced use keywords related to SCM and refugees with a similar frequency and a share of 33-66 per cent. Since these papers do not have a clear preponderance on one or the other focus, we define that they are balanced because they use keywords from both groups similarly.

We followed a similar categorisation process for the dimension Type of operation. For this dimension, we created two groups of keywords: Disaster relief or Development aid. The papers that we could not clearly assign to one or the other group were assigned to a category Both. Figure 3 shows the categories we used. Because there were many papers in

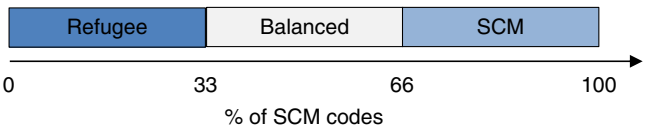


Figure 2.
Categories for dimension "Main focus of paper"

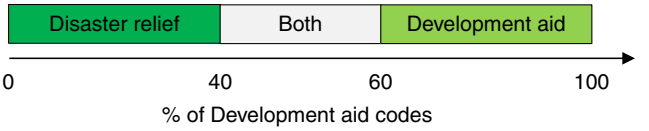


Figure 3.
Categories for dimension "Type of operations"

the middle category Both, we set the thresholds at 40 per cent and 60 per cent of codes, respectively (instead of 33 and 66 per cent).

For the third dimension, Type of research approach, we distinguished between two groups of keywords: Qualitative or Quantitative. This grouping allowed us to identify the type of research approach used by the paper. As for the previous dimensions, we added a category Combined for the papers using a similar number of words related to quantitative and qualitative approaches (see Figure 4). We set the threshold at 40 and 60 per cent for the same reason than explained above.

For this dimension, we found that some papers only used a very limited number of words related to the research approach, which did not allow us to apply this quantitative approach reliably. Therefore, we performed a manual analysis of all papers that had less than ten words related to the research approach and assigned them based on academic judgement. During this process, we were not able to assign 12 (23 per cent) of the 53 papers to either of the three categories (quantitative, qualitative and combined). We, therefore, added a category Conceptual for papers that do not use any form of data or do not indicate a specific research approach. This inductive development of categories was required because a number of papers in our selection are published in journals from other disciplines (e.g. law, medicine, geography, etc.). These journals do not necessarily apply research methodologies that are common in management literature, hence the lack of indication about the research approach in some of them.

After this quantitative analysis of papers, we did a qualitative analysis for which we have critically described, compared and related the individual documents of our literature review. As the literature covers a broad range of topics, we first used the following questions to get a better understanding of each paper and make their key messages transparent:

- What is the paper about in general?
- Are there any performance, operations, health, legal or ethical issues?
- What is/are the research question(s) about?
- What is/are the main finding(s)?
- Are there any gaps or limitations discussed? If so, which gaps and limitations?
- Do the authors recommend future research? If so, which topics have been mentioned?

After summarising each paper based on the questions, we systematically labelled the papers according to their main focus of research. For the coding, we have applied the labels mentioned in Table II which we derived inductively.

Then, we sorted and linked the labels to subordinate topics. Based on that, we inductively created the sub-categories listed in Table II. We then compared the findings and the interpretation from the papers of each sub-category. In a last step, we critically carved out gaps and limitation that are indicating future research topics.

2.5 Quality

For ensuring valid and reliable outcomes, it is vital to assess the quality of the structured content analysis in regard to the factors objectivity, validity and reliability (Spens and Kovács, 2006). Section 2 describes our chosen methodology and discloses the transparent

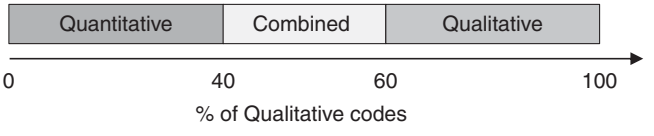


Figure 4.
Categories for dimension "Type of research approach"

Label	Description
SCM	Challenges related to supply chain management in refugee camps
Refugee	Challenges related to refugees and forced migration
Logistics models	Logistics models that have been developed in the context of refugees, forced migration or refugee camps
Performance measurement	Performance measurement of supply chain and operations processes related to refugees, forced migration or refugee camps
Commodities	Challenges related to the provision and maintenance of water and sanitation (WASH), electricity, food and shelters for refugees/in refugee camps
Public health	Challenges related to disease and health care management for refugees/in refugee camps in connection with supply chain and operations processes
Human rights	Challenges related to human rights and refugee protection in connection with supply chain or operations processes
Policy	Challenges related to policy and legal aspects in connection with refugees and operations
Host-refugee relations	Challenges related to host community and refugee relations
Education	Challenges related to education for refugees

Table II.
Labels for coding

process of the collection and evaluation of papers, which makes our research reproducible by others. For rigorous and objective analysis, we defined coding rules for each category (Spens and Kovács, 2006) and applied the auto coding function of Atlas.ti, rather than basing our categorisation on subjective judgement. Theory-led classification and validation of findings by three researchers and through workshop presentations have facilitated a substantial degree of validity and reliability of the findings generated through qualitative content analysis as well.

3. Results

3.1 Results of descriptive analysis

As aforementioned, the descriptive analysis does not look into the content of a paper but year, location and affiliation.

3.1.1 Year of publication and journal clusters. Altogether 53 papers on Humanitarian SCM and operations responding to refugees have been published in the period from 1989 to 2016. Figure 5 shows an increase of papers published since 2005. This increase is mainly due to papers published in journals belonging to the cluster Economics/Operations/Technology, in which we cannot record any publication before 2005. Indeed, a number of such journals published special issues during that period, and a dedicated publication, the *Journal of Humanitarian Logistics and Supply Chain Management*, was launched in 2011.

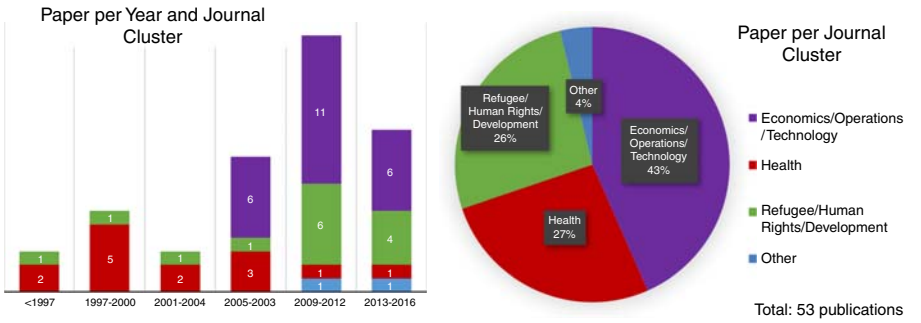


Figure 5.
Journal clusters

3.1.2 Geography of paper and location of research institution. In total, 28 (53 per cent) papers from our sample specifically address one or more than one country or continent. Figure 6 shows that Africa (in particular Central and Eastern Africa) attracts most attention. Only 4 per cent of studies in our selection focus on the Middle East and the Mediterranean region.

Our descriptive analysis shows that the 53 papers in our sample were written by authors from 71 different institutions. Most of those institutions are based in the USA, followed by the UK and the Benelux states.

3.1.3 Type of research institution and collaboration. Figure 7 shows the type of institutions the authors of the papers, we surveyed, are affiliated with. Most research has been conducted by academia (55 per cent). Global institutions/governments have produced 10 per cent and NGOs 11 per cent of the papers. In all, 24 per cent of the papers are the result of partnerships between two or more types of institutions.

Our analysis reveals that collaboration between academia and global institution/government (eight papers) is most popular.

3.2 Quantitative content analysis

In this section, the results of our categorisation of papers are presented along three dimensions: Main focus of paper, Type of operation and Type of research approach. The body of literature has been quantitatively analysed by a developed mathematical framework, outlined in Section 2.4, and the application of the auto coding function of Atlas.ti.

3.2.1 Main focus of paper. The analysis finds that 39 per cent of the papers focus on SCM, 55 per cent on refugees and only 6 per cent are well-balanced between both areas. The results and the categorisation for dimension Main focus of paper are visualised in Figure 8.

Surprisingly, most of the papers focus either strongly on SCM or refugees (Figure 9). The category Balanced contains only three papers, which means that 6 per cent of the papers are well-balanced between both concepts. Figure 9 reflects the share of papers for

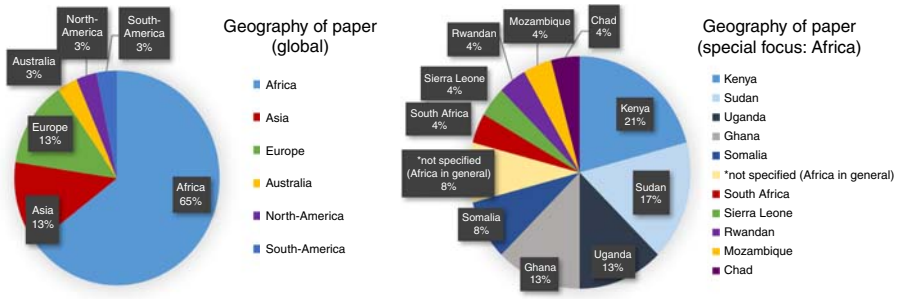


Figure 6.
Geography of paper

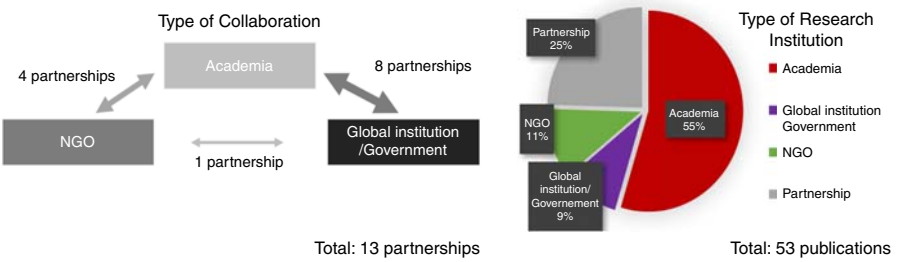


Figure 7.
Type of collaboration and research institution

each percentage of SCM and refugee codes. In total, 31 per cent of the papers have 10 per cent or less SCM codes (left column). On the other end of the spectrum, 33 per cent of the papers have more than 90 per cent of SCM codes (right column). Only 6 per cent of the papers have a similar share of SCM and refugee-related codes.

3.2.2 Type of operation. As presented in Figure 10, 64 per cent of the papers have a focus on disaster relief, 23 per cent on development aid and 13 per cent on both areas.

Less research on development aid, in particular with a focus on SCM, has been conducted until now. Thus, there is high potential for research on, e.g., SCM and operations in long-established refugee camps. Kunz and Reiner (2012) discovered that most of the research on Humanitarian SCM deals with disaster relief and that development aid work has been "almost entirely overlooked". Since 2012, this tendency in research has not changed. The analysis even finds that the share of papers on disaster relief has continued to increase between 2012 and 2016 (Figure 11).

3.2.3 Type of research approach. In regard to the Type of research approach, 36 per cent of the papers use a quantitative research approach, 24 per cent use a qualitative research approach, 23 per cent are of conceptual nature and 17 per cent apply a combination of quantitative and qualitative methodologies (Figure 12).

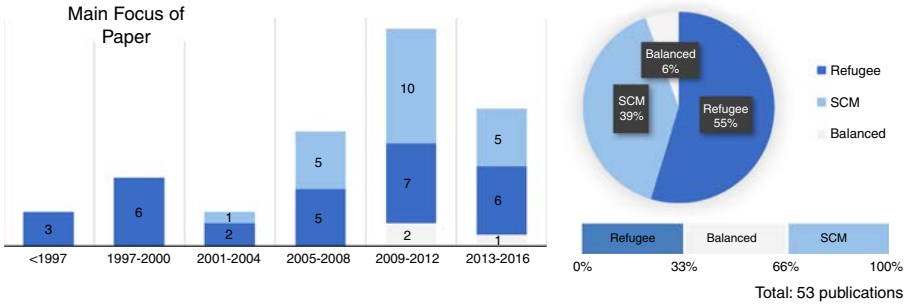


Figure 8.
Categorisation of papers for dimension "Main focus of paper"

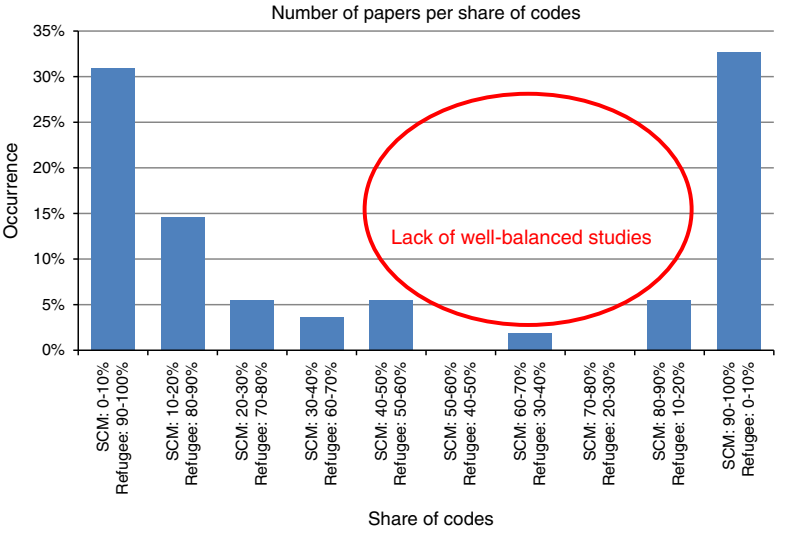


Figure 9.
Number of papers per share of SCM and refugee codes

In general, the proportion of different research methodologies for papers focussing on Humanitarian SCM is rather well-balanced. While the quantitative research methodologies have been used the most over the years, in particular in case of refugee-related papers, the conceptual research methodologies are the most common in regard to SCM and operations-related papers. As shown in the bar chart of Figure 13, we did not identify any paper with a mainly qualitative research approach between 1997 and 2004.

3.3 Qualitative content analysis

Our qualitative content analysis follows three steps: first, we allocate the papers of our selection to the defined categories SCM, Refugee or Balanced according to our quantitative analysis (Section 3.2.1) and visualise the results by means of a Venn diagram (Figure 14).

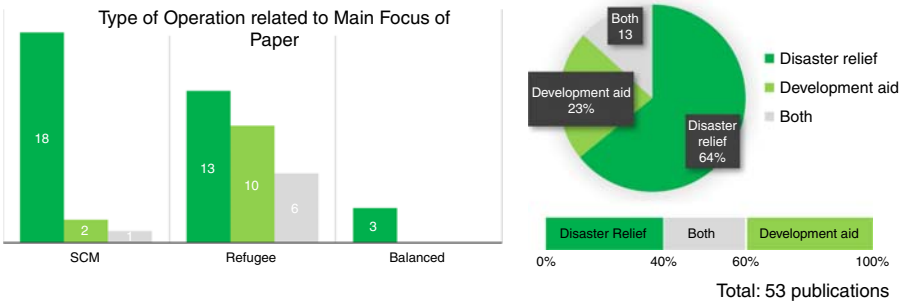


Figure 10. Categorisation of papers for dimension "Type of Operation"

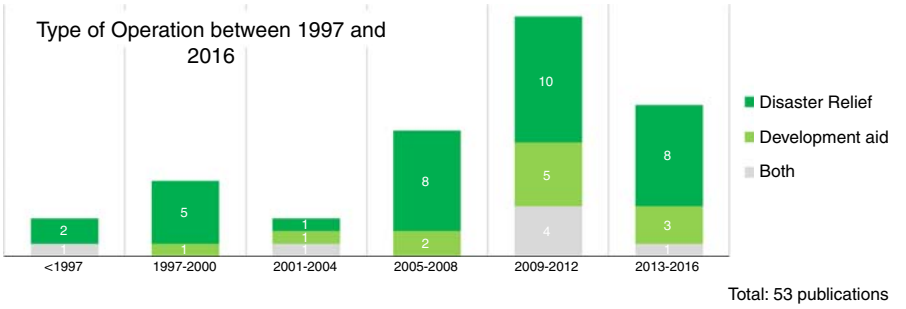


Figure 11. "Type of Operation" between 1997 and 2016

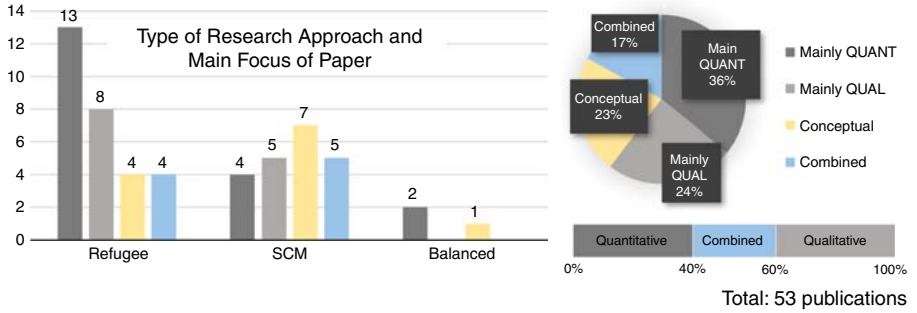


Figure 12. Categorisation of papers for dimension "Type of research approach"

Second, based on the outcome of the Venn diagram, we compared the selected papers along the dimensions Main focus of paper and Type of operation (Table III). For Disaster relief and Development aid operations, papers from the category SCM have a strong focus on logistics systems, process optimisation as well as special commodities in connection with beneficiary needs and refugee camps' infrastructure. In contrast, papers from the category Refugee deal mostly with needs of beneficiaries and host communities, their health care, protection and rights.

Table III also shows that there are only a very few well-balanced studies addressing simultaneously SCM and refugee-related topics. The table additionally reflects and confirms another earlier finding (Section 3.2.2) that there are only limited papers focussing on SCM in the context of development aid operations.

Third, sub-categories are defined within both categories SCM and Refugee in order to further cluster the papers of our selection along similar content.

The SCM sub-categories are as follows:

(1) Performance measurement (includes 17 papers; Table IV).

(2) Logistics and operations (includes 13 papers; Table V).

The Refugee sub-categories are as follows:

(1) Public health (includes 14 papers; Table VI).

(2) Human rights and refugee protection (includes 13 papers; Table VII).

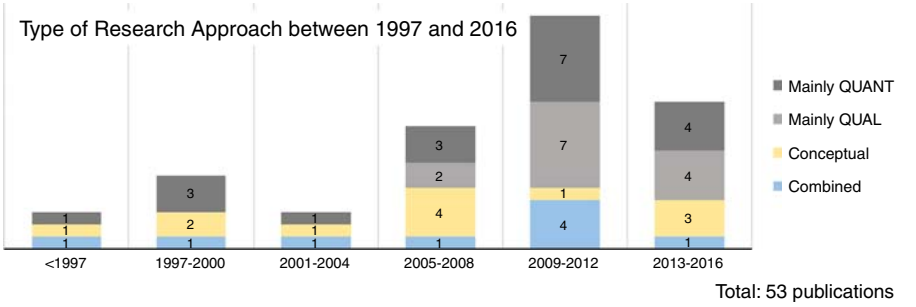


Figure 13.
"Type of research approach" between 1997 and 2016

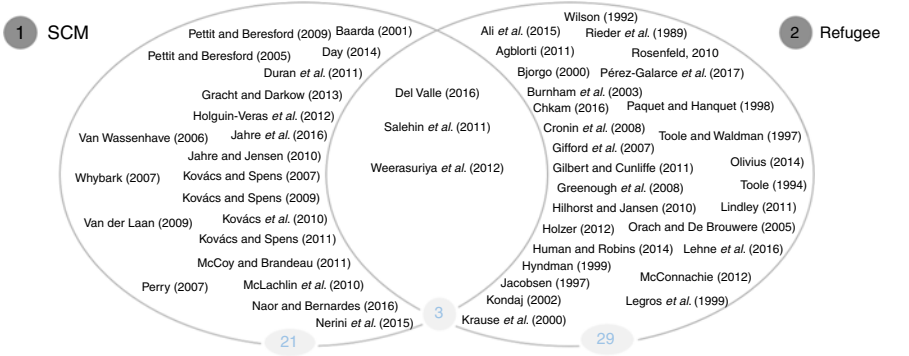


Figure 14.
Venn diagram – papers focussing on SCM and refugee topics

Main focus of paper	Type of operation: Disaster relief	Number of papers	Both	Number of papers	Development aid	Number of papers
SCM	Operations, systems, logistics processes: Special logistics processes of commodities Performance measurement Process improvements	18	Conceptual: Literature review: trends, gaps and developments in humanitarian logistics	1	Operations, SCM systems, logistics processes: Special logistics processes of commodities Performance measurement Reconstruction	2
Balanced	Combination of operations, SCM processes and beneficiaries	3	n/a	0	n/a	0
Refugee	Beneficiaries, health, human rights: Commodities, such as water supply, energy, sanitation associated with disease/health provision and combating pathogens Disease management	13	Beneficiaries, health, human rights: Host-refugee relations Role and responsibilities of NGOs Basic needs and rights of refugees and host populations Disease management	6	Beneficiaries, health, human rights: Host-refugee relations Basic needs and rights of refugees and host populations Policies, legal issues	10

Table III.
Comparison of "Type of operation" and "Main focus of paper"

Unlike the categories used in the quantitative content analysis, these sub-categories are not mutually exclusive, and most of the papers belong to more than one sub-category. These sub-categories represent four areas most often addressed in our selection of papers. There are obviously papers that do not fit into those four sub-categories. The papers have been analysed and compared according to their main findings, limitations and proposed future research as summarised below.

3.3.1 Performance measurement. The performance of a single organisation or a supply network has been investigated from different angles within the selected papers: the collaboration between stakeholders as well as the coordination, the standardisation and the optimisation of processes and activities.

Kovács and Spens (2007) highlighted the importance of collaboration by discussing a multi-facility and multi-supplier network and the challenges aid agencies face in disaster relief operations. The coordination of resources (human resources, equipment and goods) is impacted by the unpredictability of demand and uncontrollable environmental factors, such as a destroyed infrastructure which hinder logistics providers in delivering essential goods after a disaster strikes (Beamon, 2004; Long, 1997; Long and Wood, 1995; Özdamar *et al.*, 2004; Tomasini and Van Wassenhove, 2004). Consequently, a multi-facility and multi-supplier network requires an efficient communication concept in order to transform the limited available information into appropriate actions during the immediate response phase (Long and Wood, 1995). Van Wassenhove (2006) suggested leveraging the expertise and the resources of involved humanitarian and development agencies during all phases of disaster management in order to overcome supply chain inefficiency. In general, clear lines

Paper	Summary
Baarda (2001)	Legal investigation of the concept of cooperation between military and humanitarian organisation
Bjorgo (2000)	Mapping of refugee camp environmental parameters by means of VHSR satellite technology
Burnham *et al.* (2003)	Quality design: a planning methodology for the integration of refugee and local health services, West Nile, Uganda
	Emergency relief: immediate health needs of refugees through the establishment of action-oriented, life-saving services
Chkam (2016)	Role and responsibility of aid organisations in the establishment and perpetuation of camps; case study: Dadaab in Kenya 1991-2011
Day (2014)	Fostering emergent resilience: complex adaptive supply network (CASN) of disaster relief
Holguín-Veras *et al.* (2012)	Post-disaster humanitarian logistics: long-term disaster recovery and humanitarian assistance; comparison of commercial and humanitarian logistics
Jahre *et al.* (2016)	Integrating supply chains for emergencies and ongoing operations in UNHCR; network optimisation models and warehouse location model for joint prepositioning
Jahre and Jensen (2010)	Coordination in humanitarian logistics through clusters
Kondaj (2002)	Efficient coordination of the work on the rehabilitation of the refugee-affected areas
Kovács and Spens (2007)	Humanitarian logistics in disaster relief operations
	Literature review about logistics operations in disaster relief
Kovács and Spens (2009)	Identifying challenges in humanitarian logistics
Kovács and Spens (2011)	Trends and developments in humanitarian logistics – a gap analysis
McLachlin *et al.* (2010)	Not-for-profit supply chains in interrupted environments: the case of a faith-based humanitarian relief organisation; inter-organisational coordination
Naor and Bernardes (2016)	Self-sufficient healthcare logistics systems and responsiveness
Pettit and Beresford (2009)	Critical success factors (CSFs)
Van der Laan *et al.* (2009)	Performance measurement in humanitarian supply chains
Van Wassenhove (2006)	Humanitarian aid logistics: supply chain management in high gear; complexities of managing supply chains in humanitarian settings; collaboration between humanitarians, businesses and academics to achieve better and more effective supply chains

Table IV.
Summary of the papers of our selection assigned to "Performance measurement"

of responsibility as well as closer collaboration between humanitarians, businesses and academics achieve better and more effective supply chains to respond to disasters (Naor and Bernardes, 2016; McLachlin *et al.*, 2010; Van Wassenhove, 2006). Moreover, there is a cross-learning potential for both, the humanitarian and private sectors in emergency relief operations, for instance, by partnering within strategic alliances, such as the International Alliance against Hunger comprised by WFP, FAO and IFAD (Kovács and Spens, 2011). As addressed by Kovács and Spens (2011), alliances could connect short-term relief activities and long-term development due to the strong knowledge transfer and close collaboration of their members that are specialised in different fields, commodities and types of operation. Nevertheless, the standardisation and harmonisation of humanitarian activities are still seen as challenging (Kovács and Spens, 2011). One practical example given by Kondaj (2002) described different stakeholders cooperating in an Emergency Management Group during the Kosovo conflict in 1999. This cooperation has been created in order to manage diseases, the well-being and housing of refugees efficiently and hence, serve "as a bridge between emergency activities and normal development" (Kondaj, 2002, p. 190).

Besides strong stakeholder relationships, supply network resilience is another side effect of well-functioning collaboration and coordination. It can be further strengthened through harmonising supply chain activities and implementing standardised processes and pre-scripted supply chain planning both within and across different humanitarian organisations (Kovács and Spens, 2009, 2011; Naor and Bernardes, 2016; Day, 2014;

Paper	Summary
Duran *et al.* (2011)	Development of an emergency response model; pre-positioning of emergency items for CARE
Gracht and Darkow (2013)	The future role of logistics for global wealth – scenarios and discontinuities until 2025
Kovács *et al.* (2010)	A community-based approach to supply chain design; post-crisis housing reconstruction
Kovács and Spens (2007)	Humanitarian logistics in disaster relief operations; literature review about logistics operations in disaster relief
McCoy and Brandeau (2011)	Efficient stockpiling and shipping policies for humanitarian relief: UNHCR's inventory challenge; development of a spreadsheet model to help humanitarian organisations in their operational decision making, leading to improved response to beneficiaries
Nerini *et al.* (2015)	Reducing the dependency on fossil fuel in prolonged emergency situations to a minimum; development of an Energy and Water Emergency Module
Pérez-Galarce *et al.* (2017)	An optimisation model for the location of disaster refuges; capturing of the complex environment to maximise the quality of service
Perry (2007)	Disaster management planning for natural disasters; humanitarian logistics manager field study on response requirements and needs assessment concerning the 2004 tsunami disaster
Pettit and Beresford (2005)	Emergency relief logistics: an evaluation of military, non-military and composite response models; refined emergency model
Salehin *et al.* (2011)	Designing of an Emergency Energy Module for relief and refugee camp situations: case study for a refugee camp at the Chad-Sudan border
Van der Laan *et al.* (2009)	Performance measurement in humanitarian supply chains
Van Wassenhove (2006)	Humanitarian aid logistics: supply chain management in high gear; complexities of managing supply chains in humanitarian settings; collaboration between humanitarians, businesses and academics to achieve better and more effective supply chains
Whybark (2007)	Issues in managing disaster relief inventories Differences between disaster relief and enterprise inventories

Table V.
Summary of the papers of our selection assigned to "Logistics and operations"

Paper	Summary
Ali *et al.* (2015)	Effectiveness of emergency water treatment practices in refugee camps in South Sudan
Cronin *et al.* (2008)	Water and sanitation provision in refugee camps in association with selected health and nutrition indicators
Gifford *et al.* (2007)	Health and well-being among young people from refugee backgrounds in Australia
Gilbert and Cunliffe (2011)	Non-governmental organisations and the management of HIV and AIDS in refugee camps; refugee-host community relations
Greenough *et al.* (2008)	Burden of disease and health status among hurricane Katrina; refugees in shelters
Krause *et al.* (2000)	Refugees' access to quality reproductive health services; safe motherhood
Legros *et al.* (1999)	Mass vaccination with a two-dose oral cholera vaccine in a refugee camp
Lehne *et al.* (2016)	Overall scale of energy poverty; three high-level scenarios for improving access to energy for cooking and lighting
Orach and De Brouwere (2005)	Integrating refugee and host health services
Paquet and Hanquet (1998)	Controlling infectious diseases and reducing excess mortality in refugees and host communities
Rieder *et al.* (1989)	Tuberculosis and its management in refugees
Toole (1994)	Rapid assessment of health problems in refugee populations; health status and health needs of host communities
Toole and Waldman (1997)	Public health issues related to populations affected by armed conflict
Weerasuriya *et al.* (2012)	Evaluation of a surgical service in the chronic phase of a refugee camp

Table VI.
Summary of the papers of our selection assigned to "Public health"

Paper	Summary
Agblorti (2011)	Humanitarian assistance to refugees in rural Ghana: implications for refugee–host relations
Del Valle (2016)	Search and rescue operations in the Mediterranean in 2015
Hilhorst and Jansen (2010)	Humanitarian space as arena: a perspective on the everyday politics of aid; empowering refugees
Holzer (2012)	Refugee camp security; social protests by Liberian refugee
Human and Robins (2014)	Treatment Action Campaign (TAC) fights for the rights of refugees in South Africa
Hyndman (1999)	Forced migration: tension between humanitarian need and the political interests of states; preventing asylum across borders and, at the same time, protecting IDPs in safe areas
Jacobsen (1997)	Refugees' environmental impact: the effect of patterns of settlement
Lindley (2011)	Between a protracted and a crisis situation: policy responses to Somali refugees in Kenya
McConnachie (2012)	Refugee warriors: non-state armed group as potential partner in refugee protection and welfare promotion
Olivius (2014)	Optimising the efficiency and effectiveness of humanitarian operations; women's participation and humanitarian aid effectiveness in refugee camps
Orach and De Brouwere (2005)	Integrating refugee and host health services
Rosenfeld (2010)	From emergency relief assistance to human development and back; education
Wilson (1992)	Enabling refugees' existing initiatives; refugee entitlement

Table VII.
Summary of the papers of our selection assigned to "Human rights and refugee protection"

Van Wassenhove, 2006). Even though standardised templates have been created to facilitate information sharing between the different supply chain actors, other topics, like product and packaging standardisation and modularisation have not been the focus of researchers so far (Kovács and Spens, 2011). Jahre and Jensen (2010) have demonstrated additional evidence for improving efficiency and resilience in coordinating disaster response based on their research on supply chain and inter-cluster coordination. Clusters for diverse functions, including sheltering, logistics and water and sanitation, focus on the beneficiaries' needs besides the above-mentioned standardisation through functional coordination. The UN Office for the Coordination of Humanitarian Affairs (OCHA) has recognised cluster thinking to improve global capacity to respond to emergencies, lead to more predictable leadership globally and locally and enhance collaboration between humanitarian organisations and authorities. In addition, it enhances accountability and strategic field-level coordination and prioritisation (Office for the Coordination of Humanitarian Affairs, 2007).

As recommended by different authors, future research should further investigate the structure of decision-making and potential supporting tools, the demand and supply processes, their special requirements and the critical success factors for disaster relief operations (Holguín-Veras *et al.*, 2012; Pettit and Beresford, 2009; Van der Laan *et al.*, 2009). Therefore, the definition of clear mandates, appropriate policy support for national preparedness and cooperation that facilitates and improves collaboration is suggested as future research to coordinate and foster migration movements (Baarda, 2001; Holguín-Veras *et al.*, 2012). Table IV provides an overview of the papers in the sub-category Performance measurement.

3.3.2 Logistics and operations. Logistics aims to get the right amount of goods in the expected quality to the right place and distribute to the right people at the right time. In other words, the term logistics includes the planning and preparedness, design, procurement, transportation, inventory, warehousing, distribution and beneficiary satisfaction (Van Wassenhove, 2006).

Due to unpredictable and unstable circumstances before, during and after a disaster strikes, demand planning and forecasting are very difficult. Thus, relief logistics offers great potential for improvements. Whybark (2007) has examined the differences in characteristics

between disaster relief and enterprise inventories, from acquisition through storage and distribution. He finds that private companies maintain close relationship with their partners and clearly define the ownership of supplies and storage locations based on economic decisions. In comparison, humanitarian organisations are impacted in particular by the uncertainty of future demands. Ownership of humanitarian supplies is not always clear and decisions about storage locations are often influenced by political conditions. These insights have served as a basis for future research on humanitarian logistics.

McCoy and Brandeau (2011) have developed an inventory optimisation model to improve the efficiency of UNHCR emergency response to beneficiaries through appropriate central coordinated stock levels and shipping policies. They recommend the partition of a fixed budget between stockpiling and shipping costs, as well as developed shipment policy and stockpile size strategies that minimise the total expected response penalty incurred over a certain time horizon. For their investigation, they considered that the stock level, the warehousing costs as well as the ability of a humanitarian organisation to respond to beneficiaries' needs increase in proportion to each other. Overall, McCoy and Brandeau (2011) strongly focussed on the needs of beneficiaries in refugee camps beside the efficiency factors. Their developed simulation tool constitutes a sound basis for an organisation's operational decision-making process, that is oriented towards efficient relief processes to optimal use the limited relief resources, and needs of refugees. The spreadsheet model determines a near-optimal budget allocation and verbal interpretation of the optimal shipping policy and response penalty for any combination of parameters (McCoy and Brandeau, 2011).

Kovács *et al.* (2010) examined how beneficiaries can be involved as active members of humanitarian supply chains in the context of development aid operations. They suggest that their active involvement and contribution might be highly beneficial, for example, for the reconstruction of their housing. Such a community involvement not only provides local human power and materials, it also ensures the motivation of beneficiaries and leads to a reduction of transport, logistics and material costs, compared to global sourcing and involvement of international labour (Kovács *et al.*, 2010).

Besides the needs assessment, appropriate education and training are required to provide a regional labour force. One solution could be to develop and train a squad of logistics experts according to international standards (Perry, 2007; Arminas, 2005; Mashni *et al.*, 2005; Hale and Moberg, 2005; Closs *et al.*, 2005). Kovács *et al.* (2010) saw the responsibility of the final decision making with the local implementing partners in order to ensure overall neutrality and impartiality and to avoid manipulation by local communities. Local capacity building and the use of local suppliers and resources in humanitarian aid are important to support and positively stimulate the regional economy (Perry, 2007; Kovács *et al.*, 2010; Salehin *et al.*, 2011). This also increases the speed of delivery as well as cost-effectiveness of humanitarian operations (Kovács *et al.*, 2010). Moreover, reduced transport emissions can be achieved when using locally produced goods compared to global sourcing and connected logistics processes.

In order to improve the efficiency of operations and the overall well-being of beneficiaries in refugee camps, Nerini *et al.* (2015) and Salehin *et al.* (2011) conducted research on certain logistics commodities, such as water and electricity supply. According to Nerini *et al.* (2015), cost-intensive diesel engines-based generators are primarily applied to transfer clean water to a refugee camp. This approach is mostly used for short-term disaster relief logistics but in certain events also for the long term, and has a negative environmental impact. To overcome the sustainability issues, Nerini *et al.* (2015) developed a reliable alternative solution by including local energy sources such as solar, wind, biomass and hence, reducing the dependency on fossil fuel. This Energy and Water Emergency Module is a competitive

solution that reduces costs and guarantees high security of supply of water and energy needs in refugee camps through the usage of several local energy inputs. A comparable energy module that also uses locally available resources was designed by Salehin *et al.* (2011). This purpose-built energy conversion unit is based on a techno-economic analysis for a refugee camp of 20,000 people located at the Chad-Sudan border. Both solutions can be used as sustainable alternatives to conventional modules. Their integration and testing should be included in future academic research agenda.

Table V provides an overview of the papers in the sub-category Logistics and operations.

3.3.3 Public health. Selected research papers deal with the well-being among refugees, in particular the provision and the improvement of health treatments, strategies and solutions to combat diseases in camps as well as improvements of water and sanitation condition.

Refugees are facing different challenges that hinder their access to essential health services triggered by circumstances of extraordinary instability after man-made and natural disaster: violence, displacement, disruption of family and community, dislocation to unfamiliar and often overcrowded surroundings, lack of infrastructure and access to basic survival needs, escalations in conflict resulting in new refugee influxes (Krause *et al.*, 2000). It is all the more important to provide appropriate logistics functions and health conditions that serve the needs of beneficiaries.

Research on water supply, sanitation provision as well as resulting diseases have been conducted and are described by Ali *et al.* (2015) and Cronin *et al.* (2008). While Ali *et al.* (2015) analysed the concentration of residual chlorine in drinking water supplies in refugee camps in South Sudan, Cronin *et al.* (2008) conducted dedicated household surveys in several African refugee camps. Both discovered a linkage between diarrhoea disease outbreaks, inadequate water supply and water quality (Ali *et al.*, 2015; Cronin *et al.*, 2008). A similar study on cholera vaccination among 44,000 South Sudanese refugees in Uganda has also emphasised the importance of adequate quality of the water (Legros *et al.*, 1999). The demanding storage and shipping standards of the vaccines are additional challenges for their large-scale use, recognised by Legros *et al.* (1999).

Large population displacements are always associated with a high rate of mortality due to infectious diseases (Paquet and Hanquet, 1998; Toole and Waldman, 1997). Thus, in addition to above-examined supply of safe water and sanitation, these authors recognised the effects of measles immunisation, prevention and prompt treatment of dehydration as well as management of malaria during the post-emergency phase as highest priority actions to reduce excess mortality. The incorporation of emergency contingency plans, the integration of refugees to host communities and the preparation of their repatriation, as well as the rehabilitation of national health services are seen as potential solutions to combat mortality (Paquet and Hanquet, 1998; Toole and Waldman, 1997; Orach and De Brouwere, 2005).

How do NGOs effectively manage diseases in refugee camps? HIV/AIDS, for example, is very prevalent in refugee camps and could create negative economic, social, political and security implications for host states (Gilbert and Cunliffe, 2011). Gilbert and Cunliffe (2011) initiated an HIV management and condom distribution programme in camps. Their results show that further efforts and more governmental support are necessary to generate long-term behavioural changes.

Table VI provides an overview of the papers in the sub-category Public health.

3.3.4 Human rights and refugee protection. Selected papers analyse and evaluate, from a legal and political point of view, the displacement of people triggered by persecution, widespread civilian insecurity, suffering and governance failure (Lindley, 2011). The authors additionally investigated potential consequences on refugee-host relations, the conflicts between humanitarian organisations and interests of governments as well as

their obligations to protect human beings. They have recommended strategies for refugee integration and resettlement, as well as the empowerment of refugees. Wilson (1992) suggested providing cash instead of goods for empowering refugees. Such a solution is less expensive from a logistics point of view, but the increasing demand of goods could also cause lower wages and higher food prices in an area isolated from national food markets (De Waal, 1989).

A selection of papers addresses injustice from different perspectives: Olivius (2014), for example, investigated the politicisation and instrumentalisation of gender in humanitarian aid. Women's entitlement in refugee camps has become an instrument for optimising the efficiency and effectiveness of humanitarian operations in refugee camps rather than a tool for improving gender equality. This leads her to further raise awareness of the gender equality topic.

Combating inequity in order to realise a peaceful co-existence between refugees and host communities was reflected by different authors. In general, it requires considering the needs of both, the host community and refugees. Furthermore, an appropriate resettlement depends on the integration of all services in a humanitarian space, in particular when refugee camps are established in predominantly rural communities with poor living conditions and the assistance to refugees is perceived to be above average living conditions in the host communities (Agblorti, 2011; Orach and De Brouwere, 2005; Hilhorst and Jansen, 2010).

Basic needs of refugees should be reflected in policies. Recent examples of displacement show that there is a high potential for improvement: people are forced to flee war and hence, are crossing borders of the Eastern Mediterranean countries. Because of the increasing number of refugees, the EU actively seeks cooperation with third countries outside the EU to outsource the processing of asylum applications and set up a regional system for a more effective reinforcement of its borders (Del Valle, 2016). These efforts by the EU are impacting people's ability to seek asylum and impeding the work of humanitarian organisations' search and rescue operations in the Mediterranean (Del Valle, 2016) and to act according to humanitarian principles: humanity, neutrality, impartiality and independence. Thus, a significant conflict between humanitarian needs and the political interests of states is evident (Hyndman, 1999; Del Valle, 2016; Human and Robins, 2014). A South African experience could serve as a promising example to deal with this tension. In 2008, the Treatment Action Campaign forced the South African government to protect and empower refugees and non-nationals by means of political peacebuilding tools (Human and Robins, 2014).

Table VII provides an overview of the papers in the sub-category human rights and refugee protection.

4. Gaps, limitations and challenges

Drawing from the findings of the structured content analysis, the characteristics of the body of literature at the intersection of Humanitarian SCM and refugees are summarised. Furthermore, conceptual tools and perspectives are identified that have been neglected so far and could be used to strengthen future research.

The limited sample size of papers implies that the combination of the two fields of research (i.e. Humanitarian SCM and refugees) is still relatively new. There is an increase of papers published since 2005, partly caused by the launch of a dedicated journal and the publication of several special issues on humanitarian logistics. The geographic focus was mostly on African countries. As a consequence of recent events, we believe that future research should pay more attention to other areas as well, such as the Mediterranean and Middle East, in particular the neighbouring countries of Syria.

In regard to the main focus of paper, we found that most papers have a strong focus on either Humanitarian SCM or refugees, but there is a clear lack of studies that take a more balanced approach and apply SCM principles in the context of refugees. This could be explained by the fact that the two areas of research are explored by different disciplines and different researchers, who do not feel confident to focus in-depth on the other area they do not necessarily master. An operations management scholar will, for example, extensively describe SCM concepts, and refer to refugee-related issues only superficially. In contrast, a migration specialist will discuss the refugee issue in detail and only touch superficially on operational aspects. These two groups of researchers also publish in different journals, which require the papers to focus on their respective disciplines and cite theory from their own research area.

We acknowledge that a lack of research in an area does not always mean there is a need for more research. However, when two important academic disciplines that are combined in practice, such as SCM and Refugees, have not been studied together, we believe there is an important gap in research that has to be filled. In this case, the lack of research on Humanitarian SCM responding to refugees calls for interdisciplinary follow-up research by both academia and industry given the significant challenges relief organisations are facing to save lives and to ensure health and well-being of refugees with ever shrinking budgets (UNHCR, 2016b). Driving future research in this field will advance theoretical and practical understanding. It will furthermore provide guidance to policymakers and relief organisations managers tackling the current phenomenon of extensive refugee movements that have enormous impact on the refugees themselves but also the surrounding host communities and societies at large.

When looking at the type of operation, our findings correspond with the results of Kunz and Reiner (2012). Existing literature focusses mainly on disaster relief and less on development aid. Disaster relief activities are more difficult to plan. Their operational decisions are strongly influenced by uncertainties in regard to the local political system, economy, infrastructure and environment in an affected region as well as the special needs of the local population. Development aid operations are also impacted by such uncertainties, but humanitarian organisations have more time to adapt their development activities to the local realities. Although development aid operations often imply a more comprehensive modelling based on their multi-period focus, future research should take into account a broad range of sustainability issues, especially in the context of refugee camps. Here, questions like the following ones may guide reasoning: How can long-term effects of aid be embedded into the design of disaster relief? How can the continuousness of humanitarian aid operations be ensured after humanitarian organisations have left the affected region? Respectively, future research should address development aid operations, especially in connection with local economic partnerships, local sourcing, capacity building and community-based supply chain design (Kunz and Gold, 2015; Kovács and Spens, 2011). These topics are important to support and positively stimulate the regional economy (Perry, 2007; Kovács *et al.*, 2010; Salehin *et al.*, 2011) as well as facilitate cost-effectiveness and reduction of transport emissions (Kovács *et al.*, 2010). The impact of climate change and urbanisation on refugees is another important area for future research (Kovács and Spens, 2011). It is, in fact, climate change and its effects on natural resources that may force people to flee. Refugees may also enter into conflicts with host communities if they compete for limited resources (UNHCR, 2014). According to UNDESA (2014), the world's population residing in urban areas will increase from 54 per cent in 2014 to 66 per cent by 2050. This increasing urbanisation creates additional challenges for the humanitarian supply chain by fostering higher susceptibility of populations and reducing their mitigation and coping strategies (Suarez, 2009). It is therefore important to consider future research on the preparedness of urban populations for potential disasters. Social sustainability is another

suggestion for future research, more precisely, on beneficiary empowerment during development aid operations (Kovács and Spens, 2011).

The analysis of the papers' research approach discovered less empirical qualitative research on Humanitarian SCM responding to refugees, whereas we find that a high proportion of conceptual research has been conducted on this topic until now. Although conceptual research is certainly needed at each level of maturity of a new field of research, it is now time for more quantitative and qualitative empirical research in order to test theoretical frameworks and assumptions. Such empirical research could be facilitated by the increase in partnerships we identified between academia, practitioners and global institutions. Academia can benefit from those partnerships through easier access to the field or to otherwise inaccessible areas. Such partnerships between academia and practice may also be seen as beneficial for future empirical research projects in order to enhance the understanding of the complex humanitarian field, to improve existing humanitarian logistics processes and to develop best-practice solutions.

Our qualitative content analysis also led to a number of interesting suggestions for future research. The importance of coordination and harmonisation of tasks in a multi-supplier network has, for example, been captured by papers in the sub-category Performance measurement (Kovács and Spens, 2007; Schulz, 2009; Van Wassenhove, 2006). Efficient collaboration and supply chain coordination in humanitarian logistics go along with transparent communication (Long and Wood, 1995) and supporting technology. Since we only found limited examples of IT applications sustaining humanitarian logistics (Bjorgo, 2000; Nerini *et al.*, 2015; Salehin *et al.*, 2011), the need of further technological contribution is evident. Future research on engineering innovations would serve to combat the lack of data availability and forecast accuracy that is triggered by the complex and usually chaotic scenes of disasters (Van der Laan *et al.*, 2009). Various authors recommended to focus on decision-making tools, which will support the demand planning, and to enhance the research activities in ranking the CSFs for disaster relief operations (Holguín-Veras *et al.*, 2012; Pettit and Beresford, 2009; Van der Laan *et al.*, 2009).

A number of challenges have been raised by the papers in the sub-category Logistics and operations. First of all, research on logistics models, especially models for development aid operations, is underrepresented (Kovács and Spens, 2011; Jahre *et al.*, 2009). We suggest that more research should focus on this type of operations. Furthermore, there is a lack of process standardisation for certain types of operations, within and across different humanitarian organisations as well as common templates to facilitate the interoperability between humanitarian organisations, e.g., needs assessment, ordering and tracking items (Kovács and Spens, 2011). Future research could aim to answer these questions. We also found out that there is a demand for targeted local logistics training and education, and hence, sufficient local expertise (Perry, 2007; Kovács and Spens, 2011). What could be done to address this? In the context of refugee camps, future research could analyse how refugees could get involved in the operational management of camps, e.g., by hiring and training them for specific functions. Effective logistics processes are vital for relief and development operations (Kovács and Spens, 2011). However, the contextual factors affecting these operations have not been sufficiently considered for logistics (planning) processes, as they are crucial to effective logistics of humanitarian organisations and their whole supply network. Consequently, the academic research agenda should consider more empirical research on supply chains of humanitarian organisations. From a perspective of forced displacement, topics such as forecast accuracy, supply network operations and the procurement of certain commodities should be covered by future research.

The challenges of appropriate medical provision and overall well-being for refugees and their host communities are captured by the sub-category Public health. Since infectious diseases are often present in refugee camps and cause a high rate of mortality (Paquet and

Hanquet, 1998; Toole and Waldman, 1997), their prevention and management are of high priority. Moreover, an integration of the health system of refugees and the host community has been suggested for future research (Paquet and Hanquet, 1998; Toole and Waldman, 1997; Orach and De Brouwere, 2005). This improvement has been recommended due to respective situations where the medical access has been impeded for both parties (Krause *et al.*, 2000; Orach and De Brouwere, 2005). It would be beneficial to develop more standard procedures for certain diseases, as Gilbert and Cunliffe (2011) have already presented in regard to the management of HIV in refugee camps.

The sub-category Human rights and refugee protection discusses ethical and policy-related topics covered by our selected papers. Governments and their political stances highly influence the way refugees are treated. The political debate about gender equality is still an unsolved topic which is also currently shaping the treatment of women and their concomitant protection in refugee camps. Thus, future research on gender and the construction of policies should reflect the needs of all beneficiaries and their overall well-being. This might help in countering the politicisation and instrumentalisation of gender in humanitarian aid. Moreover, governments have a strong impact on Humanitarian SCM (Kunz and Reiner, 2012; Kovács and Spens, 2011). This is confirmed by our findings. In order to operate effectively across borders, humanitarian organisations need to be given clear mandates from governments. Appropriate policies and cooperation between governments must support national preparedness strategies in order to enable sound response to refugee crises (Baarda, 2001; Holguín-Veras *et al.*, 2012). Future research on politics and human rights linked with Humanitarian SCM is highly recommended (Kovács and Spens, 2011; Seekins, 2009).

Our research has a number of limitations. The quantitative content analysis based on occurrence counts could be subject to a potential selection bias of keywords related to each category. However, since we use an automated method, all papers have been treated with the same systematic approach. Potential biases would impact all papers of the selection equally. Furthermore, the word count method does not distinguish between the different contexts in which keywords have been used. We have alleviated that problem by excluding the list of references, the appendix and the footnotes as well as by manually screening the papers and removing incorrectly counted words. The qualitative content analysis is limited by its categorisation that is based on subjective decisions.

5. Conclusion

Humanitarian SCM and operations supporting refugees are a growing field of interest for researchers, governments and practitioners. This rising trend is not only due to the increasing scale and complexity of forced displacements (UNHCR, 2016a) but also because this research field is highly challenging from a supply chain and operations point of view.

The quantitative analysis revealed three main characteristics of research in our sample: first, existing research seems to be highly polarised on either SCM or refugee concepts. There is a clear lack of studies that combine both concepts in a balanced manner. In our opinion, future research should close that gap and connect Humanitarian SCM issues with those of refugees. Second, as there is a high proportion of conceptual research on this topic, more empirical studies are needed to test theoretical frameworks and assumptions. Third, we found that recent studies focus less on development aid operations compared to disaster relief. There is high potential for research on, e.g., SCM supporting refugees in long-established refugee camps.

Based on the results of our qualitative analysis, we suggest that future research should develop holistic and inclusive solutions for supply chain operations in connection with vulnerable persons and refugee camps. Such solutions should be practice led and ideally

based on a collaboration between academia, humanitarians and businesses in order to leverage the expertise and drive forward the knowledge transfer between these sectors (Van Wassenhove, 2006). Moreover, future research should improve the efficiency of the supply network coordination, e.g., by means of appropriate (cross-border) policy support and the definition of clear mandates as well as flat hierarchical decision-making and efficient communication concepts (Baarda, 2001; Holguín-Veras *et al.*, 2012; Long and Wood, 1995). Van der Laan *et al.* (2009) has outlined the need for more (information) technology contributions which could address the lack of data availability and low forecast accuracy in disaster-affected areas. Kovács and Spens (2011) recommended future research on product and packaging standardisation and modularisation to increase operational excellence. Given the limited financial resources and uncertainties humanitarian organisations face, more research on the efficient usage and sharing of resources through further development of logistics models for both disaster relief and development aid operations is required. Training programmes to build up a local expertise in a vulnerable region, in particular among refugees, as well as the testing and implementation of innovative concepts from the private sector (e.g. Dynamic Balanced Scorecard) will further reinforce and optimise (local) logistics processes.

Our analysis and evaluation of the body of literature reflect the need to connect relief and development activities in order to gain a broader understanding of response as part of long-term support for the affected communities. Therefore, we highly recommend research on local economic partnerships, local sourcing, capacity building and the provision of solutions against climate change (Kunz and Gold, 2015; Kovács and Spens, 2011). Future research in regards to public health should focus on the well-being among refugees and reducing mortality in disaster-affected areas, in particular by improving health treatments through appropriate supply chain strategies and (disease specific) solutions, e.g., of the water supply and the large-scale use of vaccinations (cold chain).

Finally, efficient Humanitarian SCM responding to refugees requires the integration of approaches and processes from other disciplines, like commercial logistics. Holistic and inclusive disaster response should meet the needs of all beneficiaries, maintain the operations in a refugee camp, create a resilient supply network and ensure the overall well-being of a country.

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Appendix

Main focus of paper	
Supply Chain Management	Refugees
*Logistics: = LOGIST**	*Refugee: = REFUGE**
LOGISTIC	REFUGE
LOGISTICAL	REFUGEE
LOGISTICIAN	REFUGEES
LOGISTICIANS	REFUGES
LOGISTICS	
Supply: = SUPPLI|SUPPLY**	*Displaced: = DISPLAC**
SUPPLIED	DISPLACED
SUPPLIER	DISPLACEMENT
SUPPLIERS	DISPLACING
SUPPLIES	
SUPPLY	
SUPPLYING	
*Operations: = OPERATION**	*Migration: = MIGRATION|MIGRANT**
OPERATION	MIGRANT
OPERATIONAL	MIGRANTS
OPERATIONS	MIGRATION
Procurement: = PROCUREMENT| PURCHASING	
PROCUREMENT	
PURCHASING	
Type of operation	
Disaster Relief	Development
Relief: = RELIEF	Development: = DEVELOPMENT
Emergency: = EMERGENCY|EMERGENCIES	Settlement : = SETTLEMENT|
EMERGENCIES	RESETTLEMENT
EMERGENCY	
Sudden: = SUDDEN	Reconstruction : = RECONSTRUCTION
Acute: = ACUTE	Rehabilitation: = REHABILITATION
Temporary: = TEMPORARY	Livelihood: = LIVELIHOOD*
	LIVELIHOOD
	LIVELIHOODS
Rapid: = RAPID*	Long-term: = LONG-TERM|LONG TERM
RAPID	
RAPIDLY	
Disaster response: = DISASTER RESPONSE	
Immediate: = IMMEDIATE*	
IMMEDIATE	
IMMEDIATELY	
Short-term: = SHORT-TERM|SHORT TERM	
Rescue: = RESCUE*	
RESCUE	
RESCUED	
Type of research design	
Qualitative Research approach	Quantitative Research approach
Qualitative: = QUALITATIVE	Quantitative: = QUANTITATIVE|QUANTIFY
Interview: = INTERVIEW*	Survey: = SURVEY*
Unstructured: = UNSTRUCTURED|SEMI-STRUCTURED	Statistical: = STATISTIC*

(*continued*)

Table AI.
Lists of keywords

Discussions: = DISCUSSIONS	Average: = AVERAGE|MEDIAN
Delphi: = DELPHI	Large sample size: = LARGE SAMPLE SIZE
Observation: = OBSERVATION	Database: = DATABASE
Workshop: = WORKSHOP	Regression: = REGRESSION
Case study: = CASE STUD*	Numerical: = NUMERICAL
	Modeling: = MODELLING|MODELING
	Simulation = SIMULATION
	Calculation: = CALCULAT*
	CALCULATE
	CALCULATED
	CALCULATION
	CALCULATIONS

Table AI.

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