



Maritime transportation in humanitarian logistics: the case of Yemen crisis.

Margarita Blank

Department of Marketing: Supply Chain Management and Social Responsibility

Hanken School of Economics

Helsinki

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HANKEN SCHOOL OF ECONOMICS

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<p>Abstract:</p> <p>Due to the unfortunate increase in disasters around the world, Humanitarian Logistics has become a separate global industry. There is an acute need to find better solutions for delivery of humanitarian assistance. Transportation mode selection is a challenging task in disaster relief operations. Humanitarian logisticians are operating under limited funding that increases the difficulty of conducting humanitarian operations. Therefore, allocation of resources is of high importance in humanitarian logistics as well as the need for more cost-efficient solutions in terms of transportation.</p> <p>The study aims to provide an insight and expand the knowledge on employment of maritime transportation in humanitarian logistics context. The aim of the study is to determine unique characteristics of sea transportation, its advantages and disadvantages as well as other factors that influence humanitarian logisticians' decisions on employing this transport mode.</p> <p>The study adopts qualitative research and uses the case study of the Yemen crisis as a research strategy. Empirical data is gathered through the interviews with humanitarian logisticians and humanitarian organizations' situation reports on the Yemen crisis are used as secondary data.</p> <p>The study contributes to the theory of humanitarian logistics by providing the insights into advantages and disadvantages of maritime transportation in humanitarian context. The research has practical implications for developing a framework for most efficient use of maritime transportation in humanitarian context.</p>	
Keywords: humanitarian logistics, maritime transportation, complex emergencies, Yemen crisis	

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LIST OF ABBREVIATIONS

HL: Humanitarian Logistics

WASH: Wash and Hygiene

NGO: Non-Governmental Organization

WFP: World Food Program

VOS: Voluntary Observing Ship

UNICEF: United Nations Children's Fund

WHO: World Health Organization

MV: Motor Vessel

1 INTRODUCTION

Due to the unfortunate increase in disasters around the world, Humanitarian Logistics has become a separate global industry (Kovacs and Spens, 2007). Therefore, its effective management is of the very high importance nowadays. Humanitarian Logistics constitutes from different parts and all the operations have one goal – save lives (Kovacs and Spens, 2007). Logistics itself is a crucial factor in humanitarian aid delivery accounting to 80% of all disaster relief operations (Trunick, 2005 cited in Kovacs and Spens, 2007). As disaster relief is taking place in destabilised environment, difficult political situation, in the areas with limited infrastructure, transportation mode selection becomes a challenging task. Apart from already mentioned factors, humanitarian logisticians have to take into account the urgency of the response, number of beneficiaries as well as the volume of needed aid.

Thorough decision on transport mode selection not only positively affects efficiency of the response, but also the success of the whole operation. Road transportation is the most studied transportation mode together with air transportation (helicopters), while the first one is used in all disaster response stages (Ertem, Isbilir and Arslan, 2017). However, there is not much research done on maritime transportation and its utilization in humanitarian logistics context. Baskaya, Ertem and Duran (2017) consider maritime transportation a “promising alternative” for humanitarian aid delivery.

1.1 Aim of the study and research problem

The study aims to provide an insight and expand the knowledge on employment of maritime transportation in humanitarian logistics context. The main aim of the study is to determine unique characteristics of sea transportation, its advantages and disadvantages as well as other factors that influence humanitarian logisticians’ decisions on employing this transport mode. In order to convey the research the following questions are answered:

RP: Under what conditions can maritime transportation be used in humanitarian logistics?

RQ1: What are the main advantages and disadvantages of maritime transportation in humanitarian logistics?

RQ2: How can the advantages of maritime transportation be effectively utilised for improving humanitarian aid delivery?

The study contributes to the research in fleet management in humanitarian logistics, focusing on maritime transportation and offering an alternative for effective and efficient humanitarian aid delivery. The study contributes to the theory on humanitarian logistics as well as theory on maritime transportation.

1.2 Delimitations

The study excludes military assistance in humanitarian operations, meaning that navy forces are not considered as the channel for humanitarian aid delivery. The study also does not touch upon passenger traffic using maritime transportation.

The research is based on the Yemen crisis that is an ongoing conflict, therefore, certain procedures are already in place in the area. Therefore, even though it is still considered to be an immediate response stage of disaster cycle, humanitarian operations have been active in the area since March 2015.

The conflict addressed in this research is ongoing, making the access to necessary information and people problematic. Sensitive issues have been discussed during research that could not be addressed by the interview respondents, therefore, some questions could not be answered.

1.3 Definition of terms

Humanitarian logistics – often referred to as Humanitarian Supply Chain, is:

“the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people” (Thomas and Kopeczak, 2005).

Maritime transportation – a way of transportation of goods and passengers via sea routes. In this study the terms “maritime transportation”, “sea transportation” and “sea freight” are used interchangeably.

Humanitarian assistance/humanitarian aid – material and financial help to the people in need with the purpose to alleviate suffering and save lives.

Complex emergencies – humanitarian crisis in a country resulting from civil conflict or foreign aggression, characterized by the large scale of devastation and cascading effect as well as the need of involvement of international organizations (IASC, 1994).

1.4 Structure of the thesis

The rest of the paper is structured as follows: firstly, introduction of the topic and the research is presented. Introduction is following by theoretical framework that discusses relevant to the current research theory. Thirdly follows the chapter on the framework that will be used to analyse findings of the research following by methodology chapter providing thorough information on the methods used for this research and their justification. The fifth chapter is findings and discussion; it presents the findings from the current research and reflects them to the existing academic literature. Conclusion is the last chapter of the paper that summarises conducted research as well as discusses its implications to practice and theory and proposes the field for future research. The structure of this paper is presented in Figure 1.

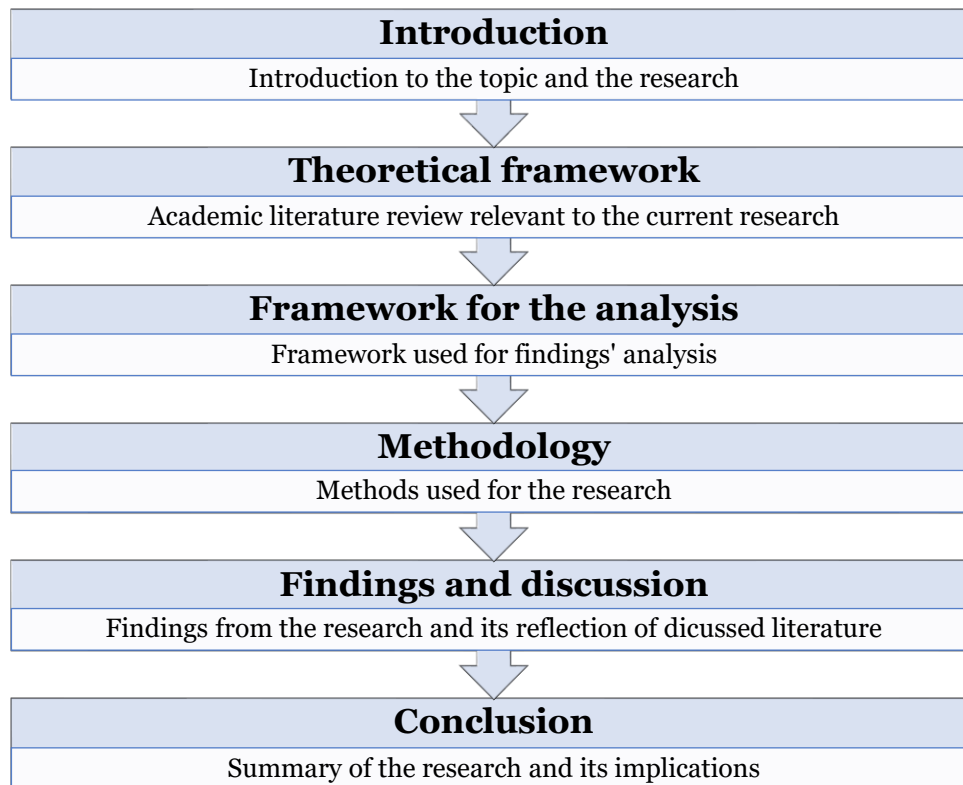


Figure 1 Structure of the thesis.

2 HUMANITARIAN LOGISTICS

This section outlines the main theoretical concepts that will be studied for the current research. Firstly, the introduction into humanitarian logistics is presented together with the theory on complex emergencies. Theory on transportation in humanitarian logistics and, specifically, maritime transportation is also included in the theoretical framework for the research.

2.1 Humanitarian supply chains

Humanitarian Logistics (HL) is the process of managing, coordinating, and controlling humanitarian supply chains, which can be defined as the flow and storage of materials (relief items) and the flow of information from the point of origin to beneficiaries (Haavisto, Kovács, and Spens, 2016). Operations of Humanitarian Logistics spread from ordinary medical supply for mitigating diseases and food deliveries for fighting hunger to provision of critical relief items in case of disasters (Holguin-Veras, et al., 2012). What makes humanitarian logistics more complex is its close connection to politics (operations in politically unstable environments), when international organizations need to seek ways to deliver humanitarian assistance and guarantee neutrality and equal treatment of all beneficiaries (Pedraza-Martinez and Van Vassenhove, 2016). The unique features of humanitarian supply chains can be outlined as follows:

- ambiguous objectives and need for neutrality: presence of many different stakeholders during humanitarian aid delivery, inadequate coordination and information sharing, and lack of cooperation between the parties constitute a challenge of undefined common objective of the operation (Tomasini and Van Vassenhove, 2009). Humanitarian organizations have to work with multiple actors, whose beliefs have to be taken into account during operation (Van Vassenhove, 2006);
- scarcity of resources: this is characterized by limited human resources specifically trained for humanitarian operations (high turnover of personnel involved in humanitarian aid delivery) (Van Vassenhove, 2006), limited budgets that are not available on time, and inadequate or absent infrastructure in the areas where humanitarian operations are performed (Tomasini and Van Vassenhove, 2009);
- high uncertainty: uncertainty in demand requirements and supply possibilities together with uncertainty about other stakeholders' resources (Tomasini and Van

Vassenhove, 2009). Uncertainty concerning the severity of disaster, infrastructure of affected area, availability of needed equipment - these factors have a high impact on the efficiency of humanitarian response (Overstreet et al., 2011);

- urgency and pressure of time: humanitarian response is performed under urgent conditions where speed becomes the main factor for saving people's lives (Tomasini and Van Vassenhove, 2009; Van Vassenhove, 2006);
- destabilized environments: humanitarian logistics is carried out in the environments that are prone to constant changes, which results in the necessity of robust and agile supply chains (Van Vassenhove, 2006);
- connection to politics: humanitarian operations are always held in politicized environment, where it is difficult but necessary to keep neutrality and equity towards beneficiaries (Tomasini and Van Vassenhove, 2009; Van Vassenhove, 2006).

Logistics is the process of management and storage of goods, it decreases inventory costs and ensures on-time delivery (Wood et al., 1995). Taking logistics separately and identifying it as a department or one of the parts in relief operations, Van Vassenhove (2006) defined its main characteristics in humanitarian aid delivery:

- logistics affects operations' performance - both operations' efficiency and effectiveness;
- logistics serves as the main link between different stages and steps in humanitarian aid delivery;
- logistics is considered to be the source of data as it is involved in tracking of relief items and information gathering;
- logistics constitutes the most cost consuming part of relief operations and is a critical factor in their successful implementation that is expressed and measured in reached beneficiaries (saved lives).

Humanitarian supply chains can be compared to commercial supply chains with one main difference – humanitarian supply chains (humanitarian logistics) aim at eliminating suffering and providing support to beneficiaries in need, i.e. saving lives

leading to the other objective – reducing the lead time (Haavisto, Kovács, and Spens, 2016; Tomasini and Van Vassenhove, 2009). The features of humanitarian supply chains mentioned previously constitute the most differences between private sector and humanitarian supply chains, however more points can be added to the list. The role of media in humanitarian operations is more significant than in commercial supply chains, accountability and transparency for donors is more requested and is of a greater meaning in humanitarian supply chains compared to the same in commercial supply chains for stakeholders, and «lessons learned» are, unfortunately, not that common in humanitarian context due to the lack of the final reward that is market performance in commercial supply chains (Van Vassenhove, 2006).

Richardson (1994, cited in Van Vassenhove, 2006) states that complexity of humanitarian supply chains is also caused by the combination of disasters when some of them are caused by the initial one; this makes it difficult to prioritize response urgency and necessity of humanitarian actions. Moreover, the wrong decision can accelerate destruction of the area making humanitarian aid delivery almost unrealizable (Richardson, 1994 cited in Van Vassenhove, 2006). Furthermore, there is a threat of disregarded events that may escalate and become the new humanitarian crisis due to the uncertainty of disaster's development and invisibility of possible consequences (Richardson, 1994 cited in Van Vassenhove, 2006).

Coming back to the reduction of lead-time as the objective of humanitarian supply chains requires listing the risks and challenges that obstruct its fulfilment. First of all, as humanitarian logistics is closely related to politics and governmental issues, customs problems constitute of the main challenges for importing relief items and other goods to the affected area together with bureaucracy (Tomasini and Van Vassenhove, 2009). Secondly, imbalance in control over the goods results in over control in warehouses and inventory management; finally, cooperation between actors and misunderstanding of other parties' goals become a challenge for reducing the lead-time (Tomasini and Van Vassenhove, 2009).

Two main areas can be distinguished in humanitarian logistics based on the response time and urgency of the relief operations – disaster relief (immediate response) and continuous aid work (long-term development of the region) (Kovacs and Spens, 2007). In immediate response and reconstruction stages, logistical support is of the most importance and distance is considered to be the primary factor when deciding on the

transportation mode for humanitarian aid delivery (Kovacs and Spens, 2007; Ertem, Isbilir and Arslan, 2017).

Pedraza-Martinez and Van Vassenhove (2016) also divided humanitarian logistics operations in two parts:

- *Disaster response* - includes prepositioning of items, their efficient purchasing, donations' management and transferring and is characterized by urgency, lack of information, and short duration;
- *Development programs* - their objective is to improve life of the affected area after the disaster and they are entailed to such challenges as inadequate local infrastructure, lack of budget, and last mile delivery obstacles.

Tomasini and Van Vassenhove (2009) and Van Vassenhove (2006) divided disaster management into four steps: mitigation, preparedness, response, and rehabilitation. Explanation of each step is provided in Figure 2.

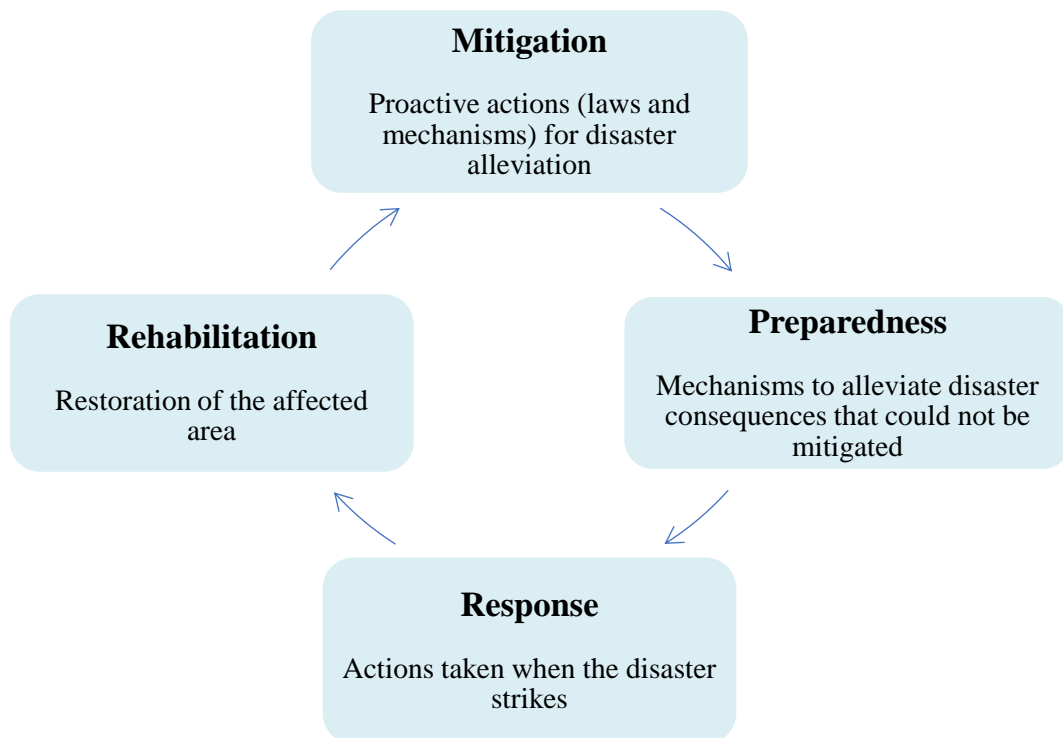


Figure 2 Steps in disaster management (adapted from Tomasini and Van Vassenhove, 2009).

Preparedness stage of the disaster cycle is focused on implementing measures to prevent the disaster or lessen the consequences and the impact of a disaster if one strikes

(Holguin-Veras et al., 2012). Preparedness ensures communities are able to foresee the disaster as well as respond to it (Christoplos, Mitchell and Liljelund, 2001) in order to minimize affected population and avert potential consequences of the disaster (Cozzolino, Rossi and Conforti, 2012). Preparation for the disaster is a vital step in disaster management as it improves effectiveness and efficiency of the response, which alleviates suffering of the affected population (Altay and Green, 2006). This stage is also important from a supply chain perspective as it includes the following activities: prepositioning of relief items, procurement of supplies, warehouse and inventory management, evacuation planning, personnel training and education (Kovacs and Spens, 2007; Tomasini and Van Vassenhove, 2009; Tabaklar et al., 2015; Atmanand, 2003). The supply chain resembles commercial supply chain at this stage with the objective to achieve cost-speed balance and establish processes and relationships to support it (Tomasini and Van Vassenhove, 2009). For instance, procurement from regional businesses of high-demand relief items saves cost and decreases lead-time in case of a disaster (Tomasini and Van Vassenhove, 2009).

The goal of the immediate response stage of the disaster cycle is to preserve life of the affected beneficiaries and provide immediate assistance right after the disaster strikes in order to minimize suffering and reduce health and survival risks (Moe, Gehbauer and Senitz, 2007; Ilhan, 2011). Immediate response stage is characterized by the need of urgent response (Holguín-Veras et al., 2012), meaning the speed of the response is of the essence and the first 72 hours are considered vital, making the lead time reduction the main goal (Van Vassenhove, 2006). After the disaster strikes, the infrastructure in the affected area is destabilized, which leads to the last mile problem (Kovacs and Spens, 2007). Moreover, in the aftermath of the disaster, due to communication problems, there is very limited knowledge of the situation in the area leading to high uncertainty in demand (Kovacs and Spens, 2007). In the response stage, coordination becomes a challenge due to the lack of control and command (Tomasini and Vassenhove, 2009).

Reconstruction stage of the disaster management cycle, also called as development programs, encompasses long-term activities focused on mitigating the impact of the disaster and ensuring rapid recovery (Oloruntoba, Sridharan and Davison, 2018). Activities included in the recovery stage are: reconstruction of the affected area, reconstruction of economic and natural environment (Oloruntoba, Sridharan and Davison, 2018) and improving living conditions of the affected community (Moe, Gehbauer and Senitz, 2007). At this stage of disaster management, cost becomes an

important factor and cost reduction a goal of operations (Tomasini and Vassenhove, 2009; Van Vassenhove, 2006). Cost reduction becomes possible due to relatively stable environment (Holguin-Veras et al., 2012), established demand and type of supplies as well as overall knowledge of the situation and beneficiaries (Kovacs and Spens, 2007).

2.2 Complex emergencies

Inter-Agency Standing Committee (IASC) provides the following definition of a complex emergency:

“a humanitarian crisis which occurs in a country, region, or society where there is a total or considerable breakdown of authority resulting from civil conflict and/or foreign aggression” (IASC, 1994).

Complex emergencies are characterised by the need of involvement of different international organizations as well as the need for extensive political coordination (IASC, 1994). Big number of casualties and displaced population are also part of complex emergencies (IASC, 1994). The scale of human suffering is large and massive humanitarian assistance is urgently needed in complex emergencies to alleviate suffering (IASC, 1994).

Large displacement of population occurs during complex emergencies leading to the eruption of communicable diseases, which happens due to malnutrition, lack of health infrastructure and clean drinking water and that are considered a major cause of mortality (Harpring et al., 2021). Complex emergencies last for years, which further aggravates the situation (Culver, Rochat and Cookson, 2017). Complex emergencies are often the reason to epidemics eruption in the affected area due to cascading factors (Harpring et al., 2021). Displacement of population also may lead to exposure of diseases that people are not accustomed to, leading to epidemics in the affected area (Culver, Rochat and Cookson, 2017).

Established humanitarian supply chains for complex emergencies are particularly vulnerable due to unpredictability of events (Harpring et al., 2021). Complex emergencies lead to the disruption of infrastructure of the affected area, logistics capabilities as well as flow and access to basic services (Harpring et al., 2021). Disruptions in the humanitarian supply chains affect the effectiveness and efficiency of humanitarian response that has a large impact for beneficiaries (Harpring et al., 2021).

In order for the humanitarian response to be successful, coordination in complex emergencies is the key (Lauras, Truptil and Benaben, 2015). All stakeholders are

required not only to share the common goal but also resources and information for successful disaster response (Lauras, Truptil and Benaben, 2015). Complex emergencies require international response and the ability of host government, humanitarian organizations as well as affected population to work together (Kruke and Olsen, 2012).

2.3 Transportation in Humanitarian Logistics

As the humanitarian logistics operations are divided into two areas according to Kovacs and Spens (2007), transportation in humanitarian logistics can also be split in the same two phases that differ in the attitude towards vehicle utilization and priorities when choosing the transportation mode (Hirschinger et al., 2016). In the first phase - disaster relief - the emphasis is placed on time and urgency, meaning that time efficiency is of the greatest importance; in the second phase - area development - operational efficiency becomes the main factor as the time pressure is not that severe and supply and demand are not that uncertain, therefore, cost becomes one of the driving factors at that stage, which makes humanitarian logistics similar to commercial supply chains in this context (Hirschinger et al., 2016).

Figure 3 presents transportation modes used in humanitarian logistics.

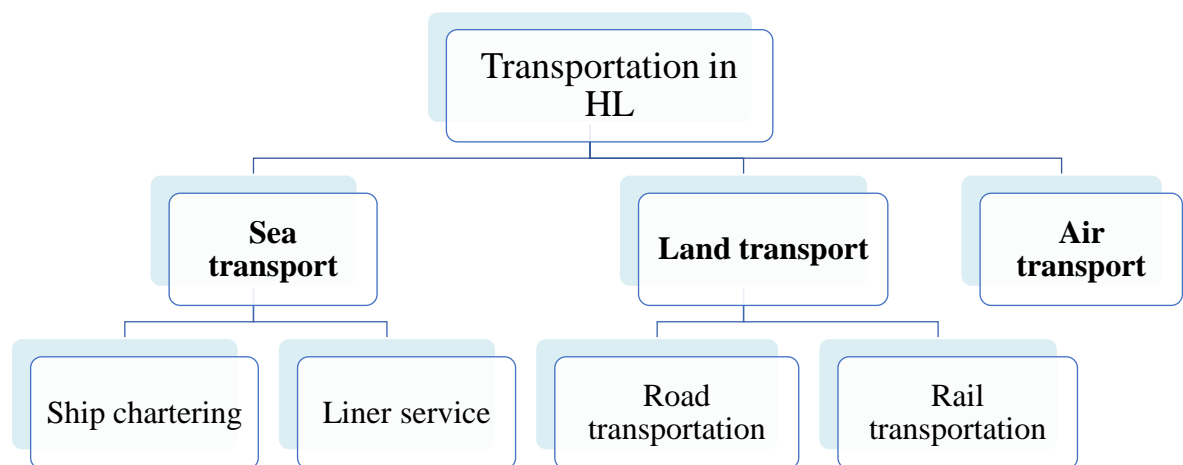


Figure 3 Transportation modes used in humanitarian logistics (adapted from Haavisto, Kovacs and Spens, 2016).

According to Haavisto, Kovacs and Spens (2016) the following are transportation modes used in humanitarian logistics and the explanations of those:

- **Sea shipping.** Sea shipping is considered to be cost efficient, however, the slowest transportation mode (the average delivery takes up to 4 months).

Therefore, even though it is widely and actively used in humanitarian operations, the cost becomes the driving factor and sea shipping has to be combined with other transportation modes to achieve on-time deliveries, especially, in immediate response stage. This transportation mode includes two options – ship chartering and using liner service:

- The main advantage of *ship chartering* is the possibility of delivering cargo both to multiple locations or to one destination, which gives flexibility to humanitarian organizations and helps in reducing the overall cost of cargo transportation. However, this form of sea shipping puts a lot of responsibility on humanitarian organizations, as they are responsible for carrying all the costs (ship costs and port expenses) and ship maintenance.
- *Liner service*, which implies renting the space on the ship that has an already established route, is generally less cost efficient than ship chartering. However, it allows transporting small volume of cargo meaning that it is not aiming at using full loads, which can be defined as the main advantage. Nevertheless, not enough space on the vessel, non-availability of the suitable trade route or ship at the desired time, and high insurance costs can be named as main disadvantages of liner shipping.
- **Land transport.** Land transportation is mostly used for distribution of relief items to beneficiaries. It involves road transportation and rail transportation:
 - *Road transportation.* It is the most commonly used land transportation mode in humanitarian aid delivery and is needed in all humanitarian operations due to its flexibility, diversity, relatively low cost, and the possibility to use already existing local infrastructure of the affected area (Kovacs and Spens, 2012). Moreover, one of the main advantages of road transportation is the possibility of goods' delivery from door to door, which excludes the necessity of involving other transportation modes in distribution process compared to rail, for instance. However, road transportation has a disadvantage that seriously affects its utilization - sensitivity to area's weather conditions.

- *Rail transportation.* The main advantages of it are the possibility to deliver large amounts of cargo, low cost, the ability to cover long distances, and relatively high speed. Moreover, safety and security can be named as rail advantages as well, especially for humanitarian operations in conflict zones and rail is not that affected by weather conditions. However, rail transportation has less flexibility, does not provide door-to-door service (therefore, has to be used in combination with road transportation), and requires infrastructure for its operations (Kovacs and Spens, 2012).
- **Air transport.** This transportation mode is mostly used at the early stages of humanitarian response when speed is the driving factor. Apart from speed, the advantages of air transportation also include safety and security, however, it is very expensive and most of humanitarian organizations cannot afford it for a long period of time, even though airdrops are considered to be economically viable option (Kovacs and Spens, 2012) as there is no need in developed local infrastructure.

Selection of transportation mode depends on such factors as carrier's operating area, type of assets the carrier is handling (what relief items can be transported with the particular carrier), transit time it can offer, schedule and service frequency, possibility of additional services, and carrier's reliability and the risks that may arise (Tomasini and Van Vassenhove, 2009).

Reis (2014) identified 10 attributes of transport mode choice: reliability, transit time, flexibility, price, frequency of service, monitoring, service level, shipper's market considerations, length of haul, and security.

Transit time, transport cost (price), reliability and frequency were also named by Feo, Espino and Garcia (2011) as the main attributes of transport; the same attributes were used by Shinghal and Fowkes (2002) for the survey in their research. Flexibility, safety/security, distance and characteristics of goods were added by Nugroho, Whiteing and de Jong (2016) as key factors for inland mode choice from the perspective of shippers or freight forwarders. According to the research, transport cost, transit time and reliability seem to be the most discussed factors in transport mode selection following by flexibility (Nugroho, Whiteing and de Jong, 2016). Price, service time, reliability and flexibility of mode were also named by Kim, Nicholson and Kusumastuti (2017) as freight

mode choice factors together with modal connectivity, security and potential for damage, ease of intermodal transfer, need for specialised handling, capacity, value-added activities in the supply chain and environment and sustainability issues. Table 1 provides transport mode selection criteria for each stage of disaster management cycle.

Stage of disaster management cycle	Key characteristics	Transport mode selection criteria
<i>Preparedness</i>	<ul style="list-style-type: none"> • Cost-speed balance • Establishing relationships for future stages • Prepositioning of relief items • Procurement of supplies 	<ul style="list-style-type: none"> • Price/transport cost • Transit time • Capacity • Reliability
<i>Immediate response</i>	<ul style="list-style-type: none"> • Speed is of the essence/lead-time reduction as a goal • Destabilized infrastructure • Unknown demand • Political issues/security 	<ul style="list-style-type: none"> • Transit time • Flexibility • Reliability • Security
<i>Reconstruction</i>	<ul style="list-style-type: none"> • Cost reduction as a goal • Relatively stable setting • Established demand and supplies' types 	<ul style="list-style-type: none"> • Price/transport cost • Capacity

Table 1 Transport mode selection criteria for each stage of disaster management cycle (adapted from Feo, Espino and Garcia, 2011; Reis, 2014; Shinghal and Fowkes, 2002; Nugroho, Whiteing and de Jong, 2016; Kim, Nicholson and Kusumastuti, 2017).

2.4 Maritime transportation in Humanitarian Logistics

Shipping industry can truly be named as global and the biggest industry in the world, being central to the world's trade and accounting to 90% of traded goods (Alderton and Winchester, 2002; Wijnolst and Waals, 1999). Due to globalization of companies, the importance of maritime transportation is increasing (Gorman et al., 2014).

Humanitarian supply chains are characterized by instability and complexity, the need for urgent establishment, as well as uncertainty in source location, final destination, and the amount of supplied items. These features are very close to maritime supply chains where even though the source and amount of supplied items is most often clearly defined, the final destination can be unknown and the supply chains need to be flexible and adaptable to new environments. Therefore, this link between maritime supply chains and humanitarian supply chains is stronger than even the link between the latter and standard commercial supply chains.

Maritime transportation has several advantages that are beneficial for humanitarian supply chains, deriving from characteristics of sea shipping itself (Ozkapici, Ertem and Aygunes, 2016). First of all, maritime transportation allows to transport large amounts of cargo, much more than any other transportation mode (Ozkapici, Ertem and Aygunes, 2016). This advantage leads to the reduction of required trips to the affected area (Ozkapici, Ertem and Aygunes, 2016). Secondly, maritime transportation is the cheapest transportation mode, which has a positive impact on reduction of the humanitarian response costs (Ozkapici, Ertem and Aygunes, 2016). Thirdly, maritime transportation is reliable and has a much smaller chance of collapsing during transportation (Ozkapici, Ertem and Aygunes, 2016). In disaster situation seaways are usually not congested and maritime transportation can be utilized, therefore, even though maritime transportation is considered to be the slowest transportation mode, the situation might reverse during emergencies (Ozkapici, Ertem and Aygunes, 2016). Fourthly, maritime transportation gives flexibility of choosing routes even though port locations are fixed, leading to the possibility to select transshipment points (Ozkapici, Ertem and Aygunes, 2016). Fifthly, container vessels give flexibility to humanitarian organizations in terms of storage – in case of collapse of the warehouses in the affected area, a container vessel may become a vital solution (Ozkapici, Ertem and Aygunes, 2016).

Taking the size of maritime industry into consideration as well as its versatility, the question arises: why such a vast industry is not fully engaged in humanitarian aid

delivery? This research aims to provide an answer to this question as well as determine advantages and disadvantages of sea transportation.

3 FRAMEWORK FOR THE ANALYSIS

This chapter presents the framework that is utilized by the researcher to analyse this study's findings.

The framework was developed based on the factors that influence transportation mode selection for humanitarian aid delivery. Four main components of decision making on transportation modes were identified: disaster, context, goods, and stakeholders involved and they are presented in Figure 4. The framework serves a purpose of classifying humanitarian activities for further identification of underlying reasons for maritime transportation employment in certain humanitarian operations. Based on it, the conditions when maritime transportation can and has to be employed are determined.

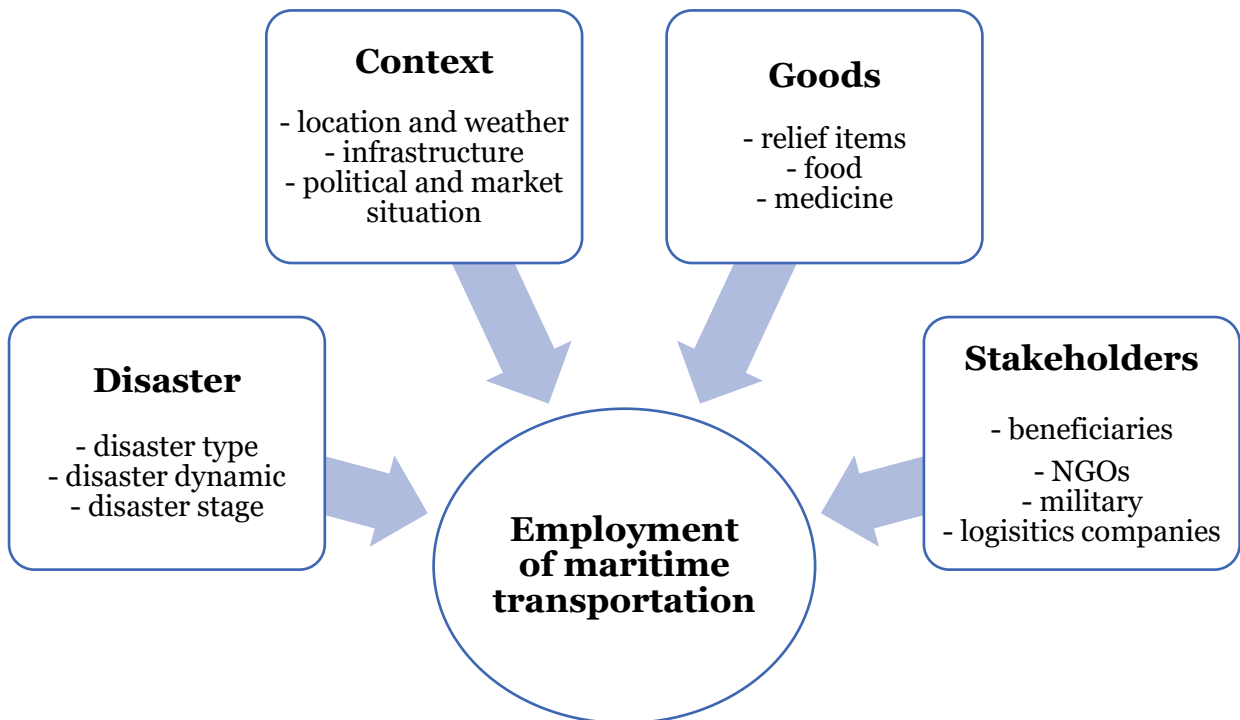


Figure 4 Framework for humanitarian operations' analysis.

3.1 Disaster component

Disaster component is comprised of three features – the type of the disaster, disaster dynamic, and disaster stage that can be also named as disaster management step.

The first feature of the disaster component is the type of the disaster – natural vs manmade. Natural disasters are characterized by relatively low probability of occurrence along with high reconstruction costs (Tansel, 1995). Moreover, natural disasters are

regional and, although their prevention is not possible, preparedness actions can and should be practiced in the area of risk to minimize the damage (Tansel, 1995). Manmade disasters, on the other hand, are of a high probability and their prevention is possible alongside with a necessity to employ preparedness and training actions (Tansel, 1995). What concerns the area of risks and costs for area rehabilitation, manmade disasters are happening worldwide where human activity is present and the costs vary depending on its features and the region of the event (Tansel, 1995).

The second feature of the disaster component is disaster dynamic. Van Vassenhove (2006) defines dynamic of the disaster and the speed of its development – sudden-onset and slow-onset disasters, which is applicable for both natural and manmade disasters. Sudden onset disasters are earthquakes or tsunami, which are natural, and terrorist attacks that refer to manmade disasters (Van Vassenhove, 2006). Slow-onset natural disasters are famine, drought, or poverty and slow-onset manmade disasters are political or refugee crises (Van Vassenhove, 2006).

The third feature of the disaster component is the stage of the disaster or the step in disaster management. Disaster stages include mitigation, preparedness, response, and rehabilitation (Tomasini and Van Vassenhove, 2009; Van Vassenhove, 2006), which were described in the previous chapter. For the current research, main focus is put on the last two steps – response and rehabilitation – as most of the logistics activities are performed then.

3.2 Context component

Area component consists of three features that describe the region where the disaster occurs – location and weather, infrastructure, and political and market situation.

Location and weather conditions in the region where the disaster strikes are the key issues to consider for deciding on transportation mode. Location comprises the geographical location of the area, whether the region is coastal or land-locked, which is the crucial decision-making element about employment of maritime transportation. However, even though it seems obvious that if the country is land-locked the probability of using deliveries by sea significantly lowers, there is still a possibility of intermodal transportations, when the goods are delivered by shipping to neighbouring coastal countries and further distributed using land transportation. Weather conditions play an important role in decision-making as well, mostly as the argument against using land transportation modes. For example, in case of Tropical Cyclone Nargis that struck in

Myanmar in 2008, most of the road infrastructure was damaged and the affected area was inaccessible by road, which made maritime transportation an alternative for delivering humanitarian aid (United Nations, 2008).

Infrastructure of the region is the other feature of the area component. Infrastructure in the affected area determines the possibility of maritime transportation employment, especially, in the response stage of disaster management – if no infrastructure existed in the affected region (port terminal infrastructure and port operational equipment) or it was severely damaged due to the disaster, cargo deliveries by sea cannot be utilised. However, in the rehabilitation stage (or long-term development of the affected area) there is a possibility that the needed infrastructure will be developed or reconstructed, and maritime transportation can be employed in the long run.

The third feature of area component is political and market situation in the affected area. Political situation refers mostly to the safety issue with cargo deliveries. As humanitarian operations are usually held in politically volatile environment, safety of people and cargo becomes an important factor for transportation mode selection. Market situation in the area that refers to possible existence of trade routes expands opportunities for Non-governmental Organizations (NGOs) for humanitarian aid delivery, as the same man-made passages established for international trade and commercial vessels can be effectively employed for humanitarian purposes.

3.3 Goods component

Goods component consists of the type of goods that can be delivered to the affected area – relief items, food, or medicine. However, goods component relates to the features of transported items, which include their size, special requirements for transportation, safety issues, and frequency of their deliveries.

Size of goods transported plays an important role when deciding on maritime transportation. As discussed in the previous chapter, maritime transportation allows high volume deliveries (Haavisto, Kovacs and Spens, 2016), therefore, is applicable to transportation of both relief items and food. However, the size of goods is also influencing the decision which option of maritime transportation mode to use – ship chartering or linear service. For high volume deliveries ship chartering is the only option due to the vessels' capacity that allows to use full loads (Haavisto, Kovacs and Spens, 2016). Linear service is used for small deliveries when the certain space on the vessel is rented (Haavisto, Kovacs and Spens, 2016).

What concerns medicine, special equipment has to be installed on the vessels to make them applicable for transportation of medicines. Refrigerated containers make it possible to maintain certain temperature and settings necessary for delivery of medicines on board.

3.4 Stakeholders component

Stakeholders component consists of the stakeholders involved in decision making on employment of maritime transportation and the parties affected by it. Therefore, beneficiaries are the main consumers of the delivered goods to the affected area. NGOs are the main players in humanitarian aid delivery and the decision-makers on maritime transportation employment including the decisions on employment of ship chartering or linear service.

Military is the other party that might be involved in humanitarian operations and can be the providers of vessels for goods transportation, however, in the light of the current research, military service is not taken into consideration.

Logistics companies, especially ship owners and ship management companies, are also parties directly involved in decision-making on maritime transportation utilization. Moreover, ship owners and ship management companies play a crucial role in respect to holding the assets, vessels, that are used by NGOs. Therefore, logistics companies are the transportation service providers in humanitarian aid operations and have to receive special attention when analysing transportation mode selection.

4 METHODOLOGY

Firstly, the chapter presents the research philosophy and sampling strategy the researcher is adopting. The chapter continues with types of data that were used for the current study, following with data collection process.

4.1 Research philosophy and sampling strategy

Based on the objective of the study, pragmatism is the research philosophy adopted for the current research. Pragmatism considers research question as the point of reference that defines research methods for the current research (Saunders, Lewis and Thornhill, 2008). Moreover, pragmatism accepts combining different research philosophies for answering research question and accepts both qualitative and quantitative research methods (Saunders, Lewis and Thornhill, 2008). Talking about research methods, qualitative approach is undertaken for the current study. Qualitative research allows to study the phenomenon in-depth, to acquire understanding of a certain concept (Patton, 2002), in case of the current research - by understanding both concepts, maritime transportation and humanitarian logistics, and penetrating into their core, define conditions when maritime transportation can be employed by humanitarian logistics.

For the current qualitative research, purposeful sampling is the appropriate sampling strategy as it allows the researcher to select illustrative information-rich cases (Silverman, 2008). The sample size is determined by saturation which is described as the contribution of each case to the research which reduces the need for further case search (Gummesson, 2000; Saunders, Lewis and Thornhill, 2008). For the current research intensity sampling strategy was defined by the researcher as the most appropriate one. Intensity sampling strategy implies selection of information-rich, but not deviant, cases, which helps the researcher to study the phenomenon in-depth (Patton, 2002). Case study is used as a research strategy for this thesis. Case study research is a comprehensive description and analysis of a certain phenomenon (Merriam and Tisdell, 2015). The case study of the Yemen crisis has been chosen as information rich example of employment of maritime transportation in humanitarian logistics.

4.2 Primary and secondary data

For the research both primary and secondary data are used. Secondary data is already existing data gathered for the other purposes, it may include companies' documents, official statistics, descriptions of humanitarian operations, and so on. The use of secondary data saves researcher's time and resources, as it is already available and does

not have a specific «location» meaning that it can be accessed from anywhere, which is regarded to be its main advantage. However, it also has a disadvantage which is the fact the data was collected and analyzed by the other person, which can influence its reliability (Krishnaswami and Satyaprasad, 2010). For the secondary data, the documents on humanitarian response in Yemen from different humanitarian organizations are collected.

Primary data is the data collected by the researcher, it is considered reliable as its source is known, which is the big advantage (Sachdeva, 2009). Primary data can be collected through interviews, survey, observations, and experiments. However, collection and especially analysis of the primary data is time and resource consuming, which can be named as the disadvantage of using it for the research (Kothari, 2004). For the current study, semi-structured interviews with representatives of several humanitarian organizations working in Yemen are used as primary data.

4.3 Interviews

Semi-structured interview, which is also named as an interview guide approach, is the type of the interview when researcher is focused on the certain subject of process, which the participant is involved in (Krishnaswami and Satyaprasad, 2010). This interview type implies development of the interview guide beforehand that includes the topics that have to be covered and the questions that have to be asked during the interview (Patton, 2002). This interview approach was chosen for the current research as it helps to stick to the certain subject and get most of the data from the interview participant, moreover, it also allows the researcher to effectively use the limited time and ensures that the interviews are conducted in a similar way.

For the research 25 members of different humanitarian organizations working in Yemen were contacted with the detailed explanation of the research and its purpose and the request to conduct an interview for the thesis. The potential interviewees were chosen on the basis of their involvement in Yemen operation, in particular, their work with logistics and purchasing. All candidates were contacted the second time if there was no response to the initial email. Out of 25 candidates, there was no response even after the second contact from 18 people, 2 candidates forwarded researcher's request to their colleagues, one person refused to participate in the interview and 4 potential candidates agreed to talk to the researcher. The numbers are presented in Table 2.

	Number of people	Percentage
<i>People contacted</i>	25	100%
<i>No response</i>	18	72%
<i>Forwarded to the colleague</i>	2	8%
<i>Negative response</i>	1	4%
<i>Positive response</i>	4	16%

Table 2 Breakdown on contacted candidates for the research.

The interviews were conducted with four representatives of different humanitarian organizations working in Yemen. The interviewees were chosen on the basis of their close involvement in logistics and purchasing planning for humanitarian deliveries to Yemen. All four of the respondents work for humanitarian organizations providing humanitarian assistance to the affected population of Yemen. Interviews were conducted online through Microsoft Teams. Table 3 below provides information on interviewees, personal identity codes for each of them, the dates of the interviews and their timing.

Interviewees	Code	Job description	Date of the interview	Duration of the interview
Respondent 1	R1	Logistics officer, working with Logistics Cluster	03.04.2021	35 min 10 sec
Respondent 2	R2	Purchasing, deliveries and distribution of supplies	15.04.2021	32 min 14 sec
Respondent 3	R3	Administrative tasks, responsible for logistics, transportation and fleet management in Yemen	27.04.2021	28 min 10 sec
Respondent 4	R4	Responsible for supply chain management for Yemen	06.05.2021	27 min 15 sec

Table 3 Information on the interviews' respondents.

The interview guide can be found in Appendix 1.

The first question in the interview guide serves the purpose of getting more information on interviewee's background and work in Yemen. The second question has a purpose to determine the main reasons behind employment of sea transportation in the Yemen crisis. Advantages and disadvantages of maritime transportation use in the context of Yemen are being determined with the help of the third question.

After establishing the main reasons for using maritime transportation and determining the main features of it in terms of Yemen, the researcher moves to identifying obstacles that were and are faced before and during employment of sea transportation. Therefore, question four addresses issues that had to be considered before using maritime transportation for humanitarian deliveries to Yemen.

As it is important to address all the issues concerning sea transportation, question five focuses on the risks associated with this transportation mode in the context of Yemen. After discussing the main aspects of sea transportation, researcher moves to determining whether any infrastructure developments were done by organization in question. Therefore, question six determines whether anything was done by certain organization in facilitating the use of sea transportation in the context of Yemen.

The next two questions are connected and their purpose is to determine the items that are being transported by sea and those that in the context of Yemen cannot be transported by sea and, therefore, other transportation mode has to be employed for their delivery. This question is important in defining how versatile sea transportation is in terms of delivered goods and whether it can be a sole transport mode for the Yemen crisis.

The researcher believes that humanitarian response in Yemen is still in the emergency stage and it is important to understand whether sea transportation can be utilised in the next stage of humanitarian response. Therefore, the purpose of question nine is to determine interviewee's opinion on the use of maritime transportation in the reconstruction stage of disaster management.

The current situation worldwide cannot be ignored and its consequences have to be discussed in the current research. For that reason, question ten addresses changes to maritime transportation that took place due to Covid-19 pandemic.

As the whole study, interview questions combined have a purpose to identify the reasons behind maritime transportation employment in the context of Yemen crisis, to determine different aspects of sea transportation use as well as evaluate this transportation mode's versatility in the Yemen emergency.

5 FINDINGS AND DISCUSSION

This chapter presents findings acquired during the research as well as discussion of these findings in the context of existing literature.

5.1 Yemen context

This subchapter provides a detailed overview of Yemen as well as the Yemen crisis. Firstly, country profile is presented in order to familiarize the reader with the country and its main characteristics. It also serves the purpose of presenting country's situation before the conflict that has its effects on the level of the crisis. Secondly, description of the Yemen humanitarian crisis is provided.

5.1.1 Country profile

Yemen is a coastal country in the Middle East located on the Arabian Peninsula (Library of Congress, 2008). Sanaa is the capital of Yemen and Yemeni Rial is the country's currency. Yemen has land borders with Oman in the west and Saudi-Arabia in the north (Logistics Cluster, 2010), the country is washed by the Red Sea and the Indian Ocean (IBCR, 2011). Figure5 presents Yemen's geographical location.



Figure 5 Yemen on the map (Encyclopædia Britannica, 2021).

Yemen's population is around 29 million people, predominant ethnic group being Arab, country's official language is Arabic, although English is also used in business circles (CIA, 2021). Islam is a state religion and virtually all the population is Muslim (Library of Congress, 2008).

Yemen has subtropical dry climate with low level of rainfalls (The World Bank Group, 2011). Due to high temperatures, sandstorms and dust storms are frequently occurring causing soil erosion and damage to crops (Library of Congress, 2008). Natural freshwater supply is very limited in the country; therefore, the supply of drinking water is very scarce (Library of Congress, 2008). Oil and gas are the primary natural resources of the country (IBCR, 2011). Even though west of Yemen has agriculturally productive land (Library of Congress, 2008), the country is highly dependent on import of commodities (The World Bank Group, 2011).

Yemen is heavily dependent on imports and involved in sea trade. Ports in Yemen are responsible for 60-70% of all the imports coming to the country (UNDP, 2021).

5.1.2 Yemen crisis

Since the conflict between Saudi Arabia-led coalition and the Houthis has escalated in March 2015, Yemen's situation significantly deteriorated (Hess, 2019) and now Yemen is facing the worst humanitarian crisis in the world (OCHA, 2021).

All the interview respondents, people directly involved in humanitarian operations in Yemen, mention the size of the disaster, the scale of devastation in the area.

“Yemen is the biggest humanitarian crisis in the world currently. (...) it is being considered the largest level 3 emergency globally. Basically, we are providing humanitarian assistance to 24 million population.” (Respondent R2).

Armed conflict led to the destruction of country's Water, Sanitation and Hygiene (WaSH) infrastructure and the spread of cholera disease (Federspiel and Ali, 2018). Population's resilience to the diseases was initially low due to malnutrition which resulted in the largest cholera outbreak (Federspiel and Ali, 2018). The situation has deteriorated even further due to the world's COVID-19 pandemic.

In 2021 66 % of population of Yemen are in need of humanitarian assistance and almost 39% are in acute need (HNO, 2021). Figure 6 shows Yemeni population in millions in need of humanitarian assistance since the beginning of the conflict, April 2015, till May 2020.

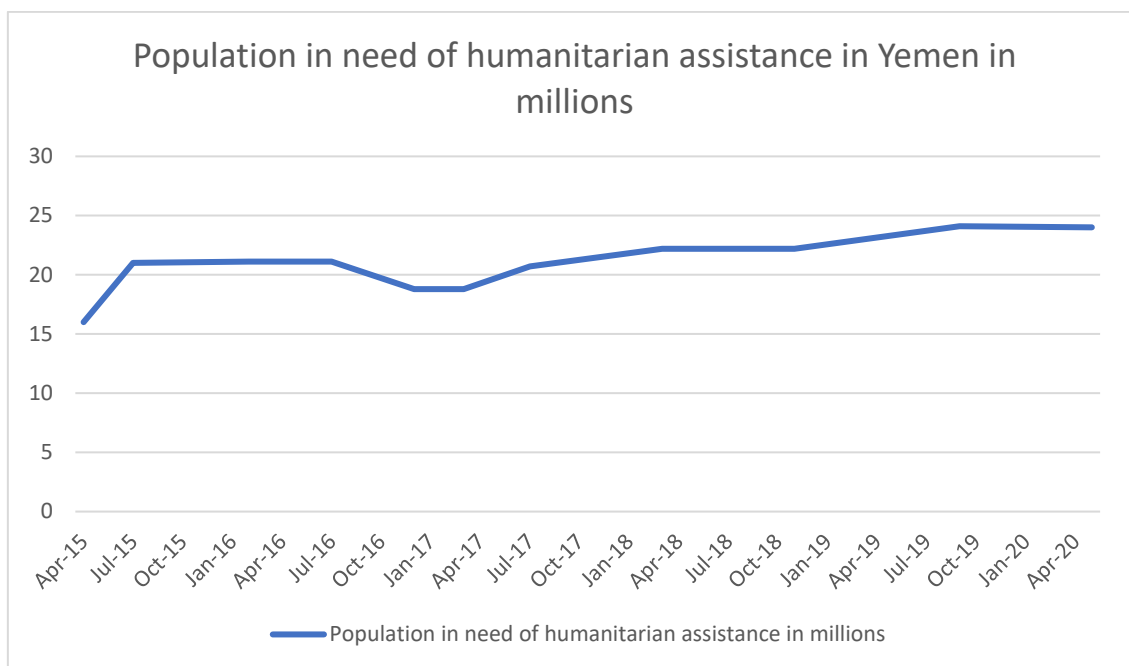


Figure 6 Yemeni population in need of humanitarian assistance in millions (Logistics Cluster, 2015-2020).

Half of the country's healthcare facilities have been destroyed during bombings and airstrikes, there is deficit of medical equipment and access to the remaining health care facilities is problematic (Mousavi and Ankomshoa, 2020). Damaged health care infrastructure can not provide adequate support and effective response measures to Covid-19 pandemic (Mousavi and Ankomshoa, 2020). Due to high vulnerability of Yemeni population, Covid-19 pandemic presents a great risk to the community (IRC, 2020).

Yemen's public services and infrastructure were affected by the conflict leading to closure of schools, health services and decrease in water, electricity and communications infrastructure functioning (HNO, 2021). Attacks affected telecommunications, cutting access to mobile and internet networks (ACAPS, 2021). Roads and bridges connecting south and north of Yemen were damaged resulting in challenges of delivering needed assistance (HNO, 2021). The conflict undermined all the vital infrastructure and made basic services inaccessible to Yemeni population (ACAPS, 2021).

Armed conflict caused displacement of population that further deteriorated due to Covid-19, which in its turn resulted in reduction of income opportunities for population and their communities (ACAPS, 2021). Due to worsened economic conditions in the

country, purchasing power of Yemen population has significantly decreased leading to inability of households to support themselves (ACAPS, 2021).

5.2 Findings

This section talks about findings from the interviews with humanitarian organisations' representatives in Yemen working with logistics as well as findings from secondary data.

5.2.1 Current logistical situation in Yemen

Yemen currently is in civil war and country is divided in two parts: one is controlled by internationally recognized government, another is controlled by the government de facto. The frontline is very fluid.

Yemen is a coastal country and maritime transportation is the main transportation mode for delivery of humanitarian assistance. There are currently two operational ports in Yemen: Aden in the south and Hodeidah in the north-west. Figure 7 presents ports of Yemen.



Figure 7 Ports of Yemen (GAC Yemen, 2021).

In the very beginning of the operation, in April 2015, Logistics Cluster has been facilitating access to World Food Program (WFP)-chartered vessel for bringing cargo into the country (Logistics Cluster, 2015). At first, the vessel, Voluntary Observing Ship (VOS) Apollo, was operating on a weekly rotation and was only going to Aden port (Logistics Cluster, 2016). The route to Hodeidah has been first mentioned in March 2018.

Logistics Cluster announced the second WFP-chartered vessel, VOS Theia, operating to Hodeidah port three times a month (Logistics Cluster, 2018). In September 2019, both vessels have been operating on a weekly basis and both of them have been equipped with refrigerated containers (Logistics Cluster, 2019).

Aden port is open for commercial liners and international companies, it has less bureaucratic and administrative constraints and is not considered a gap among humanitarian organizations working in Yemen. Aden is established as a temporary capital for the government-controlled part of the country.

Due to the political situation in the country, Hodeidah port is only accessible for humanitarian vessels, it is under control of the government de facto. The north of the country is where most of humanitarian assistance is taking place, therefore, Hodeidah port is of strategic importance.

International shipments for Yemen come to Salalah, Oman where they are being unloaded and stored. From Salalah shipments are being transferred to chartered vessels that can take up to 5000 m³ on board. The chartered vessel moves from Salalah to Hodeidah, where the goods are unloaded and transported by land to beneficiaries. The vessel goes back to Salalah, one voyage taking one month. This supply chain for the delivery of shipments to Yemen allows humanitarian organizations to maintain uninterrupted flow of goods and maintain limited stocks inside the country due to security reasons. Figure 8 presents the humanitarian supply chain for Yemen.

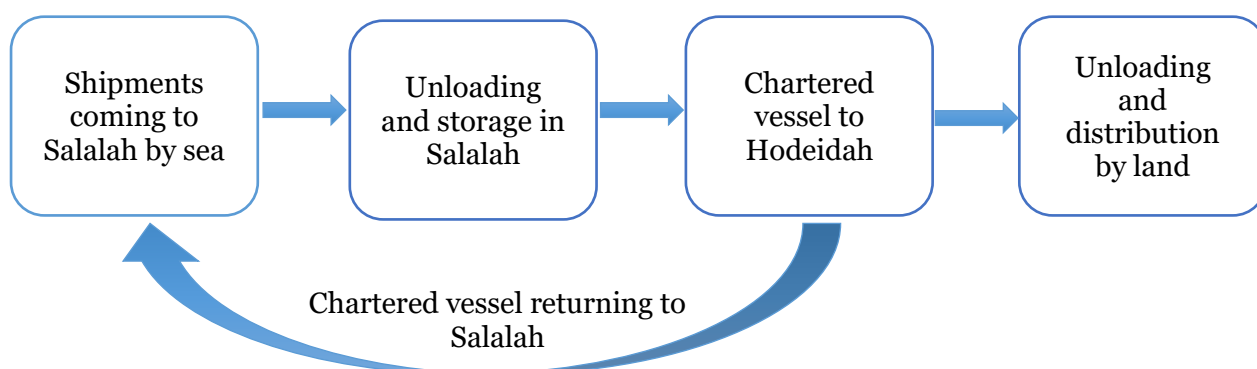


Figure 8 Humanitarian Supply Chain for Yemen.

United Nations Children’s Fund (UNICEF), WFP and World Health Organization (WHO) are using sea route to Hodeidah port for bringing supplies to Yemen (UNICEF, 2021). As of March 3rd 2021, Logistics cluster states that the north of Yemen is still served through Hodeidah port using WFP chartered vessels, the service managed by

WFP Shipping (Logistics Cluster, 2021). Concerning the south of Yemen, the shipments come through Aden port, however, this is organized autonomously by organizations as Aden port is open to commercial shipping liners. Logistics Cluster does not consider Aden port a gap in the supply chain and, therefore, is not part WFP logistics operations (Logistics Cluster, 2021). In May 2020 the third vessel has been mentioned in Logistics Cluster Situation Report – Motor Vessel (MV) Elena. The vessel is also chartered by WFP and is serving Hodeidah port (Logistics Cluster, 2020). All three vessels are available to the entire humanitarian community working on the Yemen crisis.

Logistics Cluster has also been providing sea passenger service for humanitarian workers, however, this operation is concluded as of March 2021.

5.2.2 What is delivered by sea?

In the course of research and interviews, the researcher found out that sea transportation is acceptable for most of the commodities required in humanitarian operations. Educational materials, recreational kits, nutrition supplies, supplies for water and sanitation program – all these are being delivered to Yemen by sea. Moreover, for some of the items, like blankets and mattresses, sea transportation is the best solution due to supplies' high volume and weight. Medical equipment and medicines are also transported by sea, but they require special containers with constant temperature and humidity. In order to involve maritime transportation in delivery of medicines, WFP has installed refrigerated containers on all of its vessels serving Hodeidah (Logistics Cluster, 2019).

“Basically, we supply everything that is required to ensure access to basic education, basic health services and water and sanitation, access to safe drinking water and personal hygiene.” (Respondent R2)

“I think sea transport is widely accepted for most of the commodities. (...) So sea ports have become the best delivery solution for heavy and big volume items.” (Respondent R4)

From different situation reports it is evident that WFP is using sea transportation to bring different commodities to Yemen. WFP is bringing cereals as well as mixed commodities, various medicines and non-food items using maritime transportation.

“Shipping operations have brought 60,000 mt of cereals into the country in January. Shipping also received 1,073 containers holding 21,958 mt of mixed commodities. On behalf of WHO, WFP received 69 containers holding various medicines and non-food items.” (WFP Yemen, 2021)

However, some supplies cannot be brought to the country by sea. Covid-19 vaccine is one of them. Vaccines require special temperature controls which cannot be provided on board of the vessel, therefore, air transportation has to be used for their delivery.

“It is not possible to supply vaccines through sea freight, because vaccine requires special temperature controls, special treatments. For this purpose we charter aircrafts.” (Respondent R2)

In terms of the Yemen crisis, there are certain items that cannot be brought to the country without prior approval from the government or cannot be brought to the country in general. Any military equipment has to have a clearance from the authorities before the imports as well as communication items.

“But when it comes some other security items like armoured vehicles, they are restricted to be imported to the country unless you have prior approvals from host government. Also communication items, high frequency radios, international satellites, these are restricted items that are not allowed into the country without prior approval from the host government.” (Respondent R3)

“Everything is delivered by sea except really sensitive items like guns. The essentials to respond to humanitarian emergency are brought by sea.” (Respondent R2)

Some of the items are banned in Yemen due to its complicated relationships with other countries.

“Any items that are manufactured in Israel or have a word “Israel”, for example geographical atlas or globes, it is banned by local authorities.” (Respondent R2)

5.2.3 Advantages and disadvantages of maritime transportation

All interview respondents name sea transportation a primary delivery method to the country. The main reason for that is relatively low cost of this transportation mode.

“Sea freight remains as the main route for the supply chain and the reason for that is that sea freight is the most economical way to deliver supplies.” (Respondent R2)

Even though maritime transportation is the preferred option and the cheapest transportation mode for cargo deliveries, timing is still very important in humanitarian operations that focus on saving lives. Therefore, the price is not the only variable that has to be considered in choosing the delivery method. Respondent 2 (R2) stated that occasionally it is needed to base transport mode selection on timing in unique environments like the Yemen crisis.

“Of course, in complex environment like Yemen we do determine which mode of transportation we can use: the cheapest which is sea freight or we go for air freight which is faster but much more expensive.” (Respondent R2)

However, several other advantages of sea transportation were named by the respondents. Capacity that sea transportation can provide is unique and is an important factor when choosing the delivery method to the area that has a large number of beneficiaries. Therefore, capacity of sea transportation is another advantage that was mentioned as well as cost-volume ratio. In addition to this, maritime transportation is

reliable in terms of the volume of shipments that is a big advantage for complex emergencies like the Yemen crisis.

“(...) it is necessary to use sea transport to deliver the things because of the cost, cost is smaller because of the volume of the items we are bringing, we cannot bring everything by chartered flights or inland transport.” (Respondent R4)

“So sea ports have become the best delivery solution for heavy and big volume items. Regarding medicines or urgently needed items, if it is high scale of emergency, we can bring a little stock so we can manage our work initially by chartered flights to Salaa airports, but the big stock it always comes by the sea.” (Respondent R4)

Familiarity of personnel with port operations was also mentioned as an advantage of sea transportation in comparison to air or land. As in normal conditions Yemen is highly dependent on imports and sea freight is an essential part of operations, personnel working in ports is familiar with due processes.

“Also in terms of facilitation in the ports, the ports are normally internationally open for any company, not only for humanitarian organizations, people there are used to the processes of customs, and other processes from the arrival of the consignment until the release, so it is much easier in comparison to air transport and road transport.” (Respondent R3)

Maritime transportation also has its disadvantages. Two of the respondents (R2 and R4) consider time of delivery by sea the main disadvantage of maritime transportation. However, in the context of Yemen crisis, delivery by sea is faster than by inland transportation modes.

“Disadvantage for this mode of transportation is that sea freight is lengthy, normally delivery of supplies by sea takes up to 3 months depending on the country of origin, it can be China, Europe even America. Basically, the only constraint we have in terms of sea freight is the time.” (Respondent R2)

“Main things are cost and time. Time is not too bad, faster than inland, because we are using Red Sea and Arab sea because the source comes from Dubai or Oman or Nairobi.” (Respondent R4)

The next disadvantage is derived from the lengthiness of maritime transportation. Since sea transportation is lengthy, the main risk of transporting cargo on a vessel is its exposure to high temperatures and humidity that might lead to the damage of supplies. In the case of transporting perishable supplies requiring certain temperature and humidity levels, special equipment like refrigerated containers have to be used, which significantly increases transportation cost.

“First of all it is exposure to humidity and high temperatures. So we have to be very careful when we use this mode of transportation especially for perishable supplies. In this case we need to use refrigerated containers and of course the cost of transportation is almost double.” (Respondent R2)

“Fragile items, medical items sometimes because of their shelf life they get ruined by heat in the sea, sometimes due to delays in deliveries, they come expired.” (Respondent R3)

In the context of the Yemen crisis, the issue of expiration of items is quite acute. Due to current political situation in the country, military inspection of incoming vessels is taking place. It increases the risk of damaging items and receiving expired items due to the delay and cargo's further exposure to high temperatures and humidity. Consequently, the delays due to inspection have a negative impact on implementation of humanitarian programs. These delays in the ports slow down the whole operation of supply chain and, subsequently, prolong the waiting time for beneficiaries requiring humanitarian aid.

“When our vessel comes somewhere and then the war ship comes, military inspectors come on board and check what is in containers and what type of supplies we are delivering, whether the supplies on board are according to bill of lading and packing lists, etc. The risk is that delivery of supplies is being delayed which has a negative impact on program implementation.” (Respondent R2)

Damage of supplies might also occur during unloading operations due to poor port infrastructure in the country. Since the start of the civil war, a lot of port equipment has been destroyed resulting in inadequate cargo handling.

“Because of the situation in the country, sea ports were destroyed some time back on the onset of the civil war, the capacity of the port, facilities there are very limited. Unloading and handling of the cargo in the port is not up to the international standard: we experience a lot of damages to the supplies during unloading operation.” (Respondent R2)

Humanitarian organizations are working on port rehabilitation in Yemen in order to speed up cargo releases. NGOs are working together with authorities on port reconstruction and providing necessary equipment.

“They (NGOs) are working with authorities to improve facilities at the ports. I think they provided one or two cranes, generators to support the infrastructure, to make ports function.” (Respondent R2)

Unexpected circumstances may occur during sea transportation that results in two problems: delays in deliveries and further damage of supplies. Vessel's arrival date and time is never certain, but it is a time frame during which the vessel is supposed to arrive.

“When we contract a supplier to bring us a shipment, whatever is the shipment, the delivery lead time is never reliable because of casualties, unexpected things happening during sea transport.” (Respondent R4)

Global Covid-19 pandemic has also affected humanitarian logistics. The lead time has prolonged as well as the delivery times are not reliable anymore. This further results in delays of cargo arrival.

“The third risk is that delivery schedule is not reliable anymore and this impacts our operation and this impacts us indirectly when we conduct local procurement from local market.” (Respondent R4)

5.2.4 Obstacles in maritime transportation

In the course of humanitarian response, organizations working in Yemen faced many challenges. Since the beginning of the conflict the main bottleneck of the operation has been lack of access to the country by land, sea and air due to the political situation (Logistics Cluster, 2015). Further on, based on the development of the crisis, the most affected areas have been identified – Aden and Hodeidah. Logistics Cluster in their Concept of Operations 2020 has stated that the movements of shipments between north and south of Yemen is a major gap in the supply chain (Logistics Cluster, 2020). This is caused by the political situation in the country as well as bureaucratic challenges that organizations are facing (Logistics Cluster, 2020). Presence of complicated and lengthy bureaucratic and administrative processes have first been mentioned in February 2016 (Logistics Cluster, 2016) and are still in place after 5 years.

Interview respondents have also mentioned bureaucratic challenges associated with bringing of supplies to Yemen. In order to be able to import goods to Yemen, humanitarian organizations have to receive clearance from the government.

“It is not possible to clear the supplies if you don’t have official government request and distribution list in addition to all the shipping documentation.” (Respondent R2)

“Saudi-Arabia is controlling everything coming in the country, so some specific items are qualified. If you want to import anything, you need to have clearances and explain the reason why you want to import that.” (Respondent R1)

Another obstacle is also closely linked with the political situation in Yemen. In order to reach Yemen coast, deconfliction of the vessel has to occur. Special clearance has to be granted by coalition for a certain vessel to come to Yemen coast in a specific time frame. However, if due to unexpected circumstances, the vessel was not able to arrive in the given time frame, humanitarian organizations have to apply for deconfliction again. This process considerably slows down the delivery of cargo.

“Every time with the shipping liners they need to have approvals from the same entities especially from the coalition to be allowed to reach Yemen coast.” (Respondent R1)

“Deconfliction means that we inform the authorities, the coalition, that on this date the vessel is coming and all the details of the vessel, so that they inform the navy that this is a humanitarian vessel. Navy is aware that this particular vessel will enter territorial waters controlled by the coalition and this is the call signs. They communicate with the navy, on the radio they give call signs and that’s how communication goes on. (...) Coalition gives us a written approval, time frame (2-3 days) for the vessel to come in. If the vessel doesn’t come to territorial waters within this time frame, we need to reapply for coalition approval to deconflict this vessel.” (Respondent R2)

Movement between neighbouring countries and Yemen is also restricted. The other constraint named was lack of access to Hodeidah port for commercial shipping liners,

which negatively affects the deliveries of containerized cargo to the north of Yemen (Logistics Cluster, 2020).

Humanitarian organizations have also been experiencing shortages of fuel and the increased price for it (Logistics Cluster, 2015-2020). Shortage of fuel and unpredictable access to it affected humanitarian community's operations and medical facilities, leading to congestions in ports and delays in deliveries. Shortage of fuel as a bottleneck of humanitarian response in Yemen has been identified in every situation report by Logistics Cluster, from April 2015 till May 2020. Throughout the whole operation this issue has not been resolved and still, in July 2021, access to fuel is one of the major constraints in providing needed humanitarian assistance. At the end of March 2021 four vessels carrying fuel were allowed to berth at Hodeidah port, which is the first shipment of fuel since January 3rd 2021. However, there were still ten commercial vessels with fuel being held by Saudi-led Coalition (WFP Yemen, 2021).

WFP in their situation report from January 2021 mention challenges that organization is facing due to closure of Hodeidah port for commercial liners. At the moment of the report commercial liners have not been able to berth at Hodeidah port for a month, therefore, no fuel could be delivered to the area. Even though no major disruptions to the supply chain occurred, WFP still experienced three-day delay at the district level (WFP Yemen, 2021).

The fuel crisis continued during April 2021 and there were still eight vessels unable to get access to Hodeidah port. WFP reports no major disruptions to the supply chain, but three-four days delay on district level. Logistics Cluster has stated that “the fuel crisis is reaching a critical point” with only 35% of the requested fuel has been delivered (Logistics Cluster, 2021).

Storage capacity in Yemen is named as another bottleneck in the operation, especially storage facilities in strategic places to meet humanitarian needs.

5.2.5 Changes due to COVID-19 pandemic

Covid-19 pandemic affected different industries worldwide and humanitarian logistics is not an exception. The pandemic caused global collapse of supply chain and resulted in different challenges in global logistics. The main problem that the pandemic created is a severe shortage of containers worldwide resulting in the increase of transportation costs.

“Six months after the outbreak until now (April 2021) there is a shortage of sea containers, because most of the supplies, especially personal protective equipment, are coming from China to US, to Europe, to Africa, everywhere and basically there is nothing to move backwards to China. Currently there is a severe shortage of containers, that is why sea freight costs increased dramatically during last 3, 4, 5 months.” (Respondent R2)

Moreover, Covid-19 pandemic has also affected manufacturers and dramatically increased their lead time. The demand for certain goods has risen and suppliers did not have required production capacity. Logistics Cluster has also mentioned that they are experiencing delays in deliveries due to Covid-19 pandemic.

“It affected very much because of lock downs in many countries, it has created congestion in the booking of containers also the high demand of certain commodities related to Covid-19 response. (...) Suppliers had a huge demand from many parts of the world and that increased demand was beyond the production capacity of manufacturers or suppliers. This affected the delivery time for us because we had to wait for 4, 6 months, for example.” (Respondent R4)

5.3 Discussion

Existing literature emphasized the fact that maritime transportation is widely used in humanitarian aid delivery, however, there is not much research done on the particular conditions when this transportation mode can be effectively utilized. This study aims to provide concrete features of maritime transportation as well as determine disaster conditions for its successful usage.

Haavisto, Kovacs and Spens (2016) name maritime transportation a vital transportation mode for humanitarian aid delivery and this research into the Yemen crisis fully supports this theory. All the interview respondents as well as situation reports from humanitarian organizations confirm that sea shipping is the main transportation mode used for bringing supplies to Yemen.

The study aimed to expand the knowledge of maritime transportation as well as provide insights into maritime transportation in humanitarian context. It also had a purpose of determining unique characteristics of sea transportation for humanitarian community that makes it a valuable transportation mode for humanitarian aid delivery. Each question is answered with a purpose of providing fuller picture of the research.

RP: Under what conditions can maritime transportation be used in humanitarian logistics?

In order to answer the research problem, the researcher utilized a figure that reflects the main decision-making factors on utilization of maritime transportation: disaster, context, goods and stakeholders. Figure 9 presents application of the factors influencing

transport mode selection in the context of the Yemen crisis following with detailed explanation of each component.

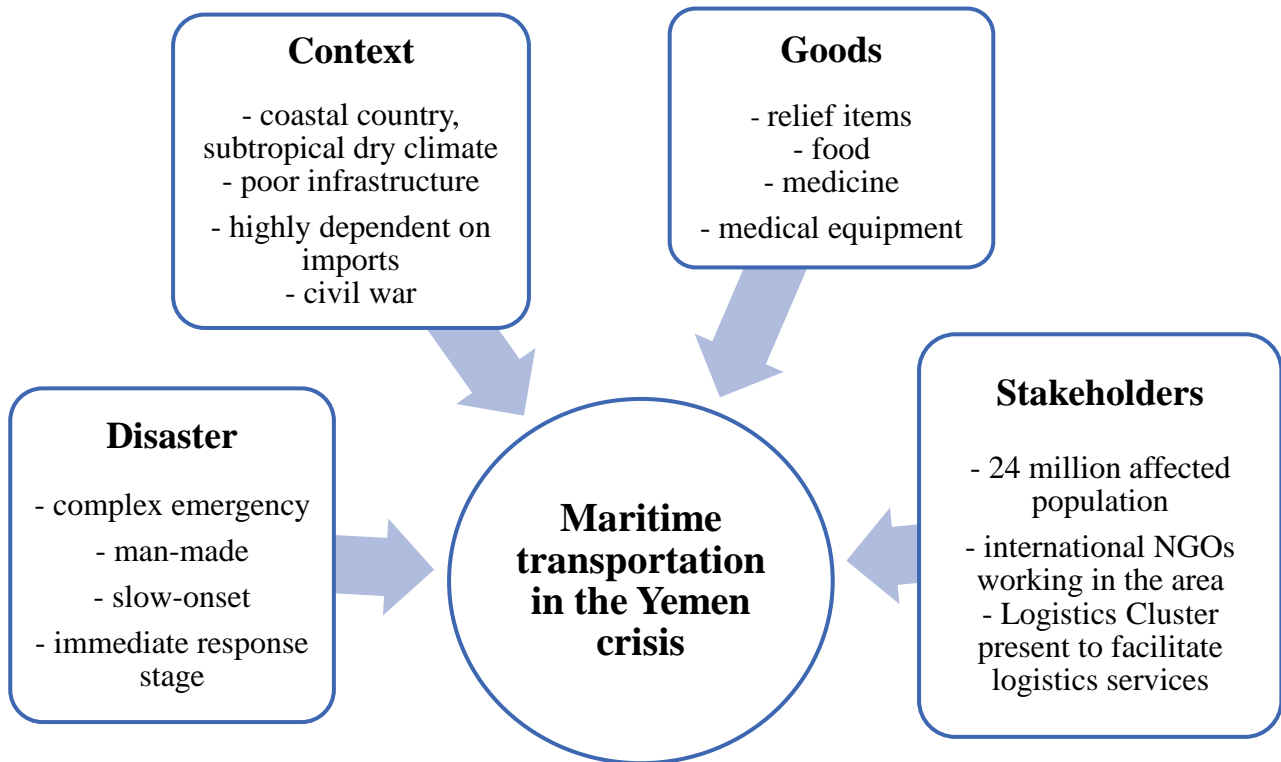


Figure 9 Decision-making factors on employment of maritime transportation in Yemen.

Disaster component:

The Yemen crisis can be confidently named a complex emergency. The crisis fits all the characteristics defined by IASC (1994): Yemen is in a civil war, over 66% of population is affected by the crisis and the scale of devastation and human suffering is vast as well as the displacement of population. Yemen has been in a civil for since March 2015 and, in July 2021, the crisis is still in full force. Harping et al. (2021) in their work mention that complex emergencies are often the reason for epidemics eruption and Cholera outbreak in Yemen is an accurate example. As stated by Harping et al. (2021), Yemen emergency experienced cascading effect: armed conflict led to displacement of population and Cholera disease outbreak.

Concerning the type of the disaster and its dynamic, The Yemen crisis is a slow-onset man-made disaster (Van Vassenhove, 2006) as the core of it is a political crisis. According to classification of humanitarian logistics operations done by Pedraza-Martinez and Van Vassenhove (2016), Yemen emergency is still in the stage of disaster

response even though the conflict has been in force since 2015. The situation has further deteriorated since March 2015 despite humanitarian actions, has further worsened by worldwide Covid-19 pandemic and there is still a long way before the reconstruction stage of disaster management cycle.

Haavisto, Kovacs and Spens (2016) also state that maritime transportation is usually used for the reconstruction phase of disaster management. However, in the light of the Yemen crisis, it is clear that the immediate response stage of the disaster can also successfully utilize this transportation mode. However, the researcher agrees with above mentioned authors that maritime transportation has to be combined with other transportation modes in order to reach beneficiaries.

Context component:

Yemen is a coastal country in the Middle East and has a subtropical dry climate. The country is experiencing high temperatures leading to sandstorms and dust storms causing soil erosion.

Yemen is dependent on imports and is largely involved in sea trade. The country has many ports as well as necessary port terminal infrastructure and port operational equipment; ports are responsible for 60-70% of all the import in the country (UNDP, 2021). Since the beginning of the conflict in March 2015 a lot of infrastructure has been destroyed, however, humanitarian organizations have programs for port rehabilitation making utilisation of maritime transportation and existing ports possible. Only two ports, Aden and Hodeidah, are operational.

Due to Yemen's involvement in sea trade, there exist established trade routes to the country that ease humanitarian operations. As mentioned before, Aden port is open for commercial shipping liners and, therefore, is not included in humanitarian operations in Yemen.

Due to the nature of the disaster in Yemen, security of cargo and warehouses is a big concern. Political situation in the country is unstable and the frontline is very fluid. To avoid losing storage facilities and, consequently, imported relief items, some humanitarian organizations maintain limited stock inside Yemen. Instead, they have a hub in the neighbouring countries with contingency stocks to ensure uninterrupted supply of goods.

Goods component:

As determined during the research, different types of goods are delivered to Yemen to alleviate suffering. The main goods supplied are food and nutrition items, relief items, medicines as well as medical equipment.

Co-relief items such as mattresses, blankets, mats, etc. have very high volume and weight and the only sensible option for their delivery is by sea.

WFP ship chartering service is used for goods' delivery allowing different organizations to combine their cargo for a full load (Haavisto, Kovacs and Spens, 2016). In order to transport medicines on board of the vessels, WFP has installed refrigerated containers on both its vessels that are operating Hodeidah port (Logistics Cluster, 2019).

Stakeholders component:

Affected population, beneficiaries, are the main stakeholders in the Yemen crisis and all the operations of humanitarian community are focused to alleviate their suffering and return them to normal lives.

Multiple international humanitarian organizations are involved in disaster relief operation in Yemen that further supports the theory that it is a complex emergency.

Logistics Cluster is actively present consolidating logistics efforts and facilitating maritime transportation and WFP-chartered vessels are operating Hodeidah port.

RQ1: What are the main advantages and disadvantages of maritime transportation in humanitarian logistics?

The main advantage of maritime transportation mentioned throughout the literature is its cost efficiency. Price as a transport mode selection criterion has been named by Feo, Espino and Garcia (2011), Reis (2014), Nugroho, Whiteing and de Jong (2016) and Kim, Nicholson and Kusumastuti (2017) and in the context of Yemen crisis it is the determining factor on choosing transportation mode. Ozkapici, Ertem and Aygunes (2016) also argue that maritime transportation is the cheapest transportation mode and has a positive impact on reduction of humanitarian response costs. Interviews with humanitarian logistics professionals fully confirmed that low cost of this transportation mode is its main advantage. Sea shipping's low cost is the main reason why humanitarian community is inclined to use this transportation mode.

Capacity has also been named as an important criterion by the same authors and Ozkapici, Ertem and Aygunes (2016) state that no other transportation mode has the ability to transport such amounts of cargo. High capacity of vessels and the opportunity to combine different supplies in one shipment has been the second most mentioned advantage of maritime transportation by the interviewees. Sea transportation is the leader in high volume shipments among all transportation modes.

Responses of the interviewees confirm the theory of Haavisto, Kovacs and Spens (2016) that maritime transportation is lengthy. When humanitarian logistics' purpose is to alleviate suffering and save lives, the time is of the essence. However, in the course of the interviews, even though time required for the vessel to complete the journey has been mentioned as the biggest disadvantage of sea transportation, it is still the main and the best option for bringing supplies to Yemen. One of the interview respondents mentioned that planning is the key and with contingency stocks there are no delays in deliveries while using this lengthy transportation mode.

Another disadvantage that sea transportation has is the need for port infrastructure, which can be a problem in politically unstable environments. However, one of the respondents mentioned that people are familiar with port' operations and that unloading of supplies is not a challenge in the context of Yemen.

Another disadvantage is closely linked to the previous two. Due to the long time that vessels are at sea, there is a possibility of damaging of the supplies, especially perishable items. The same applies to unloading operations when the infrastructure in the affected area is not up to the standard.

RQ2: How can the advantages of maritime transportation be effectively utilised for improving humanitarian aid delivery?

Maritime transportation has two very important traits for humanitarian logistics out of three – it is cheap, it has high capacity, but it is lengthy. In order to utilize this transportation mode for the benefit of humanitarian community and the efficiency of humanitarian response, the strengths of it have to be played on.

Maritime transportation can be the main transportation mode with proper planning, advanced preparation and thorough arrangements and coordination. Stocks of supplies inside the affected country and/or in the neighbouring countries as well as contingency stocks provide humanitarian actors with reliance in the availability of necessary supplies.

They act as a buffer in case of any casualties at sea, delays during the voyage and in ports as well as possible inability to receive deconfliction of the vessel, which leads to delays in deliveries and lack of necessary supplies in the affected area.

Sea transportation cannot be used as a sole transportation mode as it cannot provide last mile delivery solutions. Therefore, it must be utilised in combination with other transportation modes - high volumes of supplies can be delivered with low cost to the affected area and further distributed to beneficiaries using land transportation, for example.

6 CONCLUSION

There is an acute need to find better solutions for delivery of humanitarian assistance. Humanitarian logisticians are operating under limited funding that increases the difficulty of conducting humanitarian operations. Therefore, allocation of resources is of high importance in humanitarian logistics as well as the need for more cost-efficient solutions.

Maritime transportation is the cheapest transportation mode, which makes it attractive for humanitarian community. It can also carry high volumes of cargo, which is essential in complex emergencies with large number of beneficiaries in need. Maritime transportation is reliable and with a large number of carriers worldwide it becomes a secure and solid transportation mode providing a possibility of deliveries all over the world.

However, this transportation mode is lengthy and this disadvantage thrusts aside decision makers and turns them towards other transportation modes. Sea transportation also requires port infrastructure that might be unavailable due to initially poor infrastructure in the area of the occurred disaster.

As we have seen in the case of the Yemen crisis, maritime transportation is not only the main transportation mode, but also the best solution for bringing supplies to the country. However, it is important to understand that sea transportation cannot act as a sole transportation mode for humanitarian assistance. It has to be combined with land transportation to access beneficiaries and certain storage arrangements have to be in place for this transportation mode successful utilisation.

6.1 Theoretical and practical contribution

The study aims to broaden the perspective on employment of maritime transportation in humanitarian logistics. It also serves the purpose to deepen theoretical and practical knowledge of sea transportation and humanitarian logistics.

The study contributes to the theory of humanitarian logistics by providing the insights into advantages and disadvantages of maritime transportation in humanitarian context that can be utilised for further research into the topic. It also gives the perspective on the need of advanced planning and close collaboration of different stakeholders involved in humanitarian response. This study can be used as a basis for developing preparedness strategies involving maritime transportation.

The results of the study may be used by practitioners to develop a framework for most efficient use of maritime transportation. The framework based on this study will help humanitarian logisticians with decision making as well as better utilisation of scarce resources.

The study also has a societal contribution as it discusses the main purpose of maritime transportation in humanitarian context – saving lives. The frameworks and theories built on this study will improve humanitarian supply chain, positively affect humanitarian response, leading to alleviating suffering of the affected population.

6.2 Suggestions for future research

The study focused only on maritime transportation, therefore, similar studies could be conducted on other transportation modes. Furthermore, collaboration between different transportation modes could also be researched in the field.

For the purpose of the study only four respondents have been interviewed due to the political situation in Yemen, making the trustworthiness of the study moderate. The study also focused on the Yemen crisis, which is a complex emergency. The conflict in Yemen is still ongoing and there are certain procedures in place. Therefore, a further research on maritime transportation could be conducted involving different disasters, both sudden and slow onset, as well as the increased number of respondents could be involved. Further research on employment of maritime transportation in the immediate response stage as well as reconstruction stage of disaster cycle could also broaden the perspective on this transportation mode in humanitarian context.

The study did not touch upon passenger sea transportation that is an important part of this transportation mode. The future research suggestion could be determining the value of maritime transportation in passenger traffic and its applicability in humanitarian context.

REFERENCES

- ACAPS, 2021. *Yemen crisis impact overview*. [pdf] ACAPS. Available at: <https://www.acaps.org/sites/acaps/files/products/files/20210510_acaps_yah_crisis_impact_overview_o.pdf> [Accessed 21 June 2021].
- Alderton, T. and Winchester, N., 2002. Globalisation and de-regulation in the maritime industry. *Marine Policy*, 26(1), pp.35-43.
- Altay, N. and Green, G.G., 2006. OR/MS research in disaster operations management. *European Journal of Operational Research*, 175, pp.475-493.
- Atmanand, 2003. Insurance and disaster management: the Indian context. *Disaster Prevention and Management*, 12(4), pp.286-304.
- Baskaya, S., Ertem, M.A. and Duran, S., 2017. Pre-positioning of relief items in humanitarian logistics considering lateral transshipment opportunities. *Socio-Economic Planning Sciences*, 57, pp.50-60.
- Christoplos, I., Mitchell, J. and Liljelund, A., 2001. Re-framing risk: the changing context of disaster mitigation and preparedness. *Disasters*, 25(3), pp.185-198.
- CIA, 2021. *The world factbook: Yemen*. [online] CIA. Available at: <<https://www.cia.gov/the-world-factbook/countries/yemen/#geography>> [Accessed 31 May 2021].
- Cozzolino, A., Rossi, S. and Conforti, A., 2012. Agile and lean principles in the humanitarian supply chain. *Journal of Humanitarian Logistics and Supply Chain Management*, 2(1), pp.16-33.
- Culver, A., Rochat, R. and Cookson, S.T., 2017. Public health implications of complex emergencies and natural disasters. *Conflict and Health*, [e-journal] 11(1). 10.1186/s13031-017-0135-8
- Encyclopædia Britannica, 2021. *Yemen*. [image online] Available at: <<https://www.britannica.com/place/Yemen#/media/1/652831/223482>> [Accessed 10 July 2021].
- Ertem, M.A., Isbilir, M. and Arslan, A.S., 2017. Review of intermodal freight transportation in humanitarian logistics. *European Transport Research Review*, 9(1), pp.1-11.
- Federspiel, F. and Ali, M., 2018. The cholera outbreak in Yemen: lessons learned and way forward. *BMC Public Health*, [e-journal] 18(1338). <https://doi.org/10.1186/s12889-018-6227-6>

- Feo, M., Espino, R. and Garcia, L., 2011. A stated preference analysis of Spanish freight forwarders modal choice on the south-west Europe motorway of the sea. *Transport Policy*, 18(1), pp.60–67.
- GAC Yemen, 2021. *GAC Map Yemen*. [image online] Available at: <<https://cdn.gac.com/prod/docs/Middle-East/Yemen/gac-map-yemen.pdf>> [Accessed 1 July 2021].
- Gorman, M.F., Clarke, J.P., Gharehgozli, A.H., Hewitt, M., de Koster, R. and Roy, D., 2014. State of the practice: a review of the application of OR/MS in freight transportation. *Interfaces*, 44(6), pp.535-554.
- Gummesson, E., 2000. *Qualitative methods in Management Research*. Sage Publications, Inc.
- Haavisto, I., Kovács, G. and Spens, K., eds., 2016. *Supply chain management for humanitarians: tools for practice*. Kogan Page.
- Harping, R., Maghsoudi, A., Fikar, C., Piotrowicz, W.D., and Heaslip, G., 2021. An analysis of compounding factors of epidemics in complex emergencies: a system dynamics approach. *Journal of Humanitarian Logistics and Supply Chain Management*, [e-journal] 11(2), pp.198-226. <https://doi-org.proxy.shh.fi/10.1108/JHLSCM-07-2020-0063>
- Harpring, R., Maghsoudi, A., Fikar, C., Piotrowicz, W.D. and Heaslip, G., 2021. An analysis of compounding factors of epidemics in complex emergencies: a system dynamics approach. *Journal of Humanitarian Logistics and Supply Chain Management*, 11(2), pp.198-226.
- Hess, W., 2019. *Four Years of Conflict: Analysis of the Violence and the Humanitarian Response in Yemen*. Master's Program in Humanitarian Action and Conflict. Uppsala University. Available at <<http://uu.diva-portal.org/smash/get/diva2:1344906/FULLTEXT01.pdf>> [Accessed 25 March 2019].
- Hirschinger, M., Moser, R., Schaefer, T. and Hartmann, E., 2016. No Vehicle Means No Aid—A Paradigm Change for the Humanitarian Logistics Business Model. *Thunderbird International Business Review*, 58(5), pp.373-384.
- Holguin-Veras, J., Jaller, M., Van Wassenhove, L.N., Pérez, N. and Wachtendorf, T., 2012. On the unique features of post-disaster humanitarian logistics. *Journal of Operations Management*, 30(7-8), pp.494-506.
- Humanitarian Needs Overview (HNO), 2021. *Yemen*. [pdf] HNO. Available at: <https://reliefweb.int/sites/reliefweb.int/files/resources/Yemen_HNO_2021_Final.pdf> [Accessed 26 March 2021].

- Ilhan, A., 2011. The Humanitarian Relief Chain. *South East European Journal of Economics and Business*, 6(2), pp.45-54.
- Inter-Agency Standing Committee (IASC), 1994. *Definition of complex emergencies*. [pdf] Inter-Agency Standing Committee. Available at: <https://interagencystandingcommittee.org/system/files/legacy_files/WG16_4.pdf> [Accessed 4 July 2021].
- International Bureau for Children's Rights (IBCR), 2011. *Country Profile of Yemen: A Review of the Implementation of the UN Convention on the Rights of the Child*. [pdf] Available at: <<https://www.ibcr.org/wp-content/uploads/2016/06/Country-Profile-Yemen-1.pdf>> [Accessed 31 May 2021].
- International Rescue Committee (IRC), 2020. *The Global Crisis of COVID-19: A Comprehensive Response*. [pdf] International Rescue Committee. Available at: <<https://www.rescue.org/sites/default/files/document/5349/ircCOVIDreportfinal1.pdf>> [Accessed 30 June 2021].
- Kim, H.C., Nicholson, A. and Kusumastuti, D., 2017. Analysing freight shippers' mode choice preference heterogeneity using latent class modelling. *Transportation Research Procedia*, 25, pp.1109–1125.
- Kothari, C.R., 2004. *Research methodology: methods and techniques*, 2nd ed. New Age International.
- Kovács, G. and Spens, K.M., 2007. Humanitarian logistics in disaster relief operations. *International Journal of Physical Distribution & Logistics Management*, 37(2), pp.99-114.
- Kovács, G. and Spens, K.M., 2012. *Relief supply chain management for disasters: humanitarian aid and emergency logistics*. Business Science Reference.
- Kovács, G. and Spens, K.M., 2007. Humanitarian logistics in disaster relief operations. *International Journal of Physical Distribution & Logistics Management*, 37(2), pp.99-114.
- Kruke, B.I. and Olsen, O.E., 2012. Knowledge creation and reliable decision making in complex emergencies. *Disasters*, [e-journal] 36(2), pp.212–232. 10.1111/j.1467-7717.2011.01255.x.
- Lauras, M., Trupatil, S. and Benaben, F., 2015. Towards a better management of complex emergencies through crisis management meta-modelling. *Disasters*, [e-journal] 39(4), pp.687–714. <https://doi-org.proxy.shh.fi/10.1111/disa.12122>
- Library of Congress, 2008. *Country Profile: Yemen*. [pdf] Library of Congress. Available at: <<https://www.loc.gov/rr/frd/cs/profiles/Yemen-new.pdf>> [Accessed 31 May 2021].

- Logistics Cluster, 2010. *Logistics capacity assessment: Yemen*. [pdf] Logistics Cluster. Available at:
<https://reliefweb.int/sites/reliefweb.int/files/resources/AC729BEC4EFEC5C8852577690063F10E-Full_Report.pdf> [Accessed 21 June 2021].
- Logistics Cluster, 2015. *Yemen Concept of Operations - April 2015*. [pdf] Djibouti: Logistics Cluster. Available at:
<https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_150424_0.pdf> [Accessed 21 June 2021].
- Logistics Cluster, 2015. *Yemen Concept of Operations - July 2015*. [pdf] Djibouti: Logistics Cluster. Available at:
<https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_151006.pdf> [Accessed 21 June 2021].
- Logistics Cluster, 2016. *Yemen Concept of Operations - December 2016*. [pdf] Djibouti: Logistics Cluster. Available at:
<https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_20161129.pdf> [Accessed 21 June 2021].
- Logistics Cluster, 2016. *Yemen Concept of Operations - February 2016*. [pdf] Djibouti: Logistics Cluster. Available at:
<https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_160202.pdf> [Accessed 21 June 2021].
- Logistics Cluster, 2016. *Yemen Concept of Operations - July 2016*. [pdf] Djibouti: Logistics Cluster. Available at:
<https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_160701.pdf> [Accessed 21 June 2021].
- Logistics Cluster, 2016. *Yemen Concept of Operations - May 2016*. [pdf] Djibouti: Logistics Cluster. Available at:
<https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_160504.pdf> [Accessed 21 June 2021].
- Logistics Cluster, 2017. *Yemen Concept of Operations, July 2017*. [pdf] Djibouti: Logistics Cluster. Available at:
<https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_170727_0.pdf> [Accessed 21 June 2021].
- Logistics Cluster, 2017. *Yemen Concept of Operations, March 2017*. [pdf] Djibouti: Logistics Cluster. Available at:
<https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_20170305.pdf> [Accessed 21 June 2021].
- Logistics Cluster, 2018. *Yemen - Concept of Operations, July 2018*. [pdf] Djibouti: Logistics Cluster. Available at:
<https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_180723_0.pdf> [Accessed 21 June 2021].

- Logistics Cluster, 2018. *Yemen - Concept of Operations, March 2018*. [pdf] Djibouti: Logistics Cluster. Available at: <https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_180330.pdf> [Accessed 21 June 2021].
- Logistics Cluster, 2018. *Yemen - Concept of Operations, November 2018*. [pdf] Djibouti: Logistics Cluster. Available at: <https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_20181122.pdf> [Accessed 21 June 2021].
- Logistics Cluster, 2019. *Yemen - Concept of Operations, September 2019*. [pdf] Djibouti: Logistics Cluster. Available at: <https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_190901.pdf> [Accessed 21 June 2021].
- Logistics Cluster, 2020. *Yemen - Concept of Operations, May 2020*. [pdf] Djibouti: Logistics Cluster. Available at: <https://cdn.logcluster.org/public/logistics_cluster_yemen_conops_200519.pdf> [Accessed 21 June 2021].
- Merriam, S.B. and Tisdell, E.J., 2015. *Qualitative research: a guide to design and implementation*. [e-book] San Francisco, CA: Jossey-Bass, a Wiley Brand. Available through ProQuest Ebook Central <<https://ebookcentral.proquest.com/lib/hanken-ebooks/detail.action?docID=2089475>> [Accessed 14 July 2021].
- Moe, T.L., Gehbauer, F. and Senitz, S., 2007. Balanced scorecard for natural disaster management projects. *Disaster Prevention and Management*, 16(5), pp.785-806.
- Mousavi, S.M. and Anjomshoa, M., 2020. COVID-19 in Yemen: a crisis within crises. *International Journal for Equity in Health*, [e-journal] 19 (120). <https://doi.org/10.1186/s12939-020-01231-2>
- Nugroho, M.T., Whiteing, A. and de Jong, G., 2016. Port and inland mode choice from the exporters' and forwarders' perspectives: Case study – Java, Indonesia. *Research in Transportation Business & Management*, 19, pp.73-82.
- OCHA, 2021. *Yemen Situation Report*. [pdf] OCHA. Available at: <<https://reports.unocha.org/en/country/yemen>> [Accessed 25 March 2021].
- Oloruntoba, R., Sridharan, R. and Davison, G., 2018. A proposed framework of key activities and processes in the preparedness and recovery phases of disaster management. *Disasters*, 42(3), pp.541-570.
- Overstreet, R.E., Hall, D., Hanna, J. B., Rainer, R.K. Jr, 2011. Research in humanitarian logistics. *Journal of Humanitarian Logistics and Supply Chain Management*, 1 (2), pp.114-131.

- Ozkapici, D.B., Ertem, M.A. and Aygunes, H., 2016. Intermodal humanitarian logistics model based on maritime transportation in Istanbul. *Natural Hazards*, [e-journal] 83(1), pp.345-364. 10.1007/s11069-016-2318-9.
- Patton, Q.P., 2002. *Qualitative research and evaluation methods*, 3rd ed. Sage Publications.
- Pedraza-Martinez, A.J., Van Wassenhove, L.N., 2016. Empirically grounded research in humanitarian operations management: The way forward. *Journal of Operations Management*, 45, pp. 1-10.
- Reis, V., 2014. Analysis of mode choice variables in short-distance intermodal freight transport using an agent-based model. *Transportation Research Part A*, 61, pp.100-120.
- Sachdeva, J.K., 2009. *Business research methodology*. Mumbai, India: Himalaya Publishing House.
- Satyaprasad, B.G. and Krishnaswami, O.R., 2010. *Business research methods*. Mumbai, India: Himalaya Publishing House.
- Saunders, M., Lewis, P. and Thornhill, A., 2008. *Research methods for business students*. Pearson Education.
- Shinghal, N. and Fowkes, T., 2002. Freight mode choice and adaptive stated preferences. *Transportation Research Part E*, 38, pp.367–378.
- Silverman, D., 2008. *Interpreting qualitative data*. Sage Publications.
- Tabaklar, T., Halldórsson, A., Kovács G. and Spens. K., 2015. Borrowing theories in humanitarian supply chain management. *Journal of Humanitarian Logistics and Supply Chain Management*, 5(3), pp.281-299.
- Tansel, B., 1995. Natural and manmade disasters: accepting and managing risks. *Safety Science*, 20, pp. 91-99.
- The World Bank Group, 2011. *Yemen: Vulnerability, Risk Reduction, and Adaptation to Climate Change*. [pdf] The World Bank Group. Available at: <https://climateknowledgeportal.worldbank.org/sites/default/files/2018-10/wb_gfdr climate_change_country_profile_for_YEM.pdf> [Accessed 5 June 2021].
- Thomas, A.S. and Kopczak, L.R., 2005. *From logistics to supply chain management: the path forward in the humanitarian sector*. [pdf] Fritz Institute. Available at: <<http://www.fritzinstitute.org/pdfs/whitepaper/fromlogisticsto.pdf>> [Accessed 15 July 2021].

Tomasini, R.M. and Van Vassenhove, L.N., 2009. *Humanitarian Logistics*. Palgrave Macmillan.

Tomasini, R.M. and Van Vassenhove, L.N., 2009. From preparedness to partnerships: case study research on humanitarian logistics. *International transactions in operational research*, 16, pp.549–559.

UNDP, 2021. *The faces of Yemen's sea ports*. UNDP. [online] Available at: <<https://undp.medium.com/the-faces-of-yemens-sea-ports-e83fc2849c6>> [Accessed 9 July 2021].

UNICEF, 2021. *Yemen Country Office: Humanitarian Situation Report*. [pdf] UNICEF. Available at: <<https://reliefweb.int/sites/reliefweb.int/files/resources/UNICEF%20Yemen%20Humanitarian%20Situation%20Report%20-%201-30%20April%202021.pdf>> [Accessed 1 July 2021].

United Nations, 2008. *Myanmar Flash Appeal*. [pdf] United Nations. Available at: <https://www.iom.int/sites/default/files/jahia/webdav/shared/shared/mainsite/media/docs/reports/myanma_flash_appeal%202008.pdf> [Accessed 21 June 2021].

Van Vassenhove, L.N., 2006. Blackett memorial lecture humanitarian aid logistics: Supply chain management in high gear. *Journal of the Operational Research Society*, 57(5), pp.475-489.

Wijnolst, N. and Waals, F., 1999. *Shipping industry structure*. Delft University Press.

Wood, D.F., Barone A., Murphy, P. and Wardlow, D., 1995. *International Logistics*. Chapman & Hall.

APPENDIX 1 INTERVIEW GUIDE

1. Please, tell me about your work in Yemen.
2. Why is sea transportation used in the context of Yemen?
3. What are advantages and disadvantages in employing sea transportation in Yemen crisis?
4. What were/are the obstacles of using sea transportation in Yemen crisis? What did you have to consider before employing sea transportation?
5. What are the risks involved in sea transportation?
6. Concerning infrastructure, was there any done by your organization to facilitate maritime transportation use?
7. What is delivered by sea?
8. What in the context of Yemen cannot be delivered by sea?
9. Currently it is an immediate response stage. Do you think sea transportation will be used for reconstruction stage in the context of Yemen?
10. How did sea transportation change during Covid-19 pandemic?