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### Deltaker

Navn: Ingrid Lid og Karine Alette Petermann

### Informasjon fra deltaker

Tittel \*: Challenges to environmental sustainability in humanitarian logistics activities

Navn på veileder \*: Marianne Jahre

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## Challenges to environmental sustainability in humanitarian logistics activities

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Marianne Jahre

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## Abstract

With the changing climate causing an emerging number of disasters, the demand for humanitarian relief operations is likely to grow. While humanitarian operations aim to alleviate and improve the lives of the beneficiaries, they also have a significant environmental impact. Given the anticipated rise in occurrences of disaster events, it will be imperative to incorporate greener practices into humanitarian disaster relief operations to minimize their potential to exacerbate further disasters. Although it may be difficult to consider environmental sustainability while lives are at stake, doing so is crucial.

This thesis uses a qualitative research approach to investigate how humanitarian organizations are planning to reduce the environmental impact of their logistic activities. The study also explores the challenges that these organizations must overcome to enhance their environmental sustainability.

Our findings reveal that humanitarian organizations have increased their environmental focus in recent years. Nevertheless, there are several challenges they must overcome to become more environmentally sustainable. The conclusion necessitates the importance of considering the aggregated footprint of the initiatives across the whole supply chain to ensure that the initiatives are ultimately more environmentally sustainable. Although the reduction of greenhouse gas emissions has received the greatest attention due to its documented impact on the climate, humanitarian organizations should also pay regard to the wider impact of their activities beyond greenhouse gas emissions. The resolution of this issue cannot, however, be achieved by any individual organization in isolation. Effective collaboration and information sharing among partners in the humanitarian sector are crucial for improving the collective impact of global efforts. This involves the exchange of best practices, challenges, and initiatives.

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## **List of abbreviations**

CO2 - Carbon Dioxide  
CTR - The Office of Cooperative Threat Reduction  
DMC - Disaster Management Cycle  
EMAS - Eco-Management and Audit Scheme  
HA - Humanitarian Actor  
HL - Humanitarian Logistics  
HO - Humanitarian Organization  
HSC - Humanitarian Supply Chain  
ICRC - International Committee of the Red Cross  
IFRC - International Federation of Red Cross and Red Crescent Societies  
JEU - OCHA Joint Unit  
MOU - Memorandum Of Understanding  
MSF - Médecins Sans Frontières  
NCA - Norwegian Church Aid  
NEAT+ - Nexus Environmental Assessment Tool  
NGO - Non-Governmental Organization  
NRC - Norwegian Refugee Council  
OCHA - United Nations Office for the Coordination of Humanitarian Affairs  
REES - Retail Ethical and Environmental Strategy  
SCRM - Supply chain risk management  
UN - United Nations  
UNICEF - United Nations Children's Fund  
WASH - Water, Sanitation, and Hygiene  
WFP - World Food Program

## 1.0 Introduction

### *1.1 Background and motivation*

The climate is changing, and the number of disasters is projected to increase in the coming decades (UNDRR, 2022). Connectedly, the demand for humanitarian relief operations is likely to grow. At the core of humanitarian relief is the timely procurement and provisioning of aid to the affected population, referred to as beneficiaries. The backbone of humanitarian relief operations is the supply chain (Lewin et al., 2018; Besiou & Van Wassenhove, 2020), which accounts for approximately 80 percent of all humanitarian relief expenses, including supply, inventory, transportation, and distribution (Van Wassenhove, 2006).

While humanitarian operations aim to alleviate and improve the lives of the beneficiaries, they also have a significant environmental impact due to the materials they bring in, the natural resources they consume, and the waste and pollution they generate (Martinez et al., 2011). An example of this is the earthquake that struck Haiti in 2010. After the disaster, lots of plastic water bottles were left in the country. This helped solve the problem of not having enough drinking water, but it also made the country's waste problem worse (Corbett et al., 2022). While well-intended, immediate disaster response can result in avoidable humanitarian challenges in the future. Drinking water is essential, but it may not be necessary to provide it in small plastic bottles (Corbett et al., 2022). With the projected increase in disaster events, it will be necessary to green humanitarian disaster relief operations so that they minimize their contribution to new disasters, even though it is difficult to consider environmental sustainability while lives are at stake.

Humanitarian organizations (HOs) have increased their focus on environmental sustainability in recent years, creating a climate charter for the industry. The charter is a new industry standard for greener humanitarian aid and has commitments that should be "turned" into time-bound goals and action plans (Climate Charter, 2022). Many HOs have also launched internal greening initiatives and targets. In our thesis, we delve deeper into these initiatives and the associated challenges.

A frequently used framework known as the Disaster Management Cycle (DMC) identifies four phases of disaster management. The four phases are preparedness, response, recovery, and mitigation (Corbett et al., 2022). We believe that the preparedness phase, which aims to improve disaster response, is the best time to consider greening operations because there is limited time for planning when a disaster occurs. Thus, this phase is the focus of our thesis. We found several articles supporting the importance of the preparedness phase in order for humanitarian disaster relief operations to become greener (Eng-Larsson and Vega, 2011; Corbett et al., 2022).

After reviewing articles on the topic, it is clear that there are not an overwhelming number of articles within humanitarian logistics (HL) and environmental sustainability, or green logistics. A recent bibliometric analysis by Khan et al. (2022) provides an overview of the development of articles within the topics of HL and sustainable development. This article addresses the entire sustainability perspective rather than just the environment, which is the focus of our thesis. The study showed that over 46 percent of the articles they found were published in the last three years. The article also highlights that the preparedness phase should be further examined in this research area, as they found non articles. We also found a limited number of articles on the topic when we did our own research.

## ***1.2 Research question***

The purpose of this master thesis is to investigate how HOs are planning to reduce the environmental impact of their logistic operations activities and the associated challenges they need to overcome to become more environmentally sustainable. The research question has been developed on the basis that there has been little research on how preparedness can contribute to reducing the environmental impact of HL. With the results of our study, we hope to contribute to covering this gap. The primary research question is as follows:

*How are humanitarian organizations planning to reduce the environmental impact of their logistic operations activities?*

Due to the complexity of the primary research question, three additional sub-questions have been developed. The three sub-questions are presented at the end of the literature review.

### *1.3 Thesis Structure*

The thesis comprises the following sections: **Chapter 1** presents the background and motivation for the thesis, as well as the primary research question for the thesis; **Chapter 2** provides a foundation of knowledge on the topic and gives a review of the existing literature; **Chapter 3** introduces our methodology and elaborates on the choice of research design; **Chapter 4** presents the empirical findings and analysis; **Chapter 5** delves into the core findings of our study and compares findings with the existing literature; and **Chapter 6** concludes the thesis and provides suggestions for future research.

## **2.0 Literature review**

The purpose of this literature review is to provide a foundation of knowledge on the topic of environmental sustainability in HL preparedness. To gather literature for this review, we searched the databases Web of Science and Google Scholar. We ended up analyzing 44 articles by using search strings based on keyword combinations relevant to our problem statement (listed in appendix 7). We found 21 articles relevant for HL and environmental sustainability and 8 articles that were in some way relevant for HL and environmental sustainability in the preparedness phase. Examining articles within the topic reveals that there aren't an overwhelming number of articles on HL and environmental sustainability. Due to the limited literature on the topic, we found it necessary to gather more general insights from related topics. Thus, the following topics are covered in this literature review: HL preparedness, HL activities, and environmental sustainability. Our findings from the literature analysis are included in the section on environmental sustainability. We conclude our literature review with sub-questions to our primary research question and a conceptual framework.

## ***2.1 Humanitarian logistics preparedness***

HL refers to the measures used to manage the flow of logistics in the event of a disaster. Its purpose is to save lives and make resources accessible so that needs can be satisfied (Raillani et al., 2020). The Fritz Institute's advisory committee for HL attempted to address the need for a standard definition of logistics in the humanitarian sector (Van Wassenhove, 2006). Thomas and Mizushima (2005) define it as:

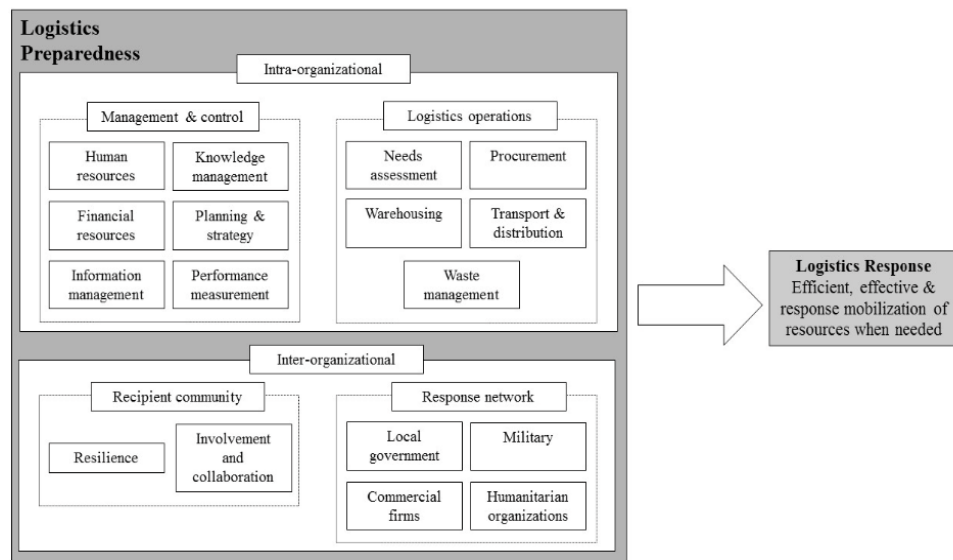
*“The process of planning, implementing and controlling the efficient, cost-effective flow of and storage of goods and materials, as well as related information, from point of origin to point of consumption for the purpose of meeting the end beneficiary's requirements”.*

As previously stated, the focus of our thesis is the preparedness phase of the DMC. There are several definitions of logistic preparedness, but in this paper, we use the suggested definition by Jahre et al. (2016):

*“The implementation of processes, structures, and systems connecting local community, national, and international actors by designing, planning, and training for efficient, effective, and responsive mobilization of material, financial, human, and informational resources when and where needed. This encompasses a range of activities, including needs assessment, procurement, warehousing, transporting, and distributing, waste management, and performance measurement, for the purpose of alleviating the suffering of vulnerable people.”.*

The preparedness phase of disaster management focuses on how to plan for and respond to future disasters and can occur on the regional level or within an organization (Lindgreen et al., 2013). Preparedness, which involves the establishment of appropriate systems prior to the event of natural disasters, is crucial as disaster relief operations have become more complex due to a rise in the number of natural catastrophes around the world (Holgun-Veras et al., 2012; Jahre et al., 2016). Research has revealed that disaster preparedness saves money if a disaster occurs; one dollar spent on preparedness saves seven dollars in response (Van Wassenhove, 2006).

Several preparedness activities are involved in HL logistics. Jahre et al. (2016) propose a framework for logistics preparedness (illustrated in *Figure 1*) that segments activities into specific categories. Based on this framework, the focus of our study is logistics operations. This category distinguishes between the following humanitarian logistics activities: needs assessment, procurement, warehousing, transportation & distribution, and waste management, where waste management, often referred to as reverse logistics (Peretti et al., 2015, cited in Jahre et al., 2016, p. 19). In this framework needs assessment are added to classical logistics operations (Jahre et al., 2016). We return to this framework in 2.2.



*Figure 1: A proposed framework for logistics preparedness (Jahre et al., 2016)*

A closely related topic to HL preparedness is supply chain risk management (SCRM), as it enables HOs to quickly identify and mitigate potential risks that may impede the delivery of aid during disaster relief operations. The humanitarian supply chain operates in an unpredictable, dynamic, and chaotic environment (Balcik & Beamon, 2008, cited in Sarkis et al., 2013, p. 200). Without effective mitigation and preparedness efforts, like prepositioning humanitarian inventory (strategic stock) close to disaster prone locations, a quick and efficient response would be nearly impossible (Rezaei Malek et al., 2016). SCRM is an approach that emphasizes analyzing, mitigating, responding to, and tracing normal and abnormal risks and disruptions that occur within a business setting (Ho et al.,

2015; Jahre, 2017). Jahre (2017) sheds light on the relationship between HL and SCRM and presents mitigation strategies that HOs could utilize, or are already utilizing, to enhance their logistics preparedness. For instance, strategic stock is the most frequently reported strategy, accounting for 69 percent of the identified papers in the article by Jahre (2017). Strategic stocks of basic relief items could be of great assistance for coping with global disruptions such as natural disasters; however, depending on whether you place strategic stocks or not, there will be consequences regarding, for example, transportation or durability.

## ***2.2 Humanitarian logistic activities and challenges in conducting these activities***

To delve deeper into the greening challenges associated with the preparedness phase, we use the framework presented by Jahre et al. (2016) to differentiate between the various humanitarian operations activities included in this phase. We also present some of the more general practical HL challenges experienced during disaster relief operations before we go into the challenges of conducting each of the activities.

As disaster relief operations are very context-specific and dynamic, challenges differ depending on the type, location, intensity, and timing of a given disaster (Kovács and Moshtari, 2019). The existing HL literature identifies and discusses a wide range of practical HL challenges during disaster relief operations, such as:

- Lack of logistical knowledge and trained logisticians
- The absence of standards and performance indicators
- Security problems
- Inadequate funding and investment in information technology
- Supply and demand uncertainty
- The presence of myriad humanitarian actors
- The breakdown of the rule of law
- Media attention

(Maghsoudi & Moshtari, 2020)



Even though previous research has identified numerous challenges associated with HL, Maghsoudi & Moshtari (2020) argue that further research and suggestions for understanding these challenges and mitigating their impact on logistics activities in disaster relief operations can improve humanitarian response. This can ultimately result in a significant reduction in human suffering and help HOs improve their environmental impact.

### *2.2.1 Needs assessment*

In the context of logistics, needs assessment involves evaluating the available infrastructure (ports, roads, service providers, etc.) so that logistics can be set up properly (Jahre et al., 2016). It also necessitates the development of systems, structures, and processes to ensure the effective management of all resources within the organization's own borders as well as those in the response network and recipient community (Jahre et al., 2016). There are often several actors involved in humanitarian operations, including local and international HOs, beneficiaries, governments, donors, the military, private sector companies, and the media (increasingly social media) (Besiou et al., 2021). With many actors involved, coordination of needs assessments between the actors involved is necessary. If needs assessment is done the wrong way, it might result in wasted resources, duplication of effort, or gaps in service. The first two mentioned have an impact on the environmental sustainability of the humanitarian operation.

The process of needs assessment can be challenging, and Maghsoudi & Moshtari (2020) identify challenges related to the unpredictability of demand in terms of disaster location, timing, type, and size, which can create a bottleneck for logisticians trying to determine an accurate number and the needs of the affected population. Furthermore, cross-border logistics and cross-border refugee movements have been identified as challenges that affect operational needs assessment (L'Hermitte et al., 2015; Maghsoudi & Moshtari, 2020). Another challenge that is raised in relation to needs assessments and demand capture is disruptions in the communication infrastructure after a disaster, which can lead to the affected population not being able to express their needs associated with culture and language (Kovács and Spens, 2011).

The Maghsoudi & Moshtari (2020) article identifies challenges during the Kermanshah earthquake relief operations in 2017. Among other things, it becomes apparent that challenges with needs assessment were related to the existence of a large number of diverse actors with different knowledge and expertise, which led to the incorrect delivery of large quantities of items and materials. This resulted in expired materials, such as mineral water. Further, there were challenges associated with access to remote areas, so even local and state authorities struggled to achieve efficient, accurate, and reliable information sharing. In addition, the cultural, demographic, geographic, and lifestyle characteristics of the affected population made it challenging to meet public demand. For instance, there were three major ethnic groups in Kermanshah, but certain actors failed to comprehend the unique needs of each. Lastly, a combination of disturbances in the communication infrastructure, a general lack of data, and the fact that needs assessments are dynamic and change rapidly make needs assessment evaluations challenging. Under these conditions, local actors, and the experiences they entail will be a crucial source of knowledge on demands (Maghsoudi & Moshtari, 2020).

### *2.2.2 Procurement*

Procurement is one of the most important activities in humanitarian operations, with the goal of acquiring relief items from suppliers to help beneficiaries (Lamenza et al., 2019). Procurement is estimated to account for 65 percent of relief operations costs (Schulz, 2009). According to Ertem et al. (2010), procurement is critical in humanitarian relief operations since prepositioned stocks and gifts-in-kind donations are often not enough to cover all the demand caused by a disaster. Further, Ertem and Buyurgan (2013) stated that the procurement process in humanitarian relief operations can vary based on the type of disaster, the location of the suppliers, and the policies implemented by each organization. Thus, there is no special procurement process specified in the literature for humanitarian relief operations (Lamenza et al., 2019). But humanitarian procurement and purchasing knowledge are expanding rapidly. One reason for this is that there is a lot of research and literature on purchasing and supply management in commercial supply chains, which is comparable to humanitarian

procurement (Lamenza et al., 2019). These parallels enable the adaptation of commercial procurement knowledge to the humanitarian environment.

In order to minimize supply vulnerabilities and maximize the company's purchasing power, Kraljic (1983) proposed a matrix for purchasing strategies. The matrix's four quadrants represent four distinct product categories that differ in the following two dimensions, importance of purchasing and the complexity of the supply market. With the Kraljic matrix as the main reference, Lamenza et al., (2019) developed a Humanitarian Purchasing Matrix to guide purchasing strategies for relief items in humanitarian operations.

Due to financial uncertainty, unpredictability of demand, and regulations comparable to those of public procurement, organizations have traditionally conducted their purchases when necessary or needed through tenders (Jahre et al., 2016). Nevertheless, it is seen that a rising number of organizations are working on procurement and forming supplier partnerships (Pazirandeh and Herlin, 2014; Pazirandeh and Norrman, 2014). For instance, Vaillancourt (2017) looked at the consolidation of purchasing in humanitarian supply chains (HSC) and concluded that inter-organizational collaboration for consolidated purchasing reduces costs and improves the quality of the items purchased.

The literature on sustainable procurement is scarce, and most studies target the social pillar of sustainability, particularly through ethical procurement. However, Van Kempen et al. (2017) evaluated each aspect of sustainability in humanitarian procurement. To investigate the sustainability of various humanitarian procurement strategies, they conducted life cycle sustainability assessments. According to their findings, local procurement and sourcing are more environmentally and socially sustainable than international procurement and sourcing. In addition, national market constraints are another motivation to centralize logistics capacities, as high storage and transit requirements for some items can be better addressed with a centralized supply chain (Frennesson et al., 2022). However, purchasing barriers and the lack of available local suppliers are a problem. Access can deteriorate from bad to worse as the quality and availability of products fluctuate (Frennesson et al., 2022).

### 2.2.3 Warehousing

Procurement and warehousing are two consecutive operations. Typically, HOs preposition relief supplies in established warehouses. Yet, limiting factors such as funding may prevent the execution of such activities prior to the occurrence of a disaster (Maghsoudi & Moshtari, 2020). And prior to the Kermanshah earthquake, this was a problem, as the local warehouses were empty of prepositioned supplies (Maghsoudi & Moshtari, 2020).

The fundamental challenges of where, when, and how much to store are essential in the HSC environment. Ye et al. (2019) try to identify the gap between research and practice in humanitarian inventory management, and the article proposes a framework that takes into account *who* to respond to disaster relief inventory demands, *where* to locate the inventory, and *how* to control it. According to the study, sustainability challenges in humanitarian inventory management are due to a gap between humanitarian research and practice and should be addressed by future research.

Maghsoudi & Moshtari (2020) identify a lack of resources in terms of warehouses and a lack of access to warehouses as two major challenges when it comes to warehousing. Another difficulty encountered during the disaster relief operation in Kermanshah involved security and theft. A substantial amount of goods was stored in local warehouses in unsafe places, such as mosques, schools, residential yards, mobile containers, etc. Due to the varying degrees of security teams, several items were stolen (Maghsoudi & Moshtari, 2020).

### 2.2.4 Transportation and distribution

HSCs entail the transfer of supplies and resources from the upstream of the supply chain, where the suppliers are located, to international and local warehouses, with last-mile delivery to the downstream beneficiaries. However, Shavarani and Vizvari (2018) asserted that, in an HSC, the movement of injured people is just as important as the movement of relief supplies. Kunz and Reiner (2016) identify transportation regulation and government restrictions as the most significant HL challenges faced by international humanitarian actors (HAs). Import restrictions and tariffs, travel restrictions, border closures, and excessive bureaucracy can all

contribute to these challenges. The aspect of safety holds significant importance in the process of choosing a transportation mode, especially in the context of last-mile delivery, as highlighted by Balcik and Beamon (2008).

#### *2.2.4.1 International transportation*

When delivering relief supplies, it is necessary to consider a variety of alternatives within the limitations of the available budget and resources (Ertem et al., 2017). This can be accomplished by utilizing multiple modes of transportation (i.e., road, rail, air, and water). But due to the critical significance of time and the large distances involved in delivering relief supplies, most of the international humanitarian transportation is conducted via air, the most polluting mode of transportation (Ertem et al., 2017). International HSCs and the products distributed through these supply chains have a significant impact on the environment.

The utilization of global suppliers has the potential to enhance the accessibility of substantial quantities of high-quality supplies. However, there are some drawbacks to this strategy, including increased emissions, longer delivery times, and higher transportation costs (Balcik & Beamon, 2008). Hence, the adoption of local procurement practices has the potential to yield substantial reductions in transportation distance, thereby reducing the environmental impact of transportation. The establishment of local warehouses has the potential to reduce the utilization of air transportation.

#### *2.2.4.2 National transportation*

Ertem et al. (2017) conducted a study on transportation articles in HSCs and discovered that road transport is the most common form of transportation for humanitarian aid at the national level. But transportation challenges can pose a significant factor in the aftermath of disasters, as the extensive damage to infrastructure may restrict the transportation of goods and people. This was the case during the earthquake operations in Kermanshah, when multiple roads and bridges collapsed, causing massive traffic jams at key intersections (Maghsoudi & Moshtari, 2020). The traffic bottlenecks were compounded by the presence of several actors who came from other cities in their own vehicles. Maghsoudi & Moshtari (2020) proposed air transportation as a potential solution for solving the

problem of traffic. This mode of transportation enables the expedited delivery of aid and the transportation of injured people. However, this is both costly and harmful to the environment.

#### *2.2.4.3 Last mile delivery*

Another major challenge that Maghsoudi & Moshtari (2020) identify is the challenge associated with last mile distribution. In order to complete the delivery of relief supplies, logisticians must overcome the obstacles posed by damaged physical infrastructure and communications systems. Several significant obstacles hampered the last-mile delivery of humanitarian materials to affected populations following the Kermanshah earthquake. For instance, in certain cases, HAs were unable to control crowds, and some people jumped on vehicles to take tents and blankets, depriving the older population of that assistance. Moreover, because government agencies and NGOs operated independently and uncoordinatedly, many materials were wasted or oversupplied, while other necessities in certain rural locations remained unmet. For example, some locations did not obtain stoves for heating because the limited storage space was occupied with bulky packaged food (Maghsoudi & Moshtari, 2020). Lastly, delays in the distribution of relief supplies were noted due to the absence of an integrated logistics database. This resulted in the inability of the relief effort to track the distribution of relief supplies during disaster response or to determine which areas required the most support and what type of aid was needed at a specific time.

Furthermore, recent research on last-mile distribution has emphasized critical humanitarian challenges and innovative methods. Where, among other things, material convergence, which is the transportation of humanitarian supplies from donors to distribution centers, generates bottlenecks and challenges because of stock pileup (Suzuki 2019). Recently, however, studies on the use of unmanned aerial vehicles, or drones, for last-mile delivery in disaster-prone areas with damaged road infrastructure have been conducted. Rabta et al. (2018) discovered that drones can efficiently carry multiple packages of lightweight relief items, such as vaccines and water purification tablets, to remote or inaccessible locations.

### *2.2.5 Waste management*

Often, disasters result in the generation of large amounts of waste. Waste and debris that endangers the health and safety of the surrounding population, slows the recovery process, and harms the environment (Trivedi et al., 2015). Failure to meet waste treatment standards, including the removal of general waste, excessive unwanted donations such as pharmaceuticals, food, and clothing, emergency relief food packaging, large amounts of health care waste, and a high volume of debris that require a scientific process of disposal (Bag et al., 2020), has contaminated the environment during several earlier humanitarian operations (Zarei et al., 2019). Thus, effective, and efficient management of disaster waste is needed (Trivedi et al., 2015).

According to Peretti et al. (2015), the use of commercial reverse logistics practices in the HL sector is extremely limited. Kovács and Spens (2007) and Swanson and Smith (2013) imply that the humanitarian network can benefit from best practices in commercial logistics. However, it is essential to keep in mind that the humanitarian logistician purchases, transports, and distributes a broad range of supplies, and hence, not all the commercial concepts are applicable (Peretti et al. 2015).

The composition and nature of waste generated by a disaster are determined by the type of disaster as well as the affected location, and temporary waste sorting, recycling, and disposal staging areas are required (Trivedi et al., 2015). The improper placement of temporary storage sites can have negative effects on the environment and the livelihoods of those affected, and the volume of waste and debris generated influences the management process (Trivedi et al., 2015).

Given the frequency of natural disasters, it is generally recognized that an effective and efficient recovery process is crucial. Several considerations have been cited in the literature for the development of an efficient disaster management plan, including collection and transportation; communication strategies; contract management; disposal; recycling; hazardous waste handling and disposal; development of an MOU; organizational roles and responsibilities; record keeping; temporary debris storage (Trivedi et al., 2015). For instance, Gordon et al. (2008) state that good planning and coordination with stakeholders

are essential to minimize and control waste management, while Baycan et al. (2002) report that municipal waste collection should be considered when planning and/or executing a disaster waste management system. In addition, Trivedi et al., (2015) identify that the effectiveness of any disaster waste management program is directly attributable to the people involved. Pre-disaster training and training should be given to relevant personnel and volunteers in order to successfully handle disaster waste.

### ***2.3 Environmental sustainability***

Environmental sustainability has become a critical topic across sectors, including the humanitarian sector, as humanitarian operations often have a significant impact on the environment. In this section, we briefly introduce the concept of sustainability in general before introducing the concept of environmental sustainability. We also provide a brief review of environmental sustainability measurements as well as environmental sustainability in the context of HL.

Sustainability has gained global attention. The most widely adopted definition of sustainability was developed by the Brundtland Commission of the United Nations (UN, 1987):

*“[...] a development that meets the needs of the present without compromising the ability of the future generations to meet their own needs” (UN, 1987, p. 15). Furthermore, sustainability is “a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs.” (UN, 1987, p. 15).*

The frequently used sustainability framework by Elkington (1997) distinguishes between environmental, social, and economic perspectives on sustainability. The idea of the Elkington (1997) framework was that a company should report more than just products sold. It should also be held accountable and report its impact on the environment and humanity (Borglund et al., 2017). Our thesis focuses on the environmental perspective of Elkington’s (1997) sustainability framework.



### 2.3.1 Defining environmental sustainability

In Goodlands (1995) conceptualization of environmental sustainability, he states that environmental sustainability:

*“seeks to improve human welfare by protecting the sources of raw materials used for human needs and ensuring that the sinks for human wastes are not exceeded, in order to prevent harm to humans.”*  
(Goodland, 1995).

Goodland (1995) also presents a commonly used definition of environmental sustainability in his conceptualization;

*“a set of constraints on the four major activities regulating the scale of the human economic subsystems: the use of renewable and non-renewable resources on the source side and pollution and waste assimilation on the sink side.”* (Goodland, 1995).

His definition of sustainability may be somewhat out of date, but it is the most frequently cited. A more recent definition of environmental sustainability is *“the reduction of natural resource consumption and pollutant emissions and the elimination of organizational activities that can degrade the ecosystem”* (Vachon and Mao, 2008; Longoni & Cagliano, 2018).

A definition of environmental sustainability in the context of supply chain is *“integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumer, and end-of-life management of the product after its useful life”* (Nichols et al., 2019, p. 537). The design of an organization's supply chain influences how efficient and effective its operations are (Christopher, 2016). This can also affect how environmentally sustainable the operations are. To improve the environmental sustainability of its operations, the organization should address environmental sustainability efforts from product design to end-of-life disposal (Christopher, 2016).

To be environmentally sustainable, the organization must pay regard to the wider impact of its activities and consider factors such as:

- Climate change
- Energy use
- Water use
- Biodiversity
- Chemicals, toxins
- Air pollution
- Water management
- Ozone depletion
- Oceans and fish stocks

(Bush, 2010; Christopher, 2016)

Although these factors are necessary to consider becoming environmentally sustainable, some of the factors are challenging or nearly impossible to measure. Such as climate change, biodiversity, water management, ozone depletion, and oceans and fish stocks.

### 2.3.2 *Measuring environmental sustainability*

Measuring environmental sustainability performance is important to enhance performance. As stated by Harrington (1994) *“If you cannot measure it, you cannot control it. If you cannot control it, you cannot manage it. If you cannot manage it, you cannot improve it”*. Measuring environmental sustainability performance also gives an organization the possibility to compare performance internally, across organizations, and across sectors. Several reporting standards have been developed, and in the 1990s the EU implemented an environmental steering system for companies called EMAS (Eco Management and Audit Scheme). EMAS is a voluntary environmental management tool for all kinds of organizations that want to assess, report on, and improve their environmental performance (European Union, 2022). In addition, the EU published an international standard for corporate environmental management systems, called ISO 14001. The ISO 14001 system made environmental efforts comparable across companies (Borglund et al., 2017). The ISO 14001 standard is one of the most

widely used certifications for environmental measurement internationally. One main difference between the two is that the ISO 14001 certification process does not include a full regulatory compliance audit.

#### *2.3.2.1 Greenhouse gas emissions*

A frequently used environmental measurement for air pollution is greenhouse gas emissions. Van Fan, Perry, Kleme, and Lee (2018) emphasize the importance of reducing greenhouse emissions from supply chain operations. These gases include carbon dioxide, methane, nitrous oxide, and various fluorocarbons (Christopher, 2016), with the first mentioned being the most commonly used measurement by the humanitarian sector. Carbon dioxide remains in the atmosphere for over 100 years and can migrate to other locations during this time, implying that the implications of carbon dioxide emissions are not dictated by where they occur (Rødseth, Wangsness, & Klæboe, 2017). As a result, when assessing CO<sub>2</sub> emissions from different transport modes, such as marine and road transportation, the sum of emission levels is critical. To reduce carbon dioxide emissions in humanitarian operations, one can, for example, change to electrical vehicles in last-mile delivery, reduce air travel, or through better forecasting.

#### *2.3.2.2 Beyond greenhouse gas emissions*

Although the reduction of greenhouse emissions has received the greatest attention due to its documented impact on the climate, organizations should also recognize that supply chain decisions also have an impact on other areas. The measurement of carbon dioxide does not include all the previously mentioned measurable factors identified by Bush (2010) that should be considered to become more environmentally sustainable, such as energy and water use, and chemicals and toxins. Defra (2006) identified four key categories that should also be considered when measuring environmental sustainability:

1. emission to air;
2. emissions to water;
3. emission to land; and
4. resource use

(Shaw et al., 2010)

### *2.3.3 Environmental sustainability in humanitarian logistics*

As the review of the literature revealed, there is a lack of HL research focusing on environmental sustainability. Haavisto and Kovacs (2014) analyzed the annual reports of several major HOs to determine how they address various sustainability expectations. The study discovered that the content of the annual reports included relatively little information about green supply chains, logistics, and green products. For instance, WFP implemented a tree-planting initiative to counterbalance the negative impact of transportation emissions, while UNICEF incorporated measures to address unethical marketing practices in one of its programs. However, except for these minor details, ethical and environmental concerns were not addressed in relation to products, services, programs, or supply chain design. Further, Haavisto and Kovács' (2014) analysis suggests that the sustainability perspective from a program standpoint has not received much attention. Thus, they suggest further research on how HOs address greening initiatives in their transportation and procurement decisions.

Zarei et al. (2019) emphasizes the importance of further research into environmentally sustainable practices specific to each phase of the disaster cycle. While many studies focus on the rehabilitation or post-disaster phase of the life cycle (Livitt et al., 2011; Urban et al., 2011; Kunz and Gold, 2017; Hinzpeter and Sandholz, 2018), few researchers have focused on the preparedness phase of the disaster cycle when it comes to making HL more environmentally sustainable. Abrahams (2014) identified environmental sustainability challenges in post-disaster supply chains and states that the primary challenge to implementing environmental sustainability is the impression of urgency within the disaster response. The results of his study show that negligence toward environmental sustainability promotes unsustainable behavior in humanitarian supply chains.

To obtain environmentally sustainable disaster relief, Eng-Larsson & Vega (2011) argue that environmental issues must be included in the preparedness phase and not just during the development of the operations. Further, they compare the best practices of green logistics and disaster relief logistics and identify gaps that they believe should be addressed in order to reduce the environmental impact of disaster relief logistics, with a focus on the preparedness phase. They identify the following five gaps:

1. Better matching of supply and demand
2. Reduce transport volumes
3. Reduce transport distance
4. Increase vehicle fill rate
5. Decrease vehicle impact

Four of the five gaps identified by Eng-Larsson and Vega (2011) are primarily focused on transportation. However, there may be other gaps that should be addressed, such as increased coordination of needs assessments among the many actors or reducing waste in landfills.

#### ***2.4 Sub-questions and conceptual framework***

To answer the research question, we have formulated three sub-questions, all of which refer to the supply chain in the preparedness phase of disaster relief operations.

According to our literature review, environmental sustainability has become a critical topic across sectors, including the humanitarian sector. To answer the primary research-question, we set the scene by investigating the perception of environmental sustainability in HOs by answering the following sub-question:

*Sub-question 1: What is the perception of environmental sustainability in humanitarian organizations?*

Our literature review shows that there is a need for further research on how HOs address greening initiatives. To address the greening initiatives, we must first gain an overview of greening initiatives that have been developed. Hence, the second sub-question seeks to provide an overview of the current state of environmental sustainability initiatives in HL operations:

*Sub-question 2: Which initiatives have HOs developed to reduce the environmental impact of their logistic operations activities?*

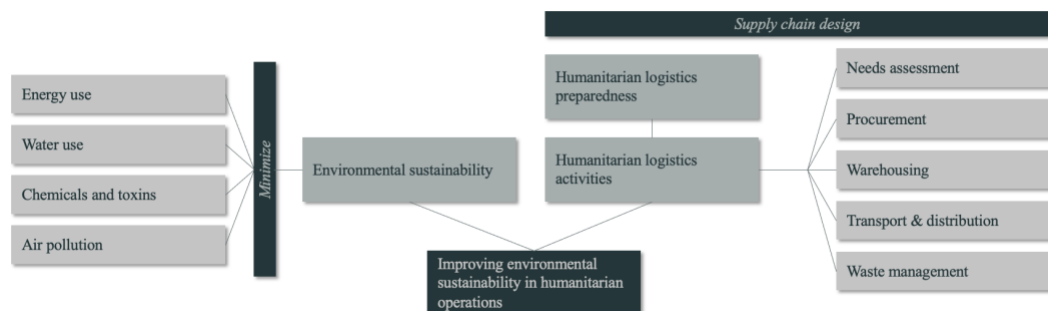
Working with HL in general involves several challenges due to the unpredictable, dynamic, and chaotic environment of the supply chain. The literature review also

revealed challenges such as security problems, funding, and uncertainty in supply and demand. These general challenges might also have an impact when developing and implementing environmental initiatives. The third sub-question seeks to identify the main challenges the HOs have experienced when working on environmental sustainability efforts in their logistics operations:

*Sub-question 3: What are HO's main challenges when developing and implementing environmental initiatives?*

### Conceptual framework

In the literature review, we have presented a foundation of knowledge related to our research question and the sub-questions. Based on some of the main concepts from the literature review, we developed a conceptual framework (*Figure 2*) to assist us with our research. The left pillar contains measurable factors that have an impact on the environmental sustainability performance of operations activities (Bush, 2010; Christopher, 2016). The right pillar contains the different humanitarian logistics activities proposed in Jahre et al.'s (2016) framework for logistics preparedness. We seek to achieve the overall objective of our thesis by considering and connecting the factors from the left pillar with the humanitarian logistics activities on the right pillar. Humanitarian logistics preparedness involves the design of the permanent supply chain. Therefore, the planning of supply chain design in humanitarian logistics activities aimed at minimizing the environmental impact of the factors on the left pillar can improve the environmental sustainability of humanitarian operations.



*Figure 2: Conceptual framework*

### **3.0 Research Methodology**

This chapter describes the approach used to address the research question and its sub-questions. We begin by discussing our research strategy and chosen design. We then describe our method of data collection in further detail. Finally, we summarize how the quality and ethics of the research are ensured.

#### ***3.1 Research Strategy***

Research methods can be classified as quantitative or qualitative. The methods refer to the strategy used by the researchers to collect and analyze the data from the study (Bell et al., 2022). When gathering and evaluating data, quantitative research emphasizes quantifiable information. In contrast, qualitative research has a distinct theoretical foundation and is presented through words and images rather than numbers (Bell et al., 2022). As environmental sustainability in humanitarian supply chains is a relatively new topic for most HOs, it becomes difficult to gather quantitative data. So, to answer the proposed research question, we need a research strategy that allows us to identify environmentally sustainable- related initiatives and challenges in the preparedness phase of humanitarian logistics activities. With this in mind, we have decided on a qualitative research method (Bell et al., 2022). The qualitative method enables us to engage closely with actors relevant to our research questions. This allows us to gain comprehensive insight from their perspectives and thereby explain and describe in greater depth the initiatives and challenges to achieve more environmentally sustainable disaster relief operations.

Researchers frequently differ between deductive and inductive research approaches (Bell et al., 2022). The deductive strategy involves utilizing prior knowledge to develop a hypothesis and then test the theory, whereas the inductive approach makes particular observations and contributes to the theory through its discoveries (Bell et al., 2022).

A third approach is known as abductive reasoning, which is also referred to as systematic combining. Given that there is limited research on this topic, this approach appears to be a good fit for our research, as it eliminates the limitations associated with deductive and inductive research (Bell et al., 2022, p. 24; Dubois

& Gadde, 2014). Abductive reasoning begins with the observation of a phenomenon and then tries to explain it by alternating between theory and data (Bell et al., 2022; Dubois & Gadde, 2014). By using an iterative approach that alternates between theoretical and empirical analysis, we can effectively explore the complexities surrounding the establishment of more environmentally sustainable logistics activities. Additionally, this method allows for a comprehensive examination of the initiatives and challenges presented by HOs. For our master's thesis, we have thus decided on the abductive approach, as it can be applied to a qualitative strategy (Bell et al., 2022).

In order to gain a deeper understanding, we started with theoretical research, followed by the concurrent acquisition of primary and secondary data. Subsequently, theoretical insights were developed to identify the factors that impact diverse decisions during the preparedness phase with regards to environmental sustainability and how it affects HOs' logistics activities. In the initial phase of developing the thesis, we carried out a preliminary theoretical analysis to analyze the logistics activities in the preparedness phase and their interconnections with environmental sustainability. Due to the absence of research on the relationship between environmental sustainability and the humanitarian sector, we considered it beneficial to utilize the conducted interviews, as well as secondary data, to analyze and modify our theoretical background. We made parallel modifications to our theoretical foundation throughout the whole data collection process, ensuring that the preceding literature and theoretical foundation were consistent with the progression of our master's thesis. Furthermore, the data obtained from the interviews and secondary data had an important impact on the applicability of the reviewed theories and models, necessitating the inclusion of additional theories and modifications to our research questions. In addition, we contributed to the body of scientific knowledge by modifying our initial conceptual framework by including additional information from our primary findings. An illustration of our abductive approach is shown in *Figure 3*.



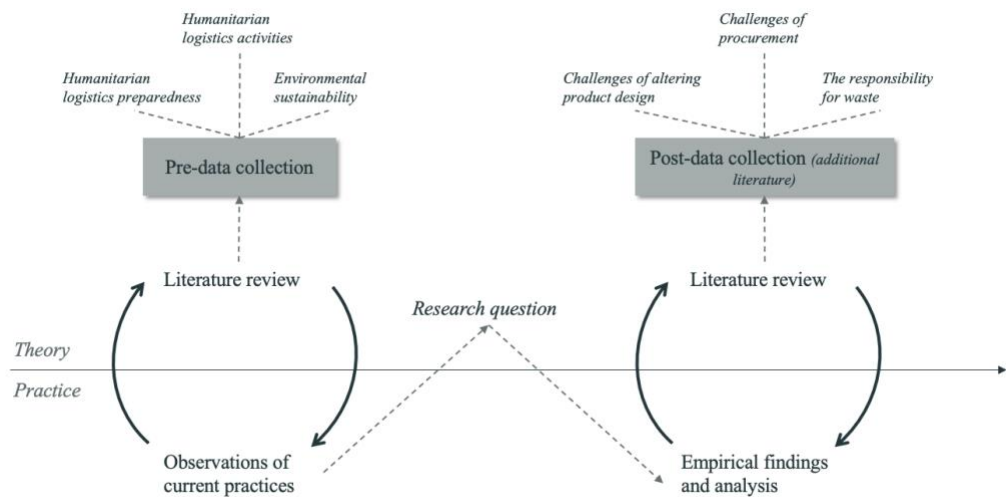


Figure 3: Illustration of abductive approach

### 3.2 Research Design

A definition of research design is provided by Bell et al. (2022) as: “a research design provides a framework for the collection and analysis of data”. The design of a study plays a crucial role in determining the quality of its conclusions. It provides a detailed explanation of the methodology used in conducting the study. Therefore, it is essential to choose an appropriate design. The five most frequently used research design types are experimental/relational, cross-sectional, longitudinal, case study, and comparative designs.

Our research design entails a qualitative investigation that centers on environmental sustainability in the humanitarian sector. We have opted to gain insight from expert interviews as the most effective method for analyzing our research question (Bell et al., 2022). During the developmental stage of our research, various designs were evaluated for their potential suitability, and a case study was part of the discussion. Case studies are in-depth examinations of one or more specific cases, whereas expert interviews are frequently conducted to gain a broader understanding of a topic and are used when it is difficult to gain access to an area of interest (Bell et al., 2022; Bogner et al., 2009). Obtaining comprehensive information, observations, and documentation for conducting an in-depth investigation in the area of interest has proven to be challenging due to the recent attention it has received from HOs. Additionally, the limited timeframe posed a challenge to carrying out a comprehensive case study. According to

Bogner et al. (2009), expert interviews have been suggested to reduce the duration of the information gathering process as they offer privileged insights that can be applied to a broader group of players. As a result, we have chosen a qualitative study with expert interviews, as it appears to be the most appropriate design for our research (Bell et al., 2022).

In research, sampling refers to the individuals who are selected for the purpose of being interviewed to obtain relevant data and information for the study. According to Bell et al. (2022), purposive sampling is considered a suitable approach for conducting qualitative research. This approach employs purposive sampling rather than random selection, as it strategically selects participants. The selection of individuals should encompass a diverse range of characteristics and viewpoints that are pertinent to the problem statement (Bell et al., 2022).

We interviewed several experts within the same sector in order to expand our understanding. We delved into an examination of the three Norwegian international HOs: Norwegian Red Cross, the Norwegian Refugee Council, and Norwegian Church Aid, with respect to their incorporation of environmental sustainability initiatives. Initially, people occupying diverse roles who appeared relevant to our research were identified on LinkedIn, with the aim of achieving maximal diversity in our data collection. The interviewees were contacted through email, which included a brief overview of the two interviewers, an introduction to the research study, and a general outline of the project's specifications.

In total, we completed eight semi-structured interviews with a sample size of nine different interviewees. The interviewees encompassed a diverse range of individuals, including those who have spent years working with climate, environment, and sustainability, as well as those who have spent a long time working with global logistics, preparedness, purchasing, and as supply chain advisers. In our empirical findings and analysis, and discussion chapter, we refer to our primary data sources as presented in Table 1.

Identifier	Code of Interview Object	Humanitarian Organization	Date of Interview
ID-1		Norwegian Church Aid	22.03.2023
ID-2		Norwegian Church Aid	29.03.2023
ID-3		Norwegian Red Cross	29.03.2023
ID-4		Norwegian Red Cross	29.03.2023
ID-5		International Federation of Red Cross and Red Crescent Societies	29.03.2023
ID-6		Norwegian Refugee Council	13.04.2023
ID-7		Norwegian Red Cross	26.04.2023
ID-8		Norwegian Church Aid	28.04.2023
ID-9		Norwegian Refugee Council	12.05.2023

*Table 1. Presentation of interview objects*

In terms of purposive sampling, Bell et al. (2022) differentiates between non-sequential and sequential sampling approaches. The sequential approach has been used in our case. According to Bell et al. (2022), the process of sampling is dynamic in nature, wherein the researcher starts with an initial sample and progressively supplements the sample as it benefits the research questions. In qualitative research, there are several forms of purposive sampling; one of these is snowball sampling, also known as snowballing (Bell et al., 2022). This sampling technique was utilized in this research, as this method is increasingly applied in qualitative research (Bell et al., 2022). The snowball effect is a phenomenon whereby an initial interaction with a group of people who are pertinent to a project is leveraged to establish connections with other people (Bell et al., 2022). In the process of primary data collection, the participants were asked about additional experts who may have relevance to the study. We found this type of recruitment of interviews very useful, as it afforded us the opportunity to engage with people through our contacts whom we may not have gotten in touch with otherwise.

### ***3.3 Data collection and analysis***

This section explains our method of data collection. Data collection is essential to the accomplishment of any research work and allows for the acquisition of firsthand knowledge and insight into the research problem (Bell et al., 2022). To assure the quality of our research and deliver the most accurate answer to our research question, we use both primary and secondary data.

#### ***3.3.1 Primary data***

Our primary method of data collection is to conduct semi-structured interviews with experts within the humanitarian sector. Semi-structured interviews offer an advantage by not being constrained by a preconceived set of questions, thereby enabling the inclusion of queries that emerge from the interviewee's feedback and knowledge (Bell et al., 2022; Gray, 2019; Qu & Dumay, 2011). The nature of the interviews varied based on the interviewees and their prior knowledge. According to Bell et al. (2022), it is vital to exhibit adaptability during semi-structured interviews and to be prepared to ask follow-up questions in accordance with the interviewee's knowledge, reflections, and responses. This approach allowed us to gather new knowledge and thoughts that we had not anticipated asking about or discussing prior to the interviews. However, the approach used for obtaining primary data has also faced criticism. Firstly, the process of conducting such interviews entails a considerable investment of time. Secondly, owing to time constraints, only a smaller sample size is deemed suitable for this study. Thirdly, a physical interaction among the interviewers could potentially introduce bias into the results since the researchers' presence may influence the interview direction.

To ensure comparability, semi-structured interviews were preferred as both researchers were present during the interviews (Bell et al., 2022). Throughout the course of our interviews, certain questions were rephrased to better conform with the natural flow of the interview and to better suit the responses provided by the interviewees. Furthermore, we reorganized the order of questions and excluded certain ones to align with the conversation more effectively with our interviewees. This was due to the fact that we were informed by some interviewees that they lacked knowledge in certain areas, making it unnecessary to ask them specific questions since they would not be able to respond. Or because the respondents

provided answers to several questions in addition to the one originally asked. This allowed us to obtain more information, as we could ask questions in a variety of ways and have a wide range of clarifying questions. As a result of this flexibility, the length of the interviews ranged from around 20 minutes to an hour.

Typically, the interview group consisted of two interviewers and one interviewee. However, group interviews were conducted in cases where they were deemed necessary, with two participants present simultaneously. For instance, we interviewed people who worked in the same place/department but in different positions. This was because they found it more convenient to do the interview together and complement each other to provide the most accurate information possible. Moreover, this allowed us to collect more information in a more efficient way, as our research was limited by time. In addition, the participants' responses would be formulated differently, leading to a more comprehensive understanding of the topic.

According to Bell et al. (2022), it is recommended to conduct interviews in a private and calm location, as this can reduce the likelihood of disruptions. Furthermore, a quiet environment can encourage the interviewee to communicate freely because they will not be overheard by anyone (Bell et al., 2022; King et al., 2018). All interviews were carried out through Zoom in settings that ensured limited disruptions, allowing the interviewees to concentrate on providing comprehensive responses to our questions.

In preparation for the interviews, we developed a set of questions that served as a framework for the interview process. This set of questions is usually referred to as an interview guide (Bell et al., 2022), as outlined in Appendix 3. The application of an interview guide is a valuable tool for researchers, as it enables them to gather consistent data from their chosen participants and modify their questions based on what is relevant in the different settings (Bell et al., 2022; Kallio et al., 2016). The use of an interview guide yielded an advantage in terms of comparisons of interviews and simplified their processing, as they adhered to a uniform structure and were based on identical interview guidelines.

The development of an interview guide requires careful consideration of several significant factors, and the extent and depth of information to be gathered during

the interview process is one of these factors (Kallio et al., 2016). While it is crucial to acquire an in-depth understanding of the research subject, it is equally important to solely gather the data that is essential to addressing the research questions (Gibbs et al., 2007). The reason behind limiting the amount of information in a research study is twofold: first, it is motivated by ethical considerations; second, it serves the purpose of providing a clear direction for the research, as an excess of information may lead to a complicated and disorienting data analysis (Kallio et al., 2016). Hence, it was necessary to consider this aspect while formulating our questions. We carefully considered how we should formulate the questions and what type of questions we should ask, acknowledging the potential impact on the data collected (Bell et al., 2022). We also conducted a thorough examination of the language and terminology used in relation to logistics terms to mitigate any potential misunderstandings or confusions.

Drawing upon our conceptual framework, our questions were formulated to comprehensively address the primary topics of research. The interview guide was partitioned into three distinct sections to cover the different topics related to the research question and sub-questions.

First, we formulated questions pertaining to the part of our research that pertains to sustainability, that is, the current state of environmental sustainability within the organization and the way in which it is incorporated into their preparedness work. In this regard, we asked, among other things, about the interviewee's perception regarding the focus on environmental sustainability within their respective organizations. This was done with the intention of comparing their perception to the portrayal presented in their organization's annual reports. Secondly, we developed questions related to HOs' work on environmental sustainability efforts in their logistics activities. Lastly, we created organization specific questions, as we wanted to gather information on the current state of environmental sustainability initiatives and projects and the main challenges they have experienced.

Further, in accordance with the recommendation to incorporate introductory questions into the interview guide to establish clarity regarding the topic at the beginning of the discussion (Qu & Dumay, 2011), we included introductory

questions pertaining to the interviewee's professional background and present role. This was helpful for gaining insight into the interviewee's knowledge of the topic, allowing us to tailor our subsequent questions to their competence and expertise.

### *3.3.2 Secondary data*

The process of gathering one's own data might turn out to be time-consuming and costly, and furthermore, it may require approval in certain instances (Bell et al., 2022). The acquisition of secondary data is deemed essential to gaining a comprehensive understanding of topics that are not covered by primary data, given the time-consuming nature of conducting multiple interviews. The research process was initiated by conducting a thorough review of the existing literature. As we used an interactive approach, the findings gained from the secondary data were utilized to support our primary data, and vice versa. With the utilization of an abductive approach, it was imperative to incorporate secondary data from other researchers. The triangulation of data from diverse sources has been identified as a means of enhancing research quality (Bell et al., 2022). This is further elaborated in the “quality of the research” section.

As a part of our secondary data, we carried out an analysis of certain keywords in the annual reports for the organizations that were interviewed, covering a period of ten years, with the aim of finding out whether there has been a shift in their emphasis towards environmental sustainability. To maximize the retrieval of pertinent information from the annual reports, we used various synonyms for distinct terms, given that different organizations have utilized dissimilar vocabulary to describe the same phenomena. The reports were analyzed for the presence of specific keywords related to environmental sustainability, such as: sustainability/sustainable, environment/environmental\*, emissions\*, footprint, CO2/carbon, greenhouse gas emissions, pollution, climate\*, and green/greener. Regarding the keyword "environment/environmental," only search results related to the external environment are considered, and no results related to, e.g., the work environment or other similar contexts are considered. The search results pertaining to emissions encompass greenhouse gas emissions, CO2, and carbon footprints. In the realm of climate, search results associated with the external climate, such as climate change or crises, are counted.

As a further part of our secondary data analysis, we extended our search to include the mapping of the annual reports of seven other international HOs, in addition to the Norwegian Red Cross, NRC, and NCA, and their initiatives towards more environmentally sustainable aid. In this context, a comprehensive analysis of the 2021 annual reports was conducted with the aim of identifying any specific goals, strategies, and initiatives related to environmental sustainability. As an extension of this, we opted to expand our investigation by exploring additional annual reports that corresponded with the research conducted by Haavisto and Kovács (2014), with the aim of making a comparison. Out of the ten HOs we have chosen to examine, six of them match the HOs Haavisto and Kovács (2014) looked at in their research. We decided to examine these organizations for the same keywords that Haavisto and Kovács (2014) used to see if there has been a change during the last ten years. However, our focus is only on the keywords associated with environmental sustainability (see Appendix 5).

### *3.3.3 Data analysis*

The process of data analysis is predominantly focused on data reduction, which involves the breakdown of large amounts of data to make them manageable and possible to interpret and analyze (Bell et al., 2022). This section of the study explains the approach that was employed for the analysis of the gathered data. Furthermore, we provide a description of the process by which the data was transformed into valuable and reliable information in order to address our research question.

The interviews were recorded, and the recordings were subsequently transcribed utilizing the validated software tool, Nvivo, yielding a significant amount of data. To organize the findings derived from these interviews, we extracted the key findings and employed color coding to distinguish between interviewees. This helped us discover similarities and distinctions in how the respondents see and interpret the addressed topics. Moreover, we incorporated the primary findings into an Excel spreadsheet to provide a comprehensive overview of the findings associated with each logistic activity (Appendix 7).



### *3.4 Quality of the research*

The assessment of business research and management quality commonly employs three criteria, namely reliability, replicability, and validity (Bell et al., 2022). However, since validity and reliability are typically associated with quantitative research, it has been argued that qualitative research requires extra criteria for evaluation (Lincoln & Guba, 1985; Guba et al., 1994). The proposed criteria are trustworthiness and authenticity. Trustworthiness is further classified into four subcategories, namely credibility, transferability, dependability, and confirmability (Guba et al., 1994). We find the trustworthiness criteria most relevant; thus, in the following section, we present these criteria as proposed by Guba et al. (1994).

#### *3.4.1 Credibility*

The establishment of credibility is of utmost importance in ensuring that research is conducted in accordance with the principles of good practice. In order to ensure the credibility of our research, we prioritized the implementation of triangulation. The concept of triangulation involves the utilization of several methods or data sources to examine a particular phenomenon (Bell et al., 2022). We have gathered primary data through conducting interviews with people who have different knowledge, occupations, ages, and genders; secondary data through reports and documents, and established research. The utilization of triangulation in our study facilitated the acquisition of comprehensive data and enabled us to obtain insights that would have otherwise been omitted, thereby establishing credibility (Deacon et al., 1998).

#### *3.4.2 Transferability*

The concept of transferability pertains to the extent to which the outcomes of a study can be generalized and applied in other contexts. The limited sample sizes typically associated with qualitative research may present a challenge (Bell et al., 2022). Undoubtedly, a study that relies on a sample size that is relatively restricted may give rise to apprehensions regarding the projected transferability. According to Bell et al. (2022), the practice of conducting interviews with a limited number of organizations within one sector may pose challenges in terms of generalizing the findings to other contexts. The geographical location where the data was

collected is also an essential aspect to consider in relation to transferability (Shenton, 2004). Our primary data collection is based on three different Norwegian HOs. As a result, it is possible that contextual factors may have influenced our findings, which could potentially impact the transferability of our research results. To surmount these limitations, it is necessary to include a "thick description" (Bell et al., 2022; Shenton, 2004). In academic research, it is typical for researchers to provide an in-depth description of the contextual, cultural, environmental, and individual factors involved in their study. This practice enables other researchers to assess the potential transferability of the research findings (Bell et al., 2022; Shenton, 2004). To address this, we have endeavored to provide comprehensive and elaborate accounts of our research. We have included details regarding sampling and subject selection criteria, the number of researchers involved in data collection, the data collection methods used, the duration of data collection, the location of primary data collection, and secondary data collection is all shown in the project plan in Appendix 6.

#### *3.4.3 Dependability*

The idea of dependability was introduced by Guba et al. (1994) with the aim of establishing trustworthiness and drawing a comparison to reliability. Critiques of qualitative research have pointed out that the identification of the researchers' methods and the origins of their findings can be challenging (Bell et al., 2022). To ensure dependability in our research, we have maintained comprehensive documentation and data pertaining to our research procedures. This includes the formulation of the research problem, participant selection, note-taking, and transcript creation. Additionally, we have provided a detailed account of our research methodology, encompassing our approach, design, primary and secondary data collection, and quality assurance methods. This is shown in the methodology chapter, which elaborates on every decision made.

#### *3.4.4 Confirmability*

Confirmability pertains to the degree of objectivity in research, specifically in terms of whether the researcher's personal values and opinions have influenced the results of the study (Bell et al., 2022). Although Bell et al. (2022) have argued that attaining complete objectivity is impossible, we strive to achieve objectivity

to the best of our ability to ensure confirmability. However, we acknowledge this challenge, as it is typical to form judgments and choices based on prior experiences and knowledge. To maintain objectivity, we endeavored to minimize researcher bias and subjectivity in our study. We accomplished this by both being present and taking notes during most interviews. By limiting the potential for findings and conclusions to be influenced by the perspective of a single researcher, we can enhance the objectivity of our research. We also think that the snowball-sampling method increases confirmability by including individuals with different backgrounds. Moreover, we have engaged in ongoing meetings and discussions to reflect on the research process and have taken measures to ensure that our interview questions are constructed in an objective way.

### ***3.5 Ethical considerations***

It is essential for any research project to incorporate ethical and societal considerations throughout the entirety of the research process. Bell et al. (2022) have identified four main ethical considerations that ought to be considered in the context of business research. These considerations include the avoidance of harm, obtaining informed consent, preserving privacy, and preventing deception. Our research was conducted with all these ethical considerations in mind.

Regarding the avoidance of harm, it is widely considered unacceptable to conduct research that poses a risk of harm to the participants (Bell et al., 2022). Therefore, it is crucial to ensure that no harm occurs or that the likelihood of it is minimized during research activities. As a result, ethical guidelines must be upheld to prioritize and maintain security (Qu & Dumay, 2011). Further, with regards to informed consent, it is crucial to provide potential research participants with comprehensive information about all pertinent aspects of the study, enabling them to make an informed decision regarding their participation (Bell et al., 2022). An information letter was composed to elucidate the purpose of data collection and its intended usage to the interviewees. Ensuring the preservation of the privacy of research participants is of utmost importance (Bell et al., 2022; Qu & Dumay, 2011). This aspect is closely associated with the concept of informed consent. Upon obtaining informed consent, researchers can use the information and data that participants have agreed to share (Bell et al., 2022). To maintain the privacy

of our interviewees, we avoided gathering unnecessary personal information and anonymized our primary data sources. Lastly, the ethical principle of deception requires careful consideration throughout the research process (Bell et al., 2022). According to Bell et al. (2022), it is vital for researchers to accurately represent the nature of their research and their research intentions without misrepresenting them. In certain instances, inadvertent deception of research participants may occur if researchers neglect to provide all pertinent information. To address this issue, we wrote an information letter to our interview participants outlining the nature and purpose of our research.

Throughout the process of writing the master thesis, all gathered data has been securely stored on our student BI OneDrive. Throughout the project, various types of data, such as documents, transcriptions, and recordings, have been carefully stored in secure locations. Furthermore, all interviews, along with their corresponding transcriptions and recordings, have been assigned an anonymized identification code and managed in compliance with the 2018 regulations set by the European Union and the General Data Protection Regulation (GDPR).

## **4.0 Empirical findings and analysis**

This chapter presents the empirical findings and analysis derived from our thorough examination of annual reports, along with insights gained from our interviews with different HOs. This chapter is intended to establish the basis for the discussion. It should be emphasized that we use both primary and secondary data to present our research throughout this chapter.

### ***4.1 Perceptions of environmental sustainability in humanitarian organizations***

In this section, we investigate the Norwegian Red Cross, Norwegian Refugee Council, and Norwegian Church Aid's perceptions of environmental sustainability. As a part of our secondary data, we have conducted an analysis of specific keywords in the annual reports over the last ten years for these organizations with the aim of seeing if there has been a shift in their emphasis on environmental sustainability.

#### 4.1.1 Norwegian Red Cross

The Norwegian Red Cross has noticeably shifted its focus towards environmental sustainability in its recent publications, as illustrated in *figure 4*. The findings associated with the specified keywords exhibit a quite low frequency across the annual reports spanning from 2012 to 2020. When searching for the terms "sustainability/sustainable", it was found that the number of occurrences varied between zero and three. However, the findings pertain to the accounts categorized as "Cost of activities: developing an effective and sustainable organization", apart from one search in the 2016 annual report, which addresses long-term sustainability and resilience in their local communities. Regarding the term "environment/environmental", the number of occurrences ranged from one to three. For greenhouse gas emissions/CO2/carbon footprint/footprint, the annual reports from 2012 to 2019 yielded a range of zero to two outcomes: however, there are a total of five results in the 2020 annual report.

Further, no outcomes were identified for the keyword "green/greener" in the annual reports from 2012 to 2019, whereas one result was made in the 2020 annual report. A single instance of the search term "pollution" was identified within each annual report spanning from 2012 to 2019. Nevertheless, this was a standardized sentence that stood in the same place in all reports, which read as follows: "The Norwegian Red Cross does not pollute the external environment beyond what is normal for this type of organization."

Finally, regarding the topic of "climate," the annual reports from 2012–2018 had between one and six occurrences, with some being more general in relation to the climate crisis, while others were somewhat more specific and addressed that a climate action plan was decided for the Red Cross. In the 2019 annual report, we got 16 outcomes, albeit with a broader focus on the climate crisis and its associated challenges. We discovered a total of 13 findings in the 2020 annual report, of which three were related to the chapter on "organization and the environment," and the other ten were more comprehensive and addressed the climate crisis and its associated challenges.

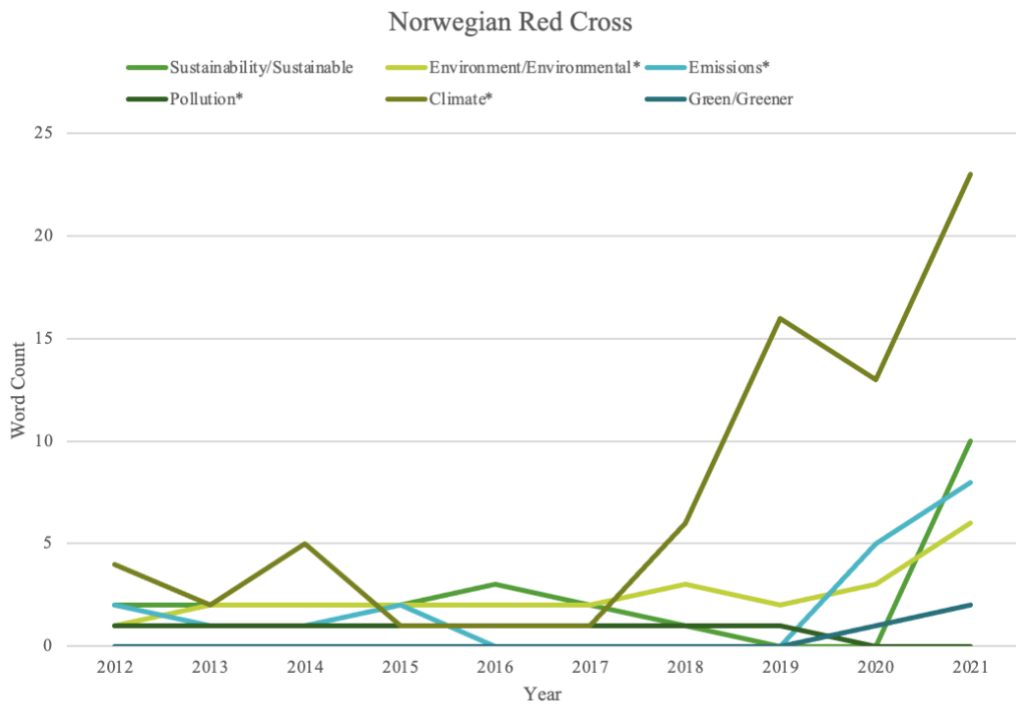


Figure 4. Norwegian Red Cross keyword count from annual reports

For the 2021 annual report, we see a noteworthy increase in the frequency of appearance of the pertinent keywords. There are a total of 10 results for "sustainability/sustainable". Five of them have to do with the Sustainable Development Goals (SDGs) of the United Nations; two have to do with the accounts- listed under "Cost of activities: developing and effective and sustainable organization"; and the final three are directly related to environmental sustainability. Moreover, the analysis revealed six occurrences of the term "environment/environmental" and a cumulative count of eight cases of the phrase's greenhouse gas emissions/CO2/carbon footprint/footprint. Regarding the topic of "climate," the report yielded a total of 23 outcomes. Out of these, 10 findings related to the chapter on "climate, environment, and sustainability," while the remaining 13 results were broader in scope and addressed the climate crisis and its associated challenges. Lastly, two hits were made on the keyword "green/greener", which refers to obtaining greener humanitarian aid.

The trends observed in the annual reports over the last few years align with the input gathered during the interviews with the Norwegian Red Cross. When questioned about their perception of the emphasis on environmental sustainability

in the organization and the level of concern among the employees, ID-3 responded:

*Now, there is a major focus on this in the strategy, management, and management documents, and we are working on concretizing the strategies and making them more operational. However, there has been limited attention to these areas in the past, and given the size of the organization, which has a volunteer base of up to 42,000 people and an employee base of approximately 650 full time employees, the degree of engagement and adoption is somewhat variable. But environmental sustainability has received a lot of attention lately, and we are working on it.*

Further, ID-7 stated that: *“In the organization, there are many employees who have a great commitment to sustainability, and this is important to many employees. A typical profile among those who apply to the organization is that they want a meaningful job.”*

#### *4.1.2 Norwegian Refugee Council*

Regarding the Norwegian Refugee Council, our focus of analysis pertains to their "Annual Report from the Board." Starting in 2017, the organization has a report called the "NRC Annual Report" in addition to the "Annual Report from the Board." However, to ensure as accurate an analysis as possible over the past decade, we have chosen to only look at the "Annual Report from the Board."

Like the Norwegian Red Cross, it is noticeable that the NRC has shifted its attention towards environmental sustainability in its annual reports over the last decade, as illustrated in *Figure 5*. The analysis of the annual reports spanning from 2012 to 2018 reveals that the keyword "sustainability/sustainable" has a limited occurrence, ranging from zero to two. The instances identified are in a fairly vague manner, such as *“the development of sustainable structures and democracy”*, *“the building of sustainable and accountable governance structures”*, and *“the need to improve the systems to learn more about the impact and sustainability for the end-user”*. Upon entering the term

"environment/environmental", we obtained a limited number of search outcomes, ranging from one to two. No findings were generated for greenhouse gas emissions/CO2/carbon footprint/footprint, but a single outcome was discovered for "pollution" in the annual reports for 2014 and 2015. However, the sentence is general and states that: *“the organization's operations do not result in any significant environmental pollution”*. Zero search hits were made for the keyword "green/greener", while the term "climate" generated between one and seven outcomes. Nevertheless, all the cases obtained were of a broad nature and focused on the climate crisis and its associated challenges.

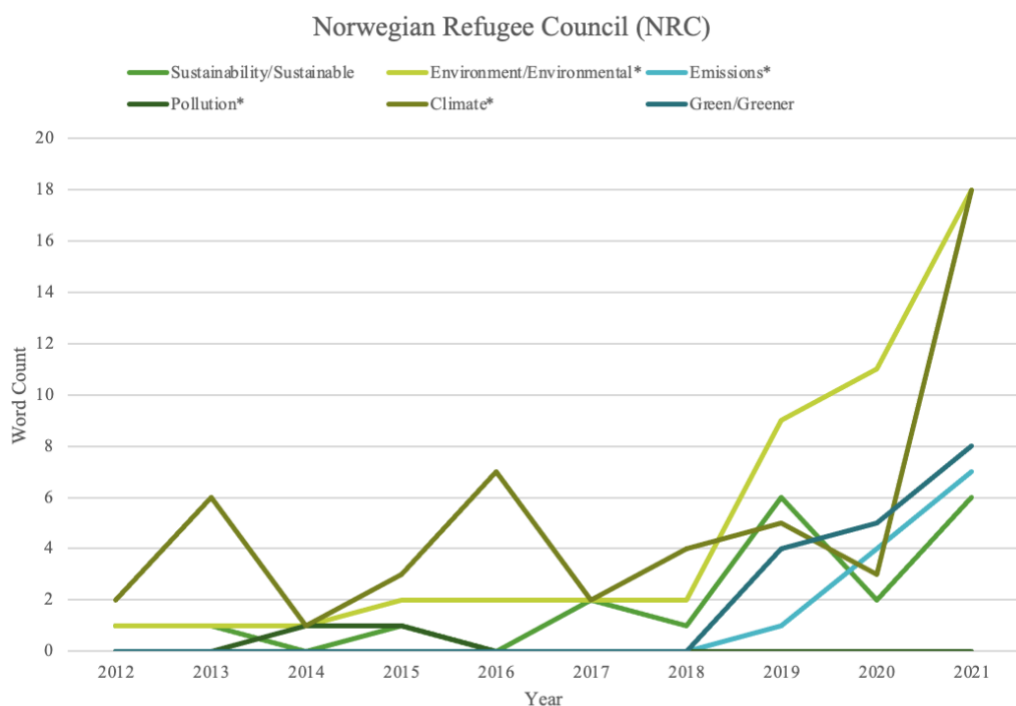


Figure 5. Norwegian Refugee Council keyword count from annual reports

In the 2021 annual report, which gained the most hits on the different keywords, the term "sustainability/sustainable" got a total of six hits. Of these, five were specifically associated with environmental sustainability initiatives, programs, and activities, while one was of a more general nature. When searching for "environment/environmental", the number of occurrences was eighteen. Regarding the terms greenhouse gas emissions/CO2/carbon footprint/footprint, there are a total of seven cases. The search phrase "pollution" yielded no results, whereas the terms "green/greener" and "climate" generated eight and 18 hits,



respectively. Of the 18 hits for "climate," six were specifically related to environmental sustainability, while the remaining 12 addressed the broader issue of the climate crisis and its associated challenges.

The patterns identified in this analysis are consistent with the data collected from the interviews. Regarding the perception of the emphasis on environmental sustainability in the organization and whether there is a great concern among the employees, ID - 6 provided the following statement:

*It is widely acknowledged that climate change is an actuality and that it is primarily caused by carbon emissions. Additionally, there is a general understanding that human activities have a significant impact on the environment and that we must take responsibility for it.*

Further, ID-9 stated that: *“Environmental concerns became a part of the NRC’s strategy first in 2022.”*

#### *4.1.3 Norwegian Church Aid*

The process of locating distinct annual reports for Norwegian Church Aid was arduous, but a complete set of annual reports for the years 2012, 2013, 2015, 2020, and 2021 was located. While an overall result report was found for the period 2016–2019. In contrast to the Norwegian Red Cross and NRC, it seems that the terms "sustainable" and "sustainability" were introduced and frequently used in the annual reports of the NCA as early as ten years ago. However, it appears that there has been a modification in the utilization and connotation of the terms, which we return to later.

The annual reports of 2012, 2013, and 2015 yielded, respectively, 45, 33, and 40 cases of the term "sustainability/sustainable", as illustrated in *Figure 6*. Regarding the term "environment/environmental", the number of occurrences was eight, nine, and seven. Further, for greenhouse gas emissions/CO2/carbon footprint/footprint, two results were made for each annual report. For the topic "pollution", one, four, and zero hits were obtained; conversely, no outcomes were found for the term "green/greener".

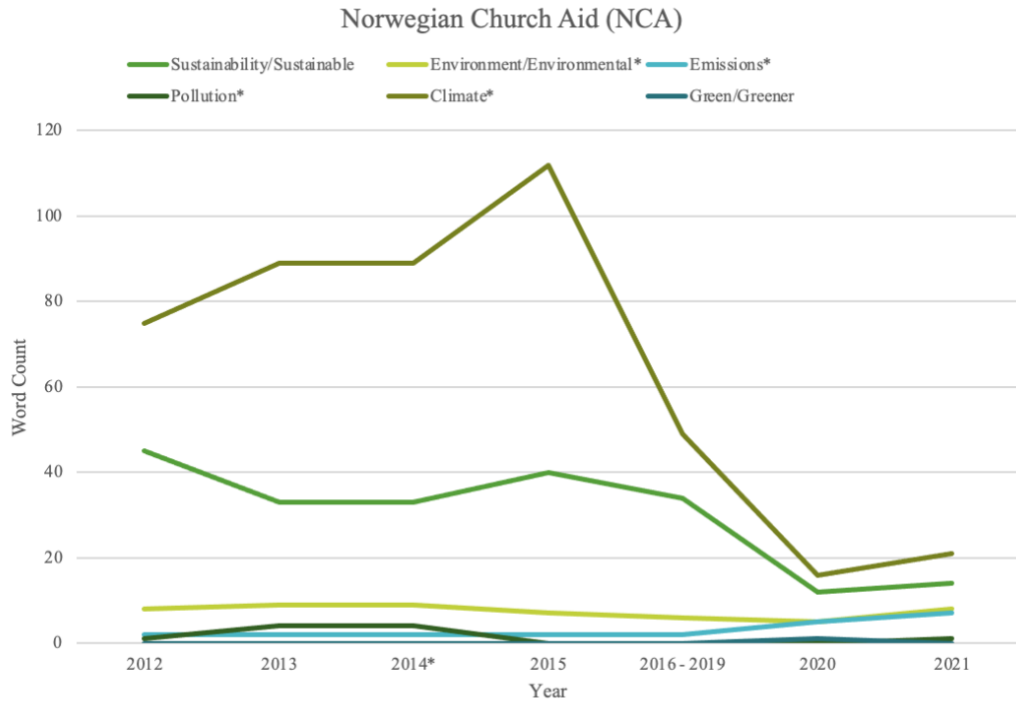


Figure 6. Norwegian Church Aid keyword count from annual reports

\*Lack of data in 2014 for NCA

The 2021 annual report contains a cumulative count of 14 instances of the term "sustainability/sustainable". Five of them pertain to the SDGs, while two have a broader scope. The remaining seven results are specifically associated with environmental sustainability, programming, and operational activities. The term "environment/environmental" was identified eight times in the report, while the phrases "greenhouse gas emissions/CO2/carbon footprint/footprint" were described a total of seven times. Only one instance of the term "pollution" was discovered, whereas no occurrences of the terms "green/greener" were detected. Regarding the topic of "climate," a total of 21 references were identified. Out of these, nine were specifically related to environmental sustainability, while the remaining 12 were of a broader nature and focused on the climate crisis and its associated challenges. The findings obtained in the 2020 annual report were comparable to those in the 2021 reports, with no significant variations observed.

It is evident from the interviews that environmental sustainability has received more attention within the organization in recent years and is on the agenda. ID - 2 stated that:

*Environmental sustainability has grown in importance within the organization in recent years. When I started here four years ago, it was just a compliance issue, and now there is a growing interest. The reason is a combination of interest from the donors and people joining the company who see the intrinsic value of environmental sustainability.*

Furthermore, ID - 1 pointed out that:

*Since 2018, our organization has implemented environmental standards. We have had an increase in the number of employees who work with environmental sustainability at the head office, and we also have plans to increase the capacity at the country offices.*

Lastly, when ID-8 was asked about the perception of the emphasis on environmental sustainability in the organization and whether there is a great deal of concern among the employees, the following response was provided:

*I would say yes, in some way. Meaning that everybody in the head office and in the country offices is conscious that something has to change and that we should work in a different way, but it's not very clear how and when.*

As already mentioned, the buzzwords "sustainability" and "sustainable" were already frequently used in NCA's annual reports ten years ago. In fact, they were used three times as much in the annual reports from 2012, 2013, and 2015 compared to the annual reports from 2020 and 2021. Nevertheless, it seems like the application of these terms and their meaning have undergone modifications throughout time.

Although the frequency of occurrences of the word "sustainability" or "sustainable" in the latest annual reports has decreased, the outcomes of the search were more precise in nature. Except for a few results that were relatively broad in scope, the majority of search outcomes were directly associated with environmental sustainability, programming and operational activities, or the United Nations' sustainability goals. The annual reports for the years 2012, 2013,

and 2015 exhibited a broader scope and a different focus. A significant proportion of the findings pertain to topics such as sustainable livelihoods; sustainable agriculture and livelihoods for farmers; the establishment of a more sustainable society through the reduction of violence and the growth of sustainable peace; the development of a sustainable health sector and services with a particular emphasis on children and women; and the promotion of sustainable economic growth. These areas continue to hold significant importance for the NCA today, but in comparison with the annual reports for 2020 and 2021, the terms "sustainability" or "sustainable" in connection with the aforementioned topics have been modified, and environmental sustainability related to logistics activities has received more attention.

However, NCA had a focus on environmental sustainability as early as 2012, with a specific emphasis on sustainable access to electricity and sustainable water supply services. This is also evident in the annual reports for 2013 and 2015. For instance, in 2012, approximately 60,000 people had access to sustainable energy solutions. The pursuit of clean energy and sustainable access to electricity from renewable sources has entailed the installation of solar panels, solar pumps, biogas systems, and energy-efficient cooking stoves. The WASH program, encompassing water, sanitation, and hygiene, has been a prominent area of emphasis in the annual reports for 2012, 2013, and 2015. Achieving sustainable access to water entails the implementation of environmentally friendly pumping systems, such as solar-powered pumps, as opposed to the conventional diesel-powered generators that have traditionally been utilized for water-lifting purposes. Nevertheless, it is vital to emphasize that these fields are still important areas for NCA.

#### ***4.2 Environmental initiatives in general***

This section delves into the broader initiatives, strategies, and goals aimed at obtaining more environmentally sustainable aid among HOs. The selected annual reports, which were analyzed in relation to keywords pertaining to environmental sustainability, exhibited differences in their length, depth, and structure. The extent of a report evidently impacts the frequency of occurrences of a given keyword. As illustrated in Appendix 4, there was variation in the frequency of hits per keyword, ranging from 112 occurrences for the term "climate" to some

keywords that were not referenced at all. To address the limitations and uncover viewpoints beyond the scope of keyword searches, a comprehensive latent content-analysis was deemed necessary. Furthermore, to expand the scope of our research, we extended our search to include mapping of other international HOs in addition to the Norwegian Red Cross, NRC, and NCA.

#### *4.2.1 Developed environmental initiatives*

There is some degree of variation among the different organizations regarding their targets and initiatives linked to environmental sustainability. However, a prevalent trend is that many of the HOs appear to be in the initial stages of mapping and defining diverse initiatives, measures, and targets. A shared goal among most of the organizations is the reduction of emissions. With that being stated, we have conducted a more in-depth examination of the different HOs. An overview is shown in Table 2.

Organization	Environmentally sustainable initiatives	Targets
Norwegian Red Cross	<ul style="list-style-type: none"> <li>Green Response/Sustainable Response</li> <li>Climate Charter</li> <li>Collaboration with DNV</li> </ul>	<ul style="list-style-type: none"> <li>10% annual reduction in CO2 equivalents from air travel, starting in 2019</li> <li>Reduce packaging and eliminate single-use plastics in relief items</li> </ul>
Norwegian Refugee Council	<ul style="list-style-type: none"> <li>Developing implementing minimum standards in their aid programmes</li> <li>Collaboration with Boston Consulting Group</li> <li>Climate Charter</li> <li>Enhancing environmental performance at field level</li> </ul>	<ul style="list-style-type: none"> <li>Reducing emissions, starting in 2022</li> <li>Improve waste management, starting in 2022</li> </ul>
Norwegian Church Aid	<ul style="list-style-type: none"> <li>NCA's Response (FBCA strategic initiative)</li> <li>Climate Charter</li> </ul>	<ul style="list-style-type: none"> <li>Reduce carbon footprint compared to 2019</li> </ul>
Norwegian Peoples Aid	<ul style="list-style-type: none"> <li>Developing of mapping tools for environmental sustainability in international programs</li> <li>Procedures regarding mine and explosive clearance</li> <li>Climate Charter</li> </ul>	<ul style="list-style-type: none"> <li>Reducing carbon footprint</li> <li>Minimize their local environmental contamination of soil, water and air</li> </ul>
Médecins Sans Frontières	<ul style="list-style-type: none"> <li>Climate Charter</li> <li>Enhancing environmental performance at field level</li> </ul>	<ul style="list-style-type: none"> <li>Reduce their emissions by at least 50% compared to 2019 levels</li> </ul>
UNICEF	<ul style="list-style-type: none"> <li>Climate Charter</li> </ul>	
World Food Programme	<ul style="list-style-type: none"> <li>Ensuring a more environmentally friendly fleet operation</li> <li>Procuring food locally</li> <li>Reduction of carbon footprint in WFP aviation</li> </ul>	
OCHA	<ul style="list-style-type: none"> <li>Climate Charter</li> <li>Implementation of screening tool</li> </ul>	<ul style="list-style-type: none"> <li>Reducing carbon footprint</li> </ul>
Oxfam	<ul style="list-style-type: none"> <li>Implementation of a Retail Ethical and Environmental Strategy (REES)</li> <li>Climate Charter</li> <li>Mapping of their primary environmental impact areas</li> </ul>	<ul style="list-style-type: none"> <li>Reduce emissions related to their own activities by at least 71% by 2030</li> <li>Being carbon neutral by 2040</li> </ul>
Save the Children	<ul style="list-style-type: none"> <li>Implementation of an environmental and social screening tool into their project design process</li> <li>Climate Charter</li> <li>Adoption of an environmental impact policy in every country they work in</li> </ul>	<ul style="list-style-type: none"> <li>Reduce CO2 emissions of their operations with 50% compared to 2019, by 2030</li> </ul>

Table 2. Organizational initiatives for environmental sustainability

#### *4.2.1.1 Norwegian Red Cross*

In June 2021, the national board implemented regulations pertaining to climate and environmental concerns that will be applicable to the entirety of the organization as a means of reducing its environmental footprint. As the first HO in Norway, the Norwegian Red Cross signed the Climate Charter in 2021, committing to increase climate action, reduce greenhouse gas emissions, and ensure that their programming is environmentally sustainable. Moreover, they have a target of a 10% annual reduction in CO2 equivalents from air travel, starting in 2019, and a target to reduce packaging and eliminate single-use plastics in relief items.

In collaboration with DNV, a baseline has been established to quantify the climate impact in specific areas, such as electricity, aircraft, vehicles, and driving allowances, for the national office, the centers, and district and local associations. This work will continue into 2022 with a climate accounting for 2021, which will cover a broader scope of the organization's work, including international operations. Additionally, the Norwegian Red Cross is engaged in a collaborative effort with the International Committee of the Red Cross (ICRC) to create a climate accounting tool that will have value for several HOs. They also collaborate with the ICRC on a project on sustainable supply chains. Both of these areas are part of a two-year project called "*Sustainable Response*" for international business. The project also aims to introduce a new method for conducting environmental assessments, referred to as the Nexus Environmental Assessment Tool (NEAT+).

The Red Cross also supports and contributes to the UN's sustainability goals. In 2021, the organization conducted a mapping to assess its efforts towards the sustainability goals, in addition to the aforementioned initiatives and projects.

#### *4.2.1.2 Norwegian Refugee Council*

In 2021, with support from the Grieg Foundation, NRC continued the project known as Greening the Orange. The project's primary objectives were to establish a baseline for NRC's emissions, create a plan for a green transformation within the organization, and endeavor to impact the broader humanitarian sector. Greening the Orange has two main focus areas, one of which is a reduced environmental

footprint. This entails reducing their emissions, enhancing waste management practices, and implementing minimum standards in their aid programs. The latter one is developed for shelter and settlements, water, sanitation, and hygiene (WASH), livelihood and food security, and emergency response.

As a component of the NRC's Global Strategy initiative, a Climate and Environment Strategy 2030 was formulated, with a primary emphasis on enhancing the NRC's response in the areas of climate adaptation, access to clean energy, and reduced environmental footprint. The strategy was implemented in 2022. They have also established a partnership with Boston Consulting Group to enhance their fundamental understanding of their carbon footprint and devise strategies for mitigating the environmental impact of their operations. Moreover, the Climate Charter was signed in 2021.

In addition to the initiatives led at a global level, there are a growing number of innovative projects that concentrate on enhancing environmental performance at the field level. The initiatives encompass a range of projects, such as the conversion of plastic waste into shelter materials in Bangladesh, reforestation efforts and dissemination of environmental knowledge in Burkina Faso, and the provision of opportunities for refugees to monitor their energy consumption in Jordan. NRC also intends to develop approaches to enhance the sustainability of its procurement and fleet. This will be achieved, among other things, through the implementation of country-level procurement, which will result in reduced warehousing and transportation.

#### *4.2.1.3 Norwegian Church Aid*

Like several other HOs, NCA aims to reduce its carbon footprint compared to 2019. Furthermore, a strategic priority is that by December 31, 2022, they will show measurable reductions in carbon emissions, systematically and broadly increase sustainability in their operational activities, and aim to integrate the most effective sustainability practices and knowledge from the Covid-19 pandemic. They have also implemented a strategic initiative known as Faith-Based Climate Action with the objective of mobilizing faith-based organizations and movements to promote action on climate change. Through this initiative, NCA is providing assistance to faith actors in developing climate change actions that address local



needs and vulnerabilities in their respective communities and among their constituencies. Additionally, they signed the Climate Charter in 2021.

#### *4.2.1.4 Norwegian People's Aid*

In the annual report from 2021, it appears that Norwegian People's Aid achieved environmental certification and currently maintains annual climate accounts for its head office in Oslo, as well as gathering data to create a comprehensive map of the climate and environmental footprint of their head office in Oslo. They also work to get a more holistic impression of the organization's global climate and environmental footprint. Furthermore, they have started work on developing mapping tools for their international program activities. They also agreed to sign the Climate Charter in 2021.

Within humanitarian mine and explosive clearance, the Norwegian People's Aid has developed new methods that prioritize environmental considerations. The range of sustainable practices encompasses waste sorting and the implementation of eco-friendly techniques. Furthermore, their target is to mitigate their carbon footprint and minimize their local environmental contamination of soil, water, and air, while averting any possible adverse effects on the depletion of natural resources and degradation of ecosystems.

#### *4.2.1.5 Médecins Sans Frontières*

As per the 2021 annual report of Médecins Sans Frontières (MSF), the organization is committing to reduce its emissions by a minimum of 50% in comparison to the levels documented in 2019, by 2030. They are in the process of mapping and evaluating the best methods by which to attain their goal. However, they acknowledge that significant adaptation will be requisite in the fields of transportation of people and supplies, construction, energy generation, and waste management. At the field level, the MSF has undertaken efforts to enhance the infrastructure of hospitals and health centers in, e.g., Venezuela. These initiatives have primarily focused on improving the provision of electricity, waste management, water, and sanitation services. And in Armenia, they have worked on building a waste management area at the Martuni hospital. They have also signed the Climate Charter.

#### 4.2.1.6 UNICEF

UNICEF's annual report for 2021 did not yield any concrete results pertaining to environmental sustainability initiatives, projects, or targets. However, in their strategic plan for 2022-2025, with a vision towards 2030, it is stated that:

*UNICEF is taking a whole organization approach to address climate change by protecting children and their communities from the impacts of climate change, building resilience, and providing climate-smart services. UNICEF works with partners at the global and local level to ensure that children can live in a safe and clean environment. We help make children the center of climate change strategies and response plans, recognizing them as agents of change who are taking action everywhere to protect the future of our planet.*

Additionally, a brief review was conducted of the UNICEF Supply Annual Report 2021. Like their 2021 Annual Report, no discoveries were ascertained with regards to terms such as "greenhouse gas emissions/CO2/carbon footprint/footprint". But they address that together with partners by carrying out a variety of supply interventions, including product innovation, global and local procurement, market shaping, strengthening sustainable procurement practices, and promoting more sustainable supply chains. In 2021, they also affixed their signatures to the Climate Charter.

#### 4.2.1.7 World Food Programme

Since 2009, the UN's World Food Programme (WFP) has allocated more than 300 million US dollars towards initiatives aimed at mitigating the effects of climate change. In 2022, nearly four million people were protected by climate insurance, while more than 15 million people have benefited from climate risk management solutions. As of 2022, the World Food Programme (WFP) has provided support to a total of 1.6 million people across 18 countries, facilitating their access to sustainable energy products and services. Among other things, they provide schools and local communities by facilitating their access to sustainable energy solutions, such as solar pumps, solar mills, or solar refrigerators.

Additionally, WFP Aviation significantly reduced its carbon footprint in 2019 by deploying the first-ever civilian version of a Casa-295, which helped the organization achieve progress in this area. They also work towards a greener fleet, focusing on vehicles for last mile deliveries and generally ensuring a more sustainable fleet operation. Current initiatives aimed at encouraging an innovative and greener fleet encompass the implementation of amphibious all-terrain vehicles, training fleet staff to ensure that trucks are maintained and driven properly and in the most environmentally friendly way, and initiatives to ensure the responsible management of hazardous waste generated in maintenance workshops. In the 2021 annual report, it also appears that almost ¼ of WFP food was procured locally in 2020.

#### *4.2.1.8 United Nations Office for the Coordination of Humanitarian Affairs*

United Nations Office for the Coordination of Humanitarian Affairs (OCHA) endeavors to achieve a more sustainable approach to humanitarian action, and in collaboration with the OCHA Joint Unit (JEU), they are coordinating efforts to reduce the carbon footprint of HOs and encourage risk-informed action. The UN Environment Programme, in conjunction with JEU, collaborates with various partners to facilitate adaptation to climate change in humanitarian contexts, enhance cooperation between environmental and HAs, and reduce environmental risks in humanitarian projects and programs. The NEAT+ has been introduced as a means for organizations to mitigate their environmental footprint. In 2021, JEU developed a version of NEAT+ that possesses the capability to detect environmental risks associated with humanitarian projects in urban areas. They also signed the Climate Charter in 2021.

#### *4.2.1.9 Oxfam*

According to the 2021 annual report, Oxfam has several initiatives, projects, and targets pertaining to environmental sustainability. Among other things, they have mapped that their primary environmental impact area in 2021/2022 was building energy, which was responsible for 74.2% of their carbon emissions. Moreover, land travel and logistics account for 22.2% of their carbon emissions. While air travel contributed to 3.6% of their carbon emissions.

Oxfam has implemented a Retail Ethical and Environmental Strategy (REES) that they will report on annually. Regarding waste and donated goods, the goal is to decrease the proportion of overall waste that is deposited in landfills as well as reduce the amount of waste in tonnes per £m of turnover from donated goods. And the recent partnership with CTR has expanded their capacity to send a wider range of excess donated items for reuse and recycling than they did before. In the context of energy and carbon, they aim to use less energy and lower their carbon emissions. The objective is to decrease the energy consumption of buildings within the retail division and to lower the total quantity of carbon emissions produced by the retail division. Moreover, they endeavor to enhance ethical and environmental considerations concerning their suppliers and products. One of the proposed measures is to enhance the proportion of new wood and paper products that incorporate recycled materials, excluding packaging. They will persist in ensuring that a minimum of 90% of the wood and paper utilized by them is either recycled or holds certification from the Forest Stewardship Council. Moreover, they aim to increase the percentage of suppliers who have signed a supply chain transparency agreement.

In addition to the REES, Oxfam has expanded and enhanced the extent of its carbon commitment in 2021. They will significantly reduce emissions related to their own activities and have committed to at least a 71% absolute reduction by 2030. This target is based on a 2011/2012 baseline and does not include offsets. Further, they commit to being carbon neutral by 2040. In addition, they signed the Climate Charter in 2021.

#### *4.2.1.10 Save the Children*

According to Save the Children's 2021 annual report, they have integrated an environmental and social screening tool into their project design process. This tool serves to identify potential hazards to the environment and local communities that may arise from project activities. Moreover, it facilitates the selection of appropriate mitigation measures, which are accompanied by clearly defined responsibilities, timelines, expected outcomes, and cost implications.

Additionally, according to annual environmental assessments, air travel constitutes the most significant source of carbon emissions. Save the Children commits to a 50% CO<sub>2</sub> emissions reduction in their operations by 2030. They also

had a target of adopting an environmental impact policy in every country they work in; however, they fell just short of achieving this goal. Lastly, like many other organizations, they have endorsed the Climate Charter.

### ***4.3 Humanitarian logistics activities and environmental initiatives***

During the interviews, we asked about the environmental sustainability initiatives pertinent to each logistic activity. This section provides a summary of the feedback collected, corresponding to each logistics activity. An overview of the findings is presented in Table 3.

Organization	Environmentally sustainable initiatives
Needs assessment	<ul style="list-style-type: none"> <li>• Implementation of NEAT+ screening tool</li> <li>• Collaboration through cluster</li> <li>• Water balance</li> <li>• Incorporation of risk management and risk assessments into the climate and environmental work</li> </ul>
Procurement	<ul style="list-style-type: none"> <li>• Improvement of forecasting</li> <li>• Providing cash to beneficiaries</li> <li>• Implementation of environmental criteria in supplier selection</li> <li>• Local procurement</li> <li>• Altering product design</li> </ul>
Warehousing	<ul style="list-style-type: none"> <li>• Establishment of regional distribution centers</li> </ul>
Transportation and distribution	<ul style="list-style-type: none"> <li>• Reduction of flights</li> <li>• Transportation by sea</li> <li>• Use of hybrid cars</li> <li>• Forecasting</li> </ul>
Waste management	<ul style="list-style-type: none"> <li>• Promote separation of waste</li> <li>• Implementation of guideline for waste management</li> </ul>

*Table 3. Environmentally sustainable initiatives pertinent to each logistic activity*

#### ***4.3.1 Needs assessment***

To get an understanding of the developed environmental sustainability initiatives connected to needs assessment, we asked the HOs the following: *“If needs assessment is done the wrong way, it might result in wasted resources and/or duplication of efforts. How do you work to prevent this?”* ID-9 expressed that: *“Before a disaster strikes, one of the main tasks is to assess the market. A market assessment means what is available and not available in terms of environmentally friendly solutions.”* Our interviews revealed limited implementation of

environmental initiatives related to needs assessment. ID-1 revealed that needs assessment is not fully integrated yet, stating that: *“We have environmental standards that say that we should have needs assessment with environmental consideration when we do interventions. But it's not fully integrated.”*

Furthermore, ID-1 stated their plan was to continue working on the needs assessment initiative with the NEAT+ tool by stating that: *“Our action plan is to continue working on the NEAT+ tool with the climate charter”*. ID-2, which is working for the same HO as ID-1, said that they are also trying to encourage more use of the NEAT+ tool in the country offices so they can use it as an initial environmental screening tool (ID-2).

We also asked the HOs if they collaborate with other actors (local and international HOs, beneficiaries, governments, donors, the military, private sector companies, or the media) when planning for a disaster. According to our discussions with one of the larger HOs, needs assessment coordination is done on a delegation level. ID-5 stated that: *“When doing needs assessment at the delegation level, there is collaboration.”* According to ID-9, most non-governmental organizations (NGOs) coordinate needs assessments through collaboration with the cluster:

*Most NGOs work with umbrellas. We call it cluster or cluster lead. The cluster makes sure that the aid is not duplicated by area so that people don't receive twice or three times the same kind of items. So, it's about being efficient and trying to apply some standards. The standards of the shelter kit—the specifications—could apply countrywide to all NGOs accepting the leadership of the cluster.*

The lack of coordination in needs assessment can lead to the incorrect delivery of large quantities of items and materials. In other words, wasted resources. ID-5 stated that needs assessment coordination could be improved:

*If another humanitarian organization is working at the same place as us, we agree on them taking one hospital, and then we take another. On that level, the project agrees on who gets what. At the willingness of work on who does what and where (before it becomes an order), there is a lot of*

*discussion. When it becomes an order, there is less discussion. This is a shame and could be improved. It's not simple.*

Another initiative that was mentioned during our interviews was achieving a balanced water supply in the water catchment (source of drinking water) for the WASH programs. ID-8 shared: *“We try much more than before to have a kind of equation on how much water comes in the water catchment where we are and how much we can extract, and which are distorted.”* This initiative might not be directly relevant for the preparedness phase of a disaster operation.

Furthermore, one of the interviews (ID-3) highlighted an initiative to incorporate risk management and risk assessments into the climate and environmental work. This initiative, however, is still in its early phases.

Reflecting on the challenges of needs assessment, ID-5 cited an example of the challenges of needs assessment from the 2015 European migrant crisis, where there was a significantly increased movement of refugees into Europe. In the crisis, there were problems with how the assistance was organized and standardized (ID-5). The problems were tied to the migrants' continual travel, and they were given new aid supplies wherever they went. Some people, for example, might get a new toothbrush every third day (ID-5). Furthermore, washing clothes was difficult, and because migrants received new clothing wherever they moved, they threw dirty clothes away rather than carrying them with them (ID-5). ID -5 states that *“This is an example where correctly used energy would have been to assist with washing clothes along the route”*.

#### *4.3.2 Procurement*

Procurement is one of the most important activities in humanitarian operations, with the goal of acquiring relief items from suppliers to help beneficiaries. Several of the interviewees responded that procurement is the logistic activity with the biggest potential to become greener. In our interviews, we asked the HOs if environmental sustainability is important when selecting suppliers. In addition, we asked how they weighed environmental sustainability against other factors such as costs, quality, and risk. There was some variation in the responses we received.

Some had just begun working on environmental sustainability initiatives in procurement, while others were further along. ID-1 responded that *“We try to do better procurement. We have just started working on it.”*

#### 4.3.2.1 Forecasting

ID-5 highlighted the importance of forecasting to increase environmental sustainability in procurement by stating the following:

*In general, one of the main things that people don't think about and that has the highest impact is forecasting or planning. It's important to know that an emergency only lasts the first six months, and after that, it becomes routine in a way. So how do we support this kind of routine? In the last four or five years, we have been pushing a lot into forecasting. Forecasting is something that has been improved, but it's not perfect. With better forecasting, we can reduce transport.*

ID-5 revealed that an initiative to reduce the environmental impact was to have a proper forecasting to buy more thorough demand. This was done by encouraging each delegation to give an overview of their need's months in advance. ID-5 stated that:

*If you have proper forecasting, you will buy through demand. Each delegation needs to give an overview six to nine months in advance so that we can plan and deliver at the right time. For example, if they want to plant seeds in nine months, we find a solution so that they get the seeds at the right time. With this method, we can reduce prepositioned items and stock. Because, in general, the material will arrive when you are going to be able to use it.*

#### 4.3.2.2 Supplier selection criteria

When questioned about environmental initiatives in procurement, several of the interviewees mentioned that they are working on supplier selection criteria. ID-5 highlighted the connected challenges with adding environmental criteria to supplier selection: *“This is not simple. We have tried to have sustainability*



*criteria in selection, and we didn't manage.”* Furthermore, ID-5 pointed out that it is challenging to add the criteria to the places they work:

*We are scratching the tip of the iceberg when we talk about sustainability. It is really difficult to put together criteria that can be used across regions. It is complex for people who are studying sustainability, and we are trying to add these criteria where people have not studied sustainability and where it isn't a priority.*

Furthermore, ID-5 emphasized that corruption is a problem in many of the countries they work in and that it is difficult to trust documentation as some might falsify the documents, stating that:

*Many of the countries we work in have a fraud ranking, and then there is a corruption index. If the corruption index is high, it is difficult to trust an ISO 14000 certification. We have done our own quality, social, and environmental assessments. One thing we are trying to do when we do the quality, social, and environmental assessment is to look into:*

- *Are they paying the workers the minimum?*
- *What do the bosses do with waste?*
- *What do they do about quality?*

*If the company is red-lighted, for example, if they send the contaminated water into the river, we remove the company from the tender. We normally try not to red light companies but rather try to improve them.*

ID-9 also mentioned supplier selection criteria by expressing that they had just revised their logistics handbook by adding a new chapter on environmental concerns in procurement, stating that:

*This new handbook remains a strong recommendation to apply environmental criteria in the bid analysis of suppliers when possible and relevant. For large procurements, we have mandatory ethical standards, which include usual topics like no corruption and child safeguarding, but there is also a chapter called environmental standards. For example, if we are procuring wood, a forest certified sustainability certificate is an*

*example of criteria that we could demand. Recycling and waste management are also examples of important criteria.*

Furthermore, ID-9 provided an example of when environmental concerns were weighed against other factors when selecting energy solutions in Ukraine:

*Some colleges were favoring solar panels, but we ended up purchasing rechargeable power supplies without solar panels because Ukraine has six months of gray skies in the winter season. There is no way our solar system would be efficient. This is an example where we don't use environmental criteria for marketing or as a fancy thing; it must meet the technical requirements and be cost efficient as well.*

#### *4.3.2.3 Local procurement*

Another environmental sustainability initiative that was brought up by several of the interviewees is local procurement. For example, ID-7 stated that: “*Most humanitarian organizations are now focusing on buying locally... So, while sustainability is an important consideration for us, we approach it in a fairly decentralized manner because most purchases are now made locally.*”

This was confirmed by ID-9, which stated:

*We procure locally and try to procure as close as possible to the areas of operations. This includes emergency relief items such as shelter kits, hygiene kits, and kitchen sets. We will purchase what the market offers. For example, in Sudan, we are trying to bring a response, and we are assessing the regional market to assess what is possible to purchase and ship to Sudan. This probably includes some environmental factors.*

ID-1 expressed that local procurement was a priority and identified the difficulty with accessing environmental profiles in the places they work as a challenge:

*What was identified as the priority was to stop doing international procurement, when possible, to reduce logistics and transport, which was a way to reduce the environmental footprint. Another reason was to*

*support local markets. It's effective in that way, but it is difficult to have access to suppliers that have an environmental profile because that's not a huge concern in the countries we operate in. So, you will not have as many options as when you do an international procurement. We haven't discriminated against suppliers in terms of their environmental performance.*

ID-5 likewise discussed local procurement and highlighted the same main challenges as ID-1 and added quality as another challenge, stating: *“We also buy locally, but this doesn't mean anything in the end. We need to know where it was produced (locally or not) and how it was produced. Also, it needs to be the same quality.”* ID-9 pointed out challenges connected to local procurement of batteries, stating that:

*An example of the challenges of procuring locally was when we were purchasing the batteries for solar systems in Africa. The most vulnerable part of the solar system is the battery. Purchasing batteries is one of the more complex purchases because batteries are vulnerable to heat. If batteries were stored in a metallic container for a few months at 50 degrees, they would probably be almost dead. That's an example of how we need to be cautious with technical systems.*

#### *4.3.2.4 Cash to beneficiaries*

Another initiative that was brought up by a few of the interviewees was to give cash to beneficiaries instead of providing relief items. ID-8 stated that:

*In the past it was very common to distribute items like water containers, soap hygiene items, etc. Now it is preferable to transfer money to people so they can buy what they need. The money can either be conditional (they need to buy, for example, WASH items) or unconditional (they go to the supermarket and buy what they need).*

ID-7 also stated that they were looking into an initiative to give cash to beneficiaries: *“To the greatest extent possible, we shall not give things away to*

*beneficiaries, but we shall give them cash. Then they can choose what they need themselves, and it is definitely the most respectful way to help people.”*

Furthermore, ID-7 provided an example of a challenge with unsolicited donations to Ukraine early in 2022:

*For example, a lot of people were kind and collected and sent diapers to Ukraine, but Ukraine ended up with warehouses full of baby diapers that were not needed. It is an important part of logistics and sustainable logistics that when we decide what we want to deliver from the donor side, we deprive them of some choice since we take up space in a supply chain. We make it more difficult for them to get the items they need.*

We asked ID-7 for challenges with providing cash instead of items. ID-7 responded:

*There are several challenges to giving cash. As an example: Who will receive the cash? How do you do a needs assessment? How much cash should they get? What do they do with the money? Many people are hesitant to give cash because they fear it will be spent on cigarettes rather than baby food, as the cash was meant for.*

ID-7 also mentioned another challenge of providing relief items connected to market mechanisms:

*It is a very inaccurate way of providing help. Good assessments on the ground are required to determine what is actually needed. Furthermore, running a shoe store in a country where everyone sends free shoes is difficult. Instead of providing items, we can offer them cash so they can buy what they need. This also stimulates the local market.*

#### *4.3.2.5 Product design*

We asked the HOs if environmental sustainability is important when it comes to the product design of relief items. ID-1 responded: “*We try to procure products that last.*” ID-8 said that: “*When we buy items in-kind, we try to look for quality*

*items that last to prevent waste.” ID-8 also added that there is a challenge with buying high quality items, stating that: “These are more expensive, and then we can afford fewer items. Therefore, there needs to be a balance.”*

Some of the interviewees also pointed out a challenge with their position in the market, stating that: *“Because we are a small organization, we do not have the availability to influence the suppliers to, for example, reduce packaging”* (ID-1).

Several of the interviewees gave examples of products where they have given environmental consideration to the product design. ID-5 mentioned that they were looking into several products, stating that: *“We, with other organizations, are reviewing non-food items (such as kitchen sets, tarpaulins, and blankets) to see if we could find more sustainable options.”* ID-5 also added an example of the work they have done with the tarpaulins:

*For example, there has been a research and development project where we have changed the composition, reducing the weight of the tarpaulin by 15 percent while using 50 percent recycled plastic, as well as making it stronger. So, it will have repercussions on the plastic that ends up in landfills as well as transport. The tarpaulin stayed at the same price.*

In addition, ID-5 presented an example of a product that was more difficult to make more environmentally sustainable while maintaining the same pricing, stating that:

*Another organization has been working on the blanket, trying to make it with recycled plastic. Now they are working on the quality. One of the main issues with the blankets is that the price increased by 30 percent. With the financial crisis, we will not get more money in general. This means that we are able to distribute to 30 percent fewer people. If we get more money for the blankets, it is not feasible for all the organizations.*

Even though ID-1 mentioned they found it difficult to influence suppliers, they were working on an initiative to reduce the use of plastic water bottles in their country offices. ID-1 said that there were some challenges with this initiative,

stating that: *“This is not simple, especially when there is a cholera outbreak. We have ended up using bigger bottles (30 liters).”*

Changing energy sources is one initiative pointed out by interviewees from different HOs. For example, ID-2 responded that: *“There is a push to do more solar powered installations wherever possible.”* ID-3 stated that: *“We have an energy mapping project in which we examined how we consume energy and whether it can be replaced with partially renewable sources of energy.”*

ID-8 proposed solar panels as an initiative to reduce the environmental impact by stating that:

*An initiative to reduce the environmental impact of the operations is the use of solar energy to produce electricity compared to diesel generators. Now that the technology for solar panels has evolved, they are cheaper in the medium and long term compared to diesel generators.*

ID-1 explained that they are working on finding alternatives to their current use of diesel generation in the country offices, stating that:

*Because public power is often unavailable in our country offices, diesel generators are frequently used. This has been identified and is something we are working on. There have been some local initiatives with solar panels, with varying degrees of success. A challenge is that we are temporary in our locations. As of now, the employees have knowledge about diesel generators, such as procurement, how they work, and end-of-life procedures. This is not the case for solar panels.*

ID-9 said that they had changed energy sources successfully in one area by stating the following:

*In South Sudan, we changed the energy source for lightning in compounds from a generator to a solar system. The batteries were charged in the daytime, and in the nighttime, the lighting of the compound was silent and without any pollution. This was successful. I think it is wise to start with*

*awareness training and send some energy experts to each region. The energy experts can advise on which solutions are most relevant or which ones should not even be tested.*

#### *4.3.2.6 The greatest potential to become greener*

Our interviews revealed that several of the interviewees found procurement to be the area with the greatest potential to become greener out of the five defined logistics activities. ID-9 stated: “*Procurement has the greatest potential to become greener*”. ID-5 also pointed out that it is the most difficult, stating that:

*For me, the highest potential is in procurement, but it is also the most difficult. If we, for example, procure better items and have embedded suppliers, it will have a huge impact. For example, if suppliers use renewable energy and if items last longer than the ones that we buy, this is complicated. It is easier to work on the fleet and transport than procurement.*

Some interviewees considered all logistics activities to have the potential to become greener. ID-7 emphasized just that, as well as highlighting waste management:

*I believe that all of the logistics activities have the potential to become greener, but then again, the more short-distance and local you can make them, the greener they become almost automatically. Emissions will probably cost more, and the cheaper you can transport them, the cheaper the end product will be. A lot of the things here also have market mechanisms that are starting to help a little.”*

#### *4.3.3 Warehousing*

Inquiries were directed towards the humanitarian organizations to ascertain the relevance of environmental sustainability in the context of the prepositioning of relief items and warehousing. The responses varied. ID-5 started out explaining how they store medical items, stating that:

*For example, we have a warehouse in Geneva that is specifically for medical items. Medical items that are not bad for the person themselves (for example, bandages) are bought at the regional level. Medical items, such as drugs, are bought in Europe and sent normally by direct shipment. This reduces the warehouse in Geneva. Or it goes through Geneva through the warehouse, and then it's sent.*

Furthermore, ID-5 explained which store items they use the most, and highlighted the importance of regional centers to obtain a more sustainable supply chain:

*We have three regional centers, one in Abidjan, one in Kenya, and one in Oman. In these regional centers, we have prepositioned some of the items that we use the most. These are the first things that are distributed and needed in every emergency (for example, kitchen sets, tarpaulins, blankets, and food). When there is a crisis near the regional centers, items are sent by truck instead of being brought from China by air. I think it is also key to the sustainability of the supply chain of the humanitarian organization. But this is only possible for big organizations.*

According to ID-5, there should be more collaboration between organizations when it comes to the preposition of stocks. ID-5 also pointed out a political challenge with the collaboration of prepositions of stocks, by stating: “*But a challenge is that it can become a bit political, and maybe some do not want to share when the disaster strikes.*”

ID-7 explained that they do not preposition stocks anymore and pointed out the challenge of accurate preposition:

*Previously, we had prepositional items with another humanitarian organization in five different regions. But it is very difficult to be accurate with prepositioned equipment, so we do not preposition items around the world anymore. Earlier, we had around 500 so-called family kits, including 500 tents, 500 kitchen sets, 500 hygiene kits, etc., at each location. It was very complicated to distribute the items, and it was costly to get the items to the right country. When you preposition items and*



*assume there will be a need for them, you run into a lot of problems. In any case, the likelihood of missing is very great.*

According to ID-9, environmental sustainability is less important when it comes to pre-positioning relief items and warehousing, and it highlights funding as a challenge, stating that:

*Firstly, because of the nature of the funding, we receive funding for specific crises (specific numbers of beneficiaries and specific locations). Once the funding is received, we can buy relief items, and then the items don't stay in the warehouse for long. There are no cold chains in our organization, so energy costs are limited. Sometimes the warehouse management has some weaknesses, and we end up with what we call "dead stocks". That means items that have been missed out, or maybe the beneficiaries moved so the distributions did not take place.*

#### *4.3.4 Transportation and distribution*

We sought the perspectives of HOs to determine the significance of environmental sustainability when choosing methods of transportation for both international and regional transportation, as well as last-mile delivery. ID-5 stated that: *"There are several ways to reduce transport emissions. There is the choice of transport mode, but also how you plan your supply chain."* Furthermore, ID-7 responded that:

*As short-distance as possible, I believe, is where you have the greatest gains. Furthermore, if you already have a local response, it will need far fewer resources. Instead of flying delegates halfway around the world, you will have locals who can assist. One kroner spent on preparation saves seven kroner in response.*

#### **International transportation**

When we inquired about the importance of environmental sustainability in transportation mode choices, most of the discussion in the interviews was about international transportation. ID-5 responded that to transport internationally, we deliver by air or sea, further stating that:

*Measured in tons, we have sent 95 percent of our goods by sea in the last two years. The majority of items we send by plane are medical items that require a cold chain, and that is not possible by sea. For another organization, the picture might be different. They might not have infrastructure at a regional level and hence need to send items by air. Forecasting and planning are really important.*

ID-7, on the other hand, responded that they did not do a lot of transportation by sea, as much of the material they send is urgent, but ID-7 also added:

*Container shipping is by far the most environmentally friendly way to transport large quantities of material. There's also the dilemma of whether you should bet that you'll need the material in Africa, which is normally made in Asia, and ship it up in containers and keep it there, or whether you should wait to purchase until you know where you need to respond and what you need.*

ID-2 focused on trying to reduce flights, especially international flights, further saying that:

*Also, it is important to make sure that the fleets are not outdated and are more efficient, but this varies across countries depending on what's available and what the costs are. A challenge is far distances and security prevents certain types of travel. Environmental sustainability is considered, but it's definitely weighted among other factors and not the highest priority.*

Also, ID-1 said that they focused on reducing air travel by having digital events instead of traveling. ID-9 explained that the Covid- pandemic was a big push to reduce the number of flights and increase digital solutions, and stated that:

*Before that, there were also some initiatives to reduce the number of offline physical meetings. For example, in NRC Oslo, we have a logistics workshop every year or every second year, and the last physical workshop was five years ago. Now we have online workshops.*

ID-8 presented challenges with having digital meetings, stating that:

*A challenge connected to a reduction in flights is that much of our work is to communicate and meet people, so it should be considered if it makes sense to reduce. Generally, unnecessary travel should be reduced. There is not everyone you can have a digital meeting with; for example, there are people in the village who are not used to technology. For the people in the country offices, Zoom-meeting works fine.*

There was little discussion of regional transportation in the interviews. ID-5 briefly mentioned that regional transportation was mainly done by road.

### **Last-mile delivery**

In terms of last-mile delivery, there was also little discussion on this during the interviews. However, there was a bit more than regional transportation. ID-5 explained how they carry out last-mile delivery, and there seems to be less room for green initiatives than with international transportation. ID-5 stated:

*Last mile delivery is by trucks. It could be that in some cases, like South Sudan, or in some places where you have rivers, like the Congo, you do that last mile through a river. But that's really very small. Transportation in the country normally goes by road. Except, I give you the example of South Sudan again, where in some cases you cannot access by road, then you use the river or need to use the plane. That could be two possibilities because the river you only use half of the year.*

An environmental sustainability initiative that was revealed to be connected to last-mile delivery was the use of hybrid cars. ID-9 gave an example of this initiative and the connected challenges, stating that:

*For example, in Ukraine, 21 out of the 32 vehicles are hybrid cars. Hybrid cars are not possible everywhere. For example, in Burkina Faso, we purchased one hybrid car, but the car would only be used in the capital because we are not ready to implement such a standard in places where*

*the road condition is very poor.*

#### *4.3.5 Waste management*

In terms of waste management, we asked the HOs if they consider waste when planning their operations. One of the interviewees responded that they did not really know how much waste was generated (ID-1). ID-7 responded that it is a problem in all types of disasters that a lot of waste is left behind, stating that:

*There is a lot of waste in a disaster. I remember when I came to the Philippines very early after the typhoon, which was about 10 years ago. And then you had a tidal wave that washed everything through the streets, so it looked a bit like... In other words, there is so much rubbish along the roads that it looks like a plow has been driven through the snow. Because all the houses and things have just been demolished and are lying there. So, some of the clean-up work is waste management.*

ID-7 further discussed the difficulties associated with the infrastructure of waste disposal, stating that:

*It can be difficult to get rid of waste; for example, when we have been in the field, we very often end up burning the rubbish because you have no other way of getting rid of it. In Somalia, it's a bit like the local garbage system, where they just throw the garbage in the ditch. And then it is very difficult to have a proper recycling system.*

ID-7 concluded by saying that:

*If you want to help the countries that need it the most, then those are also the least developed systems for waste. The positive part of it is that they are very good at using everything in these countries, so a tarpaulin is not left unused; some people use it for something. The majority of the items we aim to give away are to partners down there who can use them and use them more.*

ID-8 highlighted that there is a difference in waste management in western countries than in the countries they work in and focused on initiatives that can be done, stating that:

*In some countries, the government does little. Therefore, we can only discuss what is possible. We separate or promote the separation of kitchen waste. Paper can be collected and burned. The big issue is plastics, because there's not a good solution for that. Of course, we cannot burn it because we need proper industrial burning to prevent dioxins. In some countries, there is now starting to become a market for recycled plastic. A big rising issue is the waste management of electronics. For example, mobile phones, radios, and batteries are diffused more. People can usually afford cheaper models, maybe Chinese. These products are often of low quality and do not last long. After a couple of years, maybe they will need to replace them, and there is no system to do that safely.*

In accordance with ID-8, ID-9 also presented electronic waste as a great challenge, stating that: *“Electronic waste such as mobile phones, computers, printers, and so on is a challenge. For electronic waste, the industry should be more involved. Of course, we are not dealing with manufacturers, we are dealing with wholesalers or retailers.”*

Furthermore, ID-9 said that waste management sometimes starts with avoiding unnecessary consumption, stating that:

*The greenest energy is the energy that we can spare. So, waste management sometimes starts with avoiding unnecessary consumption. In Goma, Congo, a few years ago, we had a large quantity of old computers and obsolete laptops in our stocks. So, the question was what to do with it. The decision was to make a donation to a technical school, a computing school, with old computers, which they could use for testing and for the classes.*

In conjunction with our secondary data, it was found that the Logistic Cluster has recently introduced a new waste-related initiative known as the Waste

Management and Recycling Assessment Guidance (WREC), which was published on April 17, 2023. The objective of this guidance is to offer assistance to humanitarian field practitioners in conducting evaluations of waste management and recycling companies using the WREC assessment tool. Additionally, it aims to provide a comprehensive approach for identifying local companies that provide these services in humanitarian contexts. The guidance also provides information and solutions to reduce, manage, and properly dispose of waste produced by humanitarian operations, and based on humanitarian partners' assessments, the WREC information portal provides an interactive map of waste management and recycling infrastructure by country of operation (Logistics Cluster, 2023).

### **Reverse logistics**

In addition, we asked interviewees if they do reverse logistics to reduce waste. ID-1 said that they were exploring reverse logistics solutions, and ID-9 said that at the field level they do not do reverse logistics. Likewise, ID-5 responded that they did not have a proper reverse logistics plan, stating that:

*We are trying to find some solutions in some countries, but in general, we do not do reverse logistics. The only reverse logistics we do is that if we send a full truck, we may put something in on the way back instead of bringing it empty. If a product gets a second life, we do not have visibility about it because we only distribute. Humanitarian organizations, in general, only distribute.*

ID-7 discussed difficulties with sending waste out of the country:

*There is an option to fly waste out again, and that doesn't work either. There is an issue with the bureaucratic process of taking things back out. Because you must import and export it somehow, and that can be very problematic. Some countries require an export permit. So, you should not underestimate the bureaucracy. There is also the cost of that. In many of the responses we do, we have spent a lot of money on transporting it into areas with rather poor infrastructure. And when you are going to transport it back out, you may run the risk that the best solution is to burn it.*

## **Responsibility of waste**

We also asked the interviewees about their options for what action the industry can take to decrease waste and who they think should be made responsible. The interviews revealed that there are different opinions about who should be held responsible. ID-5 responded that there is a common responsibility and that each is responsible for their own waste, stating that:

*I believe each person is responsible for their own waste. The government has a responsibility to make sure that the country has its own places to manage waste. If you go to South Sudan, Yemen, or many of the countries in which we work, they do not have that infrastructure. Anyway, we have a responsibility for our own waste. For example, we have cars and planes in the places we work, and we are trying to find a way to properly manage hazardous waste. In some places, we have found ways; in others, we haven't. We have pushed the suppliers to try to find solutions. For example, the plane company that we use. We know that is not feasible in some places, but at least we ask them to help us find it. It is a common responsibility, and we are responsible. We cannot just blame someone else.*

Also, ID-7 responded that each is responsible for their own waste, stating that: *“I believe that the organizations that send items should really be responsible for not littering. The "do no harm" principle is one of the most important principles you have when you provide aid.”*

Contradictory ID-1 responded that *“In theory, the municipalities should be responsible for the waste.”* ID-1 also added that *“It is not often prioritized by the municipalities”*.

To summarize the content covered in this section, we provide a brief overview of the key findings derived from our conducted interviews, as depicted in *figure 7*.



Figure 7. Brief overview of key findings derived from interviews.

## 5.0 Discussion

In this section, we delve into the core findings of our study, primarily focusing on how HOs are planning to minimize the environmental impact of their logistical activities. The primary research question we asked was, “*How are humanitarian organizations planning to reduce the environmental impact of their logistic operations activities?*”

To comprehensively answer this question, we subdivide it into three sub-questions:

*Sub-question 1: What is the perception of environmental sustainability in humanitarian organizations?*

*Sub-question 2: Which initiatives have HOs developed to reduce the environmental impact of their logistic operations activities?*

*Sub-question 3: What are HOs main challenges when developing and implementing environmental initiatives?*

The section unpacks the significant findings related to each of the sub-questions. We then interpret and compare these findings with the existing literature and discuss their implications. To conclude this chapter, we demonstrate the impact of the identified environmental initiatives associated with each logistic activity on measurable environmental factors. Ultimately, the goal of this chapter is to provide a detailed and comprehensive discussion that synthesizes our findings, offering an understanding of the place of environmental sustainability within the logistical activities of HOs.



### ***5.1 Perceptions of environmental sustainability in HOs***

Environmental sustainability has become a critical topic across sectors, with the humanitarian sector being no exception. This was evident from our findings; however, it appears that many of the HOs are in the early stages of developing and implementing environmental sustainability efforts in their logistics activities.

The annual reports exhibited variations in terms of their length, depth, and structure. This naturally affects the scope of the reports' content. Certain annual reports included dedicated sections pertaining to environmental sustainability, wherein they provided detailed descriptions of their efforts towards encouraging environmentally friendly emergency aid. On the other hand, in other reports, this topic was only briefly mentioned in a peripheral context as part of a more generalized approach to the subject. Nevertheless, the general perception is that HOs have changed the focus on environmental sustainability in their annual reports over the past decade.

The study conducted by Haavisto and Kovacs (2014) involved an analysis of the 2010 annual reports of numerous major HOs with the aim of ascertaining the extent to which they addressed different sustainability expectations. From our findings, it is evident that the annual reports of the Norwegian Red Cross, NRC, and NCA from a decade ago contain a relatively limited amount of information pertaining to green supply chains, logistics, and green products, as well as environmental sustainability initiatives and projects. This is also consistent with the research conducted by Haavisto and Kovacs (2014). Most of the organizations that were examined discussed sustainability in a rather ambiguous manner, either in the context of development or from a social or economic perspective. Further, we found the annual reports deficient in terms of information pertaining to preparedness measures related to the supply chain, including the prepositioning of supplies and other resources. Lastly, our findings, which are also in accordance with Haavisto and Kovacs (2014), show that the environmental sustainability perspective from a program perspective has not received much attention, except for some cases. The long-term outcomes appear to be mostly tied to delivering direct training to beneficiaries through educational efforts, agricultural instruction, and so on. However, a noticeable shift in focus on environmental sustainability was detected in the annual reports from 2019 to 2021, as presented in Chapter 4.

Where the HOs have begun to highlight the importance of greener strategies and initiatives related to their operations.

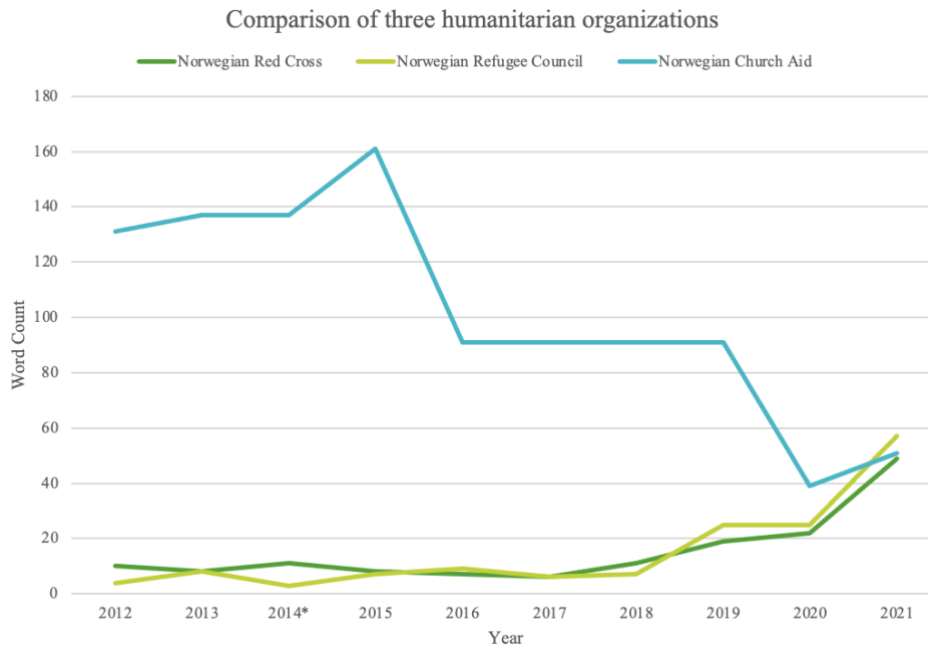
The concept of sustainability is not novel and has been in existence for several decades. Previously, the annual reports placed more emphasis on the societal aspect of sustainability, particularly in terms of social justice (for children and women), equity considerations, economic development, and resilience with respect to livelihoods. However, in the past few years, there has been a notable increase in attention given to the environmental aspect of sustainability. Instances of this can be observed in the evolution of language used over time regarding the degree to which organizations assume responsibility for their emissions, among other things. Greenhouse gas emissions are a commonly utilized environmental measurement within the humanitarian sector, and Van Fan, Perry, Kleme, and Lee (2018) have highlighted the significance of reducing greenhouse gas emissions from supply chain operations.

For instance, the NRC writes in their 2014 and 2015 annual reports that “*the organization's operations do not result in any significant environmental pollution*”. Furthermore, in its annual reports spanning from 2012 to 2019, the Norwegian Red Cross has stated that they do not pollute the external environment beyond what is normal for this type of organization. The annual reports for 2020 and 2021, however, indicate a shift in the approach towards responsibility disclaimers observed in previous years. The reports show an increasing willingness to take ownership of emissions and address them. This indicates that they have gained an increased awareness of the impact associated with their aid and operational activities. This can be seen, e.g., by the fact that most of the organizations we have looked at are committing to and have established specific organizational targets related to reducing their CO<sub>2</sub> emissions. Further, several of these organizations have initiated the utilization of mapping tools to track their emissions in relation to both national and international operations and activities, in addition to keeping climate accounts and creating climate reports. These findings are consistent with the results obtained from the interviews that were carried out, where ID-3 can tell that: “*We have worked on the climate accounting and have examined the emissions associated with the emergency hospital.*” Moreover, ID-3 adds:

*We issue reports and seek to influence government authorities, particularly at the national level. We collaborate with climate organizations to develop reports and obtain a solid foundation, especially in relation to emergency preparedness work. Preparedness is, after all, a very important area. So, trying to communicate and being someone who influences is crucial, not to mention building the culture in the organization. This is something we are also working on.*

An additional indication that perceptions of environmental sustainability among HOs have changed is the adoption of more environmentally friendly energy sources in recent years. This pertains to the head offices, country offices, or in the field, where there is an increased focus on installing greener energy sources such as solar panels, solar pumps, solar mills, etc.

Furthermore, as illustrated in *Figure 8*, we see a clear increase in the occurrence of the aggregated search terms around 2018/2019 for the Norwegian Red Cross and NRC, which indicate a heightened level of attention and emphasis. While a decrease in the frequency of keyword usage is observed in the context of NCA. However, the application of these terms and their meaning have undergone changes over time - and have become more precise in terms of environmental sustainability related to logistics activities. Across the ten organizations we have examined, it appears that there is a prevailing perception that environmental sustainability has become a more prominent consideration and is receiving increased attention compared to ten years ago. The perception of environmental sustainability has, during this period, become more precise and broader in scope, such that it has come to be viewed on par with the social and economic dimensions of sustainability, in addition to the fact that awareness of the subject has increased.



*Figure 8. Comparison of keyword counts from annual reports*

*The word count in Figure 7 is the sum of all the environmental sustainability related keywords (“Sustainability/Sustainable”, “Environment/Environmental\*”, “Emissions\*”, “Pollution\*”, “Climate\*”, and “Green/Greener”). Note that NCA has an overall report for the years 2016 to 2019, therefore the same word count has been plotted for all three years.*

*\*Lack of data in 2014 for NCA*

Nevertheless, from the annual reports, it seems that a considerable number of the aforementioned HOs are currently in the initial phases of mapping and carrying out initiatives aimed at environmental sustainability within their operations. This is further substantiated by the interviews, where ID 4 says:

*Currently, efforts are being made towards obtaining ISO 14001 certification for the emergency hospital. Because this is new, we will have to wait until the next crisis to observe how it goes and make an assessment. In addition, we have an energy mapping project in which we examine how we consume energy and whether it can be replaced with partially renewable sources of energy.*

Moreover, ID-3 adds:

*Work is presently being done to concretize and operationalize the strategies. As of now, we do not have a sustainability report, but*

*sustainability reporting is included in annual reports, quarterly reports, and other reports. But we will get a separate climate report.*

Lastly, apart from WFP, all the organizations have signed the Climate Charter in 2021 (except MSF, which signed it in 2022), which consists of six commitments that should be "turned" into time-bound goals and action plans (Climate Charter, 2022). However, as of June 2023, it is worth noting that only the Norwegian Red Cross and MSF have specified their public commitments. This indicates that several of the organizations are still in the early stages.

## ***5.2 Environmental initiatives developed by HOs***

Our analysis indicates that the HOs have different approaches to developing and implementing environmental initiatives. Some HOs focus their efforts primarily on the headquarters before developing environmental initiatives for disaster relief operations. For instance, ID-1 explained that they are currently refurbishing their headquarter in Oslo, where they are implementing environmentally friendly initiatives pertaining to energy consumption, new canteen solutions, and suppliers. Other organizations appeared to develop and instigate initiatives in a more haphazard manner, developing and implementing initiatives in various areas. While some HOs had a more strategic approach by targeting areas with the greatest potential to become greener. We now elaborate on the developed and implemented initiatives.

### ***5.2.1 Needs assessment***

Numerous actors are engaged in humanitarian operations (Besiou et al., 2021). With many actors involved, coordination of needs assessments between the actors involved is necessary. If needs assessment is done the wrong way, it might result in wasted resources, duplication of effort, or gaps in service. The first two listed have an impact on the environmental sustainability of the humanitarian operation. Our interviews revealed several initiatives to increase the environmental sustainability of humanitarian operations. However, there seem to be few planned environmental initiatives associated with the needs assessment.

One initiative that was mentioned by one of the HOs (ID-1, ID-2) as well as in the annual reports of, among others, the Norwegian Red Cross and OCHA, was the development of the Nexus Environmental Assessment Tool (NEAT+). This screening tool allows HOs to address their needs to integrate more sustainable environmental practices. The development of the NEAT+ has been linked to needs assessment, but it is also pertinent to other logistics activities, such as procurement. Another initiative that was mentioned by one of the interviewees as well as in the supply chain annual report of, among others, WFP, was the collaboration of needs assessment between HA through a cluster approach. This initiative is not primarily a greening initiative, but it contributes to more environmental sustainability as clusters promote a common strategy, good practices, information sharing, and avoid duplication of efforts (Global Education Cluster, Save the Children International, & Translators without Borders, 2021).

Furthermore, the initiative of incorporating risk management and risk assessments into the climate and environmental work was revealed during the interview, which is in alignment with the discoveries in several of the annual reports. As we learned from our literature review, risk management is a closely related topic to HL preparedness, as it enables HOs to quickly identify and mitigate potential risks that may impede the delivery of aid during disaster relief operations. To be environmentally sustainable, HOs must pay regard to the wider impact of their activities and consider factors such as water and water management (Bush, 2010; Christopher, 2016). Another initiative connected to needs assessment that was mentioned is the improvement of the water balance in the water catchment linked to the WASH programs. Hence, the equation on how much water comes into the water catchment and how much they can extract will contribute to making the HO more environmentally sustainable. Even though our research has revealed a few implemented initiatives associated with needs assessment, there is certainly potential for improvement in this activity.

### *5.2.2 Procurement*

According to our literature review, procurement is one of the most important activities in humanitarian operations, accounting for an estimated 65 percent of relief operations costs (Lamenza et al., 2019; Schulz, 2009). Based on our

findings, the area with the most significant potential for becoming greener within the logistic activities of HOs is procurement. This was a repeated viewpoint among our respondents and in some of the annual reports, despite some acknowledging that it also presents notable challenges. The extent to which the HOs have developed and implemented initiatives in procurement varies. Some HOs have only recently begun working on it, while others have progressed significantly. The identified initiatives for greening procurement mainly revolve around local procurement, establishing sustainability criteria for supplier selection, transparency in the supply chain, providing cash assistance to beneficiaries, forecasting, and altering product design. Local procurement has been implemented to varying extents by HOs, yet this approach is not necessarily more sustainable (Tuomala, Kovacs, & Aminoff, 2022). The establishment and implementation of sustainability criteria for supplier selection and providing cash assistance to beneficiaries were also consistent among the interviewees. Proper forecasting to buy more through demand was also mentioned by a couple of the interviewees. This was done by encouraging each delegation to give an overview of their needs months in advance. Altering product design was substantially discussed during the interviews, and initiatives for many different products were identified. This included products such as carpets, tarpaulins, and kitchen sets.

### 5.2.3 Warehousing

The fundamental challenges of where, when, and how much to store are essential in the HSC environment (Ye et al., 2019). Without effective mitigation and preparedness efforts, like prepositioning humanitarian inventory (strategic stock) close to disaster prone locations, a quick and efficient response would be nearly impossible (Rezaei Malek et al., 2016). HOs typically preposition relief supplies in established warehouses. However, limiting factors such as funding may prevent the execution of such activities prior to the occurrence of a disaster (Maghsoudi & Moshtari, 2020). Our interviews revealed that this was the case for one of the HOs. Hence, they did not have any specific initiatives related to this activity. ID-9 stated that *“We receive funding for specific crises (specific numbers of beneficiaries and specific locations). Once the funding is received, we can buy relief items, and then the items don't stay in the warehouse for long.”* Another HO stated that they did not preposition relief supplies anymore. However, this did not

appear to be a greening initiative as it is difficult to predict the right amount of relief supplies needed, but rather because the HO is not large enough to store relief supplies. Only one of the larger HOs stated that they prepositioned relief supplies and highlighted the importance of regional centers to obtain a more sustainable supply chain (ID-5). ID-5 added that this initiative is only possible for large HOs.

#### *5.2.4 Transportation and distribution*

Transportation in HSCs entails the transfer of supplies and resources from the upstream of the supply chain, where the suppliers are located, to international and local warehouses, with last-mile delivery to the downstream beneficiaries. Eng-Larsson and Vega (2011) identified gaps in disaster relief that they considered should be addressed to achieve an environmentally sustainable disaster response. Four of the five gaps were mostly related to transportation. These are as follows: decrease in transportation volumes; decrease in transportation distance; increase in vehicle fill rate; and finally, decrease in vehicle impact.

Our interviews revealed that the HOs mainly focus on decreases in vehicle impact, such as hybrid cars or choice of transportation mode, and transportation distance in terms of regional centers. When we inquired about the importance of environmental sustainability in transportation mode choices, most of the discussion in the interviews was about international transportation. Thus, international transportation appears to be the area of transportation that is most focused on environmental sustainability. This might not be surprising as the majority of international humanitarian transportation is conducted via air, the most polluting mode of transportation (Ertem et al., 2017). This was confirmed by ID-7 by stating: *“A challenge with environmental sustainability in disaster response is that you have to respond to a disaster that can happen anywhere in the world, and then you end up flying materials anyway”*.

An initiative to reduce the environmental impact of transportation is to improve forecasting and planning, which makes it easier to plan the supply chain and choice of transportation mode (ID-5). Improved forecasting can reduce transportation emissions. Further, it is evident from our findings that vehicles for



last mile deliveries are another focus area when it comes to transportation. This is crucial in reducing the reliance on expensive airdrops and, not least, the emissions related to their operations. Another initiative that was revealed during our interviews was the increased use of digital meetings to reduce emissions from flights. However, this initiative does not solely focus on the preparedness phase of a disaster, but it is more of a general initiative for the whole organization.

#### *5.2.5 Waste management*

Often, disasters result in the generation of large amounts of waste. Failure to meet waste treatment standards, including the removal of general waste, excessive unwanted donations such as pharmaceuticals, food, and clothing, emergency relief food packaging, large amounts of health care waste, and a high volume of debris that require a scientific process of disposal (Bag et al., 2020), has contaminated the environment during several earlier humanitarian operations (Zarei et al., 2019). Thus, environmental initiatives to reduce the environmental impact of waste are needed. However, our interviews revealed that some did not really know how much waste was generated (ID-1). Most of the responses when we asked HOs if they have any initiatives connected to waste ended up with a discussion on the issues of waste. An initiative that was mentioned by HO is the promotion of waste separation. Several of the HOs mentioned the rising issue of electronic waste. It seems that there is no doubt that waste is a problem, yet the interviews reveal that there are few initiatives to solve the problem.

### ***5.3 Main challenges in developing and implementing environmental initiatives***

This section discusses the main challenges that HOs face while developing and implementing environmental initiatives. Drawing from our literature review, we found that the humanitarian supply chain operates in an unpredictable, dynamic, and chaotic environment (Balcik & Beamon, 2008, cited in Sarkis et al., 2013, p. 200). Therefore, HOs need to be prepared to handle both normal and abnormal risks (Jahre, 2017), which makes it challenging to implement environmental sustainability initiatives. This was reflected in our interview findings. As stated by ID-5: *“The biggest challenge to implementing environmental sustainability initiatives is that humanitarian organizations work in places where the supply chains don't work because of the emergency where we work.”* Another main

challenge identified by the interviewees was the difficulty of considering environmental sustainability when lives are at stake. As ID-2 highlighted:

*The urgency of the work is a challenge. Environmental sustainability gets really deprioritized, and I think it's understandable, especially when you're doing lifesaving work, that there are so many things that must happen within the first 24 hours, 48 hours, or 72 hours that it's very hard to hold a concern about environmental sustainability.*

Echoing this statement, ID-7 underscored the urgency of their work as a challenge, noting:

*A challenge with environmental sustainability in disaster response is that you must respond to a disaster that can happen anywhere in the world, and then you end up flying materials anyway. One way to plan for a more sustainable response is by strengthening societies and making them resilient. Local communities that need less help will be the best way to make it environmentally sustainable.*

Several of the main general challenges highlighted in our interview findings center on challenges that arise during the response phase rather than the preparedness phase. This reinforces what we learned from the literature review; as there is limited time for planning when a disaster occurs, the preparedness phase is critical for humanitarian disaster relief operations to become greener (Eng-Larsson and Vega, 2011; Corbett et al., 2022). Given the apparent emphasis on issues associated with the response phase when addressing environmental sustainability, it may be beneficial for HOs to reconsider their approach to the preparedness phase.

Inadequate funding is also a challenge during disaster relief operations (Maghsoudi & Moshtari, 2020). This assertion was reinforced by ID-2, who identified funding as a challenge when planning for a more environmentally sustainable response before a disaster occurs, stating: “A main challenge for doing more environmentally sustainable planning before a disaster strike is difficult to get the funding for that and to show results from things that didn't happen.”

Measuring environmental sustainability performance is important to enhance performance. As Harrington (1994) declared: *“If you cannot measure it, you cannot control it. If you cannot control it, you cannot manage it. If you cannot manage it, you cannot improve it”*. ID-8 underscored the challenge of understanding the footprint of the activities. Furthermore, ID-4, highlighted the challenge of collecting data to measure the environmental footprint outside the head office.

The conducted interviews have provided insights into various challenges. However, this chapter will specifically concentrate on the challenges that were particularly prominent in the interviews or were mentioned by multiple participants. These main challenges are connected to procurement, altering product design, and the responsibility of waste.

### *5.3.1 Challenges of procurement*

According to our literature review, the procurement process in humanitarian relief operations can vary based on the type of disaster, the location of the suppliers, and the policies implemented by each organization, implying that there is no special procurement process specified in the literature for humanitarian relief operations (Ertem & Buyurgan, 2013; Lamenza et al., 2019). ID-5 underscored the complexities inherent in procurement processes given the diverse range of items purchased. To illustrate, ID-5 stated:

*For example, if I'm doing cars, then I work with automobile suppliers. Humanitarian organizations buy all kinds of items. We buy food, seeds, airties, narcotics, and medical items. We are not experts on anything. There are some lead buyers who are experts, but as an organization or as a company, we are so diversified that it is complicated. On top of that, we work with supply chains that don't work because of the emergency where we work.*

Despite the wide range of items HOs procure, the approach of local procurement was found to be a shared practice among all HOs. This approach is dependent on

what the local markets offer, which might be limited. From our literature review, the possible limited access to goods locally was found to be one of the challenges linked to local procurement. Frennesson et al. (2022) underscored the difficulty associated with local procurement in terms of the accessibility of local suppliers. It has been noticed that access can deteriorate from bad to worse as the quality and availability of products fluctuate. Further, Maghsoudi & Moshtari (2020) highlighted disruption in the availability of supplies and the lack of coordination for local sourcing as challenges related to procurement. On the other hand, Van Kempen et al. (2017) found that local procurement and sourcing are more environmentally and socially sustainable than international procurement and sourcing. Nevertheless, a life cycle analysis might reveal a bigger carbon footprint in the end with local procurement (Tuomala, Kovacs, & Aminoff, 2022). Our interviewees raised concerns regarding the implementation of sustainability criteria when procuring goods locally. There appears to be less control over the entire supply chain in these situations, and acquiring the environmental profile of suppliers can be challenging when environmental sustainability is often not prioritized locally. Furthermore, corruption was cited as a problem in certain locations, creating additional hurdles in promoting greener procurement.

### *5.3.2 Challenges of altering product design*

Based on our literature review, there has been a rise in the number of organizations working on procurement and forming supplier partnerships (Pazirandeh and Herlin, 2014; Pazirandeh and Norrman, 2014). One of the smaller HOs that were interviewed identified their position in the market as a challenge to affect suppliers to make more environmentally sustainable products by stating that *“Because we are a small organization, we do not have the availability to influence the suppliers to, for example, reduce packaging”* (ID-1).

Regarding product design, the interviewees cited examples ranging from altering the product design of blankets to exploring new energy sources. A main challenging aspect of product design is that packaging must be sturdy in the environments in which HOs operate. ID-5 demonstrated this challenge by using a food kit parcel as an example:

*For example, we were working with a research institute in Sweden on food kit parcels. There is a lot of plastic in the food kit parcels. We tried to take the plastic away, but we were too able because the packaging needed to be strong for the places we work. It needs to be much stronger than, for example, Europe. We were able to change from a white carton to a recycled brown carton. We were able to change the ink to non-toxic and refuse all the ink that was not needed, but we couldn't change the plastic.*

It is evident that shifting towards more environmentally sustainable designs may inevitably lead to increased costs. The higher costs of greener relief items may mean that HOs are able to assist fewer beneficiaries, underscoring the need for a careful balance in adopting such initiatives. ID-8 clearly established this by stating: *“These products are more expensive, and then we can afford fewer items. Therefore, there needs to be a balance.”*

### *5.3.3 The responsibility for waste*

Another challenge that arose from our interviews was the responsibility for waste management. From our literature review, we learned the importance of waste management, as disasters often result in the generation of large amounts of waste (Trivedi et al., 2015). Failure to meet waste treatment standards has contaminated the environment during several earlier humanitarian operations (Bag et al., 2020; Zarei et al., 2019). Gordon et al. (2008) stated that good planning and coordination with stakeholders are essential to minimize and control waste management. Thus, we sought to find out who HOs held accountable for waste in the regions where they work. It was observed that options varied on who should be held accountable for the waste generated by the disaster. Some interviewees believed that it was the responsibility of municipalities, while others argued that those who generate the waste should be responsible for their own waste. Some also mentioned that the responsibility should be a collective one. Consistent with these findings, the literature review revealed divergent perspectives regarding the attribution of responsibility for waste management. Baycan et al. (2002) assert that the planning and implementation of a disaster waste management system should consider the role of municipal waste collection. While Trivedi et al. (2015) identified that the success of any disaster waste management program is directly

attributable to all people involved. They recommend providing relevant personnel and volunteers with pre-disaster training to ensure the successful handling of disaster waste.

Peretti et al. (2015) highlighted that the use of commercial reverse logistics practices in the HL sector is extremely limited, a finding that was confirmed by our own interviews. A challenge with implementing reverse logistics practices that was apparent from the interviews is bureaucratic hurdles. Certain countries necessitate an export permit, and the associated costs of waste export can restrict the import of relief items. ID-7 pinpointed that waste management is an area for improvement, stating: “*Within waste management, there is a lot to do to find new solutions, but that requires separate development projects.*” Given the lack of clarity regarding waste management responsibilities and the limited adoption of reverse logistics, waste management appears to be an area that could benefit from improvement.

#### ***5.4 Impact of environmental initiatives on environmental sustainability factors***

To conclude the discussion and demonstrate the impact of the identified environmental initiatives associated with each logistic activity on measurable environmental factors, we linked the environmental initiatives effects on minimizing the environmental factors (presented in Table 4).

Table 4 indicates a discernible trend in the impact of these initiatives on air pollution. This finding aligns with the results obtained from the analysis of the annual reports, which show that reducing CO<sub>2</sub> emissions is a common priority for most of the organizations. Furthermore, Table 4 indicates that water usage is the environmental factor least affected by these initiatives. However, it is important to note that the majority of the initiatives indirectly impact most of the factors, but we have focused on the direct impact on the factors. It is also worth mentioning that the degree to which these initiatives contribute to minimizing these factors varies. While some initiatives have a substantial impact, others exert a lesser effect. Additionally, there is some uncertainty regarding whether these initiatives primarily target aggregated emissions across the entire supply chain or solely focus on reducing emissions within the focal organization. The examples below

demonstrate the *potential* link between initiatives and environmental factors but should be considered as general guidance.

	Minimize			
	Energy use	Water use	Chemicals and toxins	Air pollution
Needs assessment				
Implementation of NEAT+ screening tool				
Collaboration through cluster				
Water balance				
Incorporate risk management and risk assessments into the climate and environmental work				
Procurement				
Improvement of forecasting				
Providing cash to beneficiaries				
Implementation of environmental criteria in supplier selection				
Local procurement				
Altering product design				
Warehousing				
Establishment of regional distribution centers				
Transportation & distribution				
Reduction of flights				
Transportation by sea				
Use of hybrid cars				
Forecasting				
Waste management				
Promote separation of waste				
Implementation of guideline for waste management				

*Environmental initiatives*

Table 4. Impact of environmental initiatives on environmental sustainability factors

Implementation of the NEAT+ screening tool, collaboration through clusters, and incorporation of risk management and risk assessments into climate and environmental work all help to identify and prioritize needs more efficiently, reducing unnecessary consumption and thus minimizing water use, energy use, chemicals and toxins, and air pollution. A balanced water supply in the water catchment helps minimize water use by calculating how much water may be extracted and distorted.

Forecasting improvements can assist HOs in procuring the necessary quantity of relief products, decreasing excess inventory, and so contributing to the reduction of all environmental factors. Furthermore, depending on the improvements, altering product design can aid in the reduction of all environmental factors. Implementing environmental criteria in supplier selection can help to make the procurement process more environmentally sustainable by selecting more environmentally sustainable suppliers and thus helping to reduce air pollution from transportation distances and chemicals and toxins associated with the production of relief items. The initiative of providing cash to beneficiaries instead of physical items can help support local economies while also reducing air pollution associated with international transportation.

The establishment of regional distribution centers can help improve inventory management, reduce the need for smaller local warehouses, and reduce air pollution by minimizing international transportation when the crisis strikes. In the event of a disaster, there is frequently a demand for transportation modes that have higher levels of pollution, such as airplanes, as a result of time constraints.

Reducing flights and opting for transportation by sea can help minimize carbon emissions and air pollution connected with air travel. Forecasting improvements can help optimize route planning, load consolidation, and transportation mode selection, reducing the number of trips necessary and thereby reducing air pollution. Using hybrid vehicles instead of non-electric vehicles can help reduce carbon emissions and air pollution.



Promoting waste separation and the implementation of guidelines for waste management can contribute to effective waste processing and disposal, minimizing the environmental impact in terms of chemicals and toxins emitted from waste and air pollution.

## 6.0 Conclusion

This final chapter concludes the thesis by answering the primary research question: “*How are humanitarian organizations planning to reduce the environmental impact of their logistic operations activities?*” Furthermore, this chapter outlines the contributions of this study, acknowledges its limitations, and offers suggestions for future research.

The aim of this study is to examine how HOs are planning to reduce the environmental impact of their disaster relief operations. The research has been conducted through interviews with experts within the humanitarian sector who work with logistics and sustainability. Their contributions have facilitated a comprehensive understanding of the topic. The basis for this study is semi-structured interviews and the analysis of annual reports. The findings were analyzed and discussed in the context of the theoretical foundation presented.

We studied environmental sustainability expectations through further developing Jahre et al.’s (2016) proposed framework for logistics preparedness that segments different logistics activities into specific categories (illustrated in *figure 1*) into a conceptual framework, together with the factors that have an impact on the environmental sustainability performance of logistic operations activities, as suggested by Bush (2010) and Christopher (2016). This framework combines logistics activities and environmental sustainability factors, facilitating alignment between the two perspectives.

Our findings indicate, in accordance with academic literature and research, that HOs have yet to make significant strides towards achieving greener aid and are only in the nascent stages of integrating environmentally sustainable initiatives.

From our research, it becomes clear that a decade ago, the concept of environmental sustainability and environmental sustainability-related expectations pertaining to logistics activities were not well-defined in academic literature within humanitarian contexts and annual reports. Nevertheless, there has been an observable change in recent times, indicating a shift. First, the heightened emphasis on environmental sustainability in society has correspondingly led to increased attention to this topic within HOs. Second, environmental sustainability has gone through an important shift, evolving from a negligible consideration to being a compliance issue and subsequently gaining a growing interest among donors, employees, and volunteers. This has resulted in organizations assuming greater responsibility. Third, sustainability may be regarded as a metric of performance that runs parallel to efficiency, quality, and flexibility, which are three keywords closely linked to humanitarian disaster relief operations. In light of the heightened emphasis and attention on environmental sustainability in recent years, it has become apparent that sustainability is being regarded as a key metric for evaluating performance across different companies and their supply chains (Carter and Rogers, 2008).

Our key findings indicate that the perception of environmental sustainability in HOs has increased in the last decade. According to the research conducted by Haavisto and Kovacs (2014), the supply chain perspective, which encompasses operational aspects such as preparedness and greening, was not frequently discussed except in relation to local sourcing. The prominence of contextual focus is evident in the approach of HOs towards the environmental aspect of sustainability; whilst insufficient emphasis is placed on greening products, services, or operations, the focus is primarily on climate change adaptation to ensure the well-being of beneficiaries and to explore coping and mitigation strategies. This is in line with our own findings from the searches in the annual reports, and the observation aligns with the discovery made by Sarkis et al. (2011) that HOs focus on people first, and the environment second. However, a notable shift was detected in the focus on environmental sustainability in the annual reports from 2019 to 2021, where the HOs started accentuating the importance of greening strategies and initiatives.

HOs are planning to reduce the environmental impact of their logistic operations activities by developing and implementing a wide range of initiatives in the preparedness phase, from altering product design to improving forecasting. However, our analysis indicates a gap in the extent to which HOs have progressed in developing and implementing environmental initiatives, as well as revealing variations in approaches towards addressing the issue. The gap exists in the particular areas that the HOs have opted to prioritize with regard to the implementation and development of environmentally sustainable initiatives. However, our research indicates that despite the differences, most of the organizations investigated share a common goal of improving environmental sustainability by reducing air pollution, with the primary metric being the reduction of greenhouse gas emissions.

Our research also revealed a common understanding among several of the HOs that procurement is the logistic activity with the greatest potential for becoming greener. Thus, several initiatives were connected to procurement. The identified initiatives for greening procurement mainly revolve around local procurement, establishing sustainability criteria for supplier selection, transparency in the supply chain, providing cash assistance to beneficiaries, forecasting, and altering product design.

While numerous HOs have developed environmentally sustainable initiatives, they have encountered various challenges during the development and implementation of the initiatives. Central to these challenges, as revealed in our study, is the unpredictability of the humanitarian supply chain, coupled with the urgent nature of HOs' work. HOs procure a wide range of relief items, and when pursuing the initiative of local procurement, they are limited by the local market's offerings. Another challenge with local procurement arises; it is not necessarily more environmentally sustainable. This initiative often results in decreased control of the environmental impact across the whole supply chain. Acquiring the environmental profile of suppliers can be challenging, as environmental sustainability is often not prioritized locally. Moreover, corruption, prevalent in many of the countries where HOs operate, further complicates local procurement, making it difficult to trust the authenticity of local suppliers' environmental profiles. It's also worth noting that several challenges identified in the interviews

primarily pertain to issues encountered in the response phase, as opposed to the preparedness phase. Considering the discernible of challenges pertaining to the response phase in the context of environmental sustainability, it may prove advantageous for HOs to reassess their approach concerning the preparedness phase.

To conclude, HOs have increased their environmental focus in recent years. Nevertheless, there are several challenges they must overcome to become more environmentally sustainable. We wish to necessitate the importance of considering the aggregated footprint of the initiatives across the whole supply chain to ensure that the initiatives are ultimately more environmentally sustainable. Although the reduction of greenhouse emissions has received the greatest attention due to its documented impact on the climate, HOs should also pay regard to the wider impact of the activities beyond the greenhouse emissions. The resolution of this issue cannot, however, be achieved by any individual organization in isolation. Effective collaboration and information sharing among partners in the humanitarian sector are crucial for improving the collective impact of global efforts. This involves the exchange of best practices, challenges, and initiatives.

### ***6.1 Contribution, Limitations and Future Research***

This study was conducted based on the limited research on the topic of environmental sustainability in HL and contributes to covering this gap. Our research was subject to certain limitations. The most prominent limitation is the restricted number of organizations interviewed, and the difficulties with obtaining responses from wanted interview candidates. In addition, the annual reports may not have fully captured and identified all the initiatives implemented by the studied organizations. It is possible that the annual reports did not properly document variations in the understanding of environmental sustainability within and across HOs. Disparities in understanding could happen due to the organizational level, e.g., headquarters or field. Given that our research has investigated a limited number of HOs through interviews, the scope of our primary data is fairly narrow. Thus, we recommend further research to investigate additional organizations to consolidate the findings of this study as well as delve

into solutions for the identified challenges. Such research could also delve deeper into preparedness strategies and how these can be used most effectively to overcome the identified challenges. Furthermore, we recommend conducting an in-depth study of the organization's level of maturity in relation to environmental sustainability and exploring the process by which environmental initiatives are developed and implemented within these organizations. In closing, we recommend further research to investigate in-depth the impact of environmental initiatives on measurable environmental factors.

## 7.0 Bibliography

- Abrahams, D. (2014). The barriers to environmental sustainability in post-disaster settings: a case study of transitional shelter implementation in Haiti. *Disasters*, 38(s1), S25-S49
- Bag, S., Luthra, S., Venkatesh, V. G., & Yadav, G. (2020). Towards understanding key enablers to green humanitarian supply chain management practices. *Management of Environmental Quality: An International Journal*, 31(5), 1111–1145. <https://doi.org/10.1108/MEQ-06-2019-0124>
- Balcik, B. & Beamon, B. M. 2008. Facility location in humanitarian relief. *International Journal of Logistics Research and Applications*, 11, 101-121. <https://doi.org/10.1080/13675560701561789>
- Baycan, F., & Petersen, M. (2002, July). Disaster waste management-C&D waste. In Annual conference of the international solid waste association (Vol. 8, p. 12). Turkey: Istanbul
- Bell, E., Bryman, A., & Harley, B. (2022). *Business research methods* (6th ed.). Oxford University Press.
- Besiou, M., Pedraza Martinez, A. J., & Van Wassenhove, L. N. (2021). Humanitarian Operations and the UN Sustainable Development Goals. *Production and Operations Management*, 30(12), 4343–4355. <https://doi.org/10.1111/poms.13579>
- Besiou, M., & Van Wassenhove, L. N. (2020). Humanitarian operations: A world of opportunity for relevant and impactful research. *Manufacturing & service operations management*, 22(1), 135-145
- Bogner, A., Littig, B., & Menz, W. (2009). Introduction: Expert Interviews – An Introduction to a New Methodological Debate. Palgrave Macmillian. [https://doi.org/10.1057/9780230244276\\_1](https://doi.org/10.1057/9780230244276_1)
- Borglund, T., De Geer, H., Frostenson, M., Lerpold, L., Nordbrand, S., Sjöström, E., ... & Grafström, M. (2017). CSR and sustainable business. Sanoma utbildning
- Bush, C., *Sustainable Sourcing: A New Approach to High Performance in Supply Chain Management*, Accenture, 2010
- Carter, C.R. and Rogers, D.S. (2008), “A framework of sustainable supply chain management: moving toward new theory”, *International Journal of Physical Distribution & Logistics Management*, Vol. 38 No. 5, pp. 360-387.

- Climate Charter. (2022). Climate Charter. <https://www.climate-charter.org/>
- Corbett, C. J., Pedraza-Martinez, A. J., & Van Wassenhove, L. N. (2022). Sustainable humanitarian operations: An integrated perspective. *Production and Operations Management*, 31(12), 4393–4406. <https://doi.org/10.1111/poms.13848>
- Christopher, M. (2016). *Logistics & supply chain management*. Pearson UK.
- Deacon, D., Bryman, A., & Fenton, N. (1998). Collision or collusion? A discussion and case study of the unplanned triangulation of quantitative and qualitative research methods. *International Journal of Social Research Methodology*, 1(1), 47–63. <https://doi.org/10.1080/13645579.1998.10846862>
- Defra. (2006). Environmental key performance indicators, reporting guidelines for UK business.
- Dubois, A. & Gadde, L.-E. (2014). “Systematic combining”—A decade later. *Journal of Business Research*, 67(6), 1277–1284. <https://doi.org/10.1016/j.jbusres.2013.03.036>
- Elkington, J. (1997). The triple bottom line. *Environmental management: Readings and cases*, 2, 49-66.
- Eng-Larsson, F., & Vega, D. (2011, January). Green logistics in temporary organizations: a paradox? Learnings from the humanitarian context. In *Supply Chain Forum: An International Journal* (Vol. 12, No. 2, pp. 128-139). Taylor & Francis.
- Ertem, M.A., Buyurgan, N. and Rossetti, M.D. (2010), “Multiple-buyer procurement auctions framework for humanitarian supply chain management”, *International Journal of Physical Distribution & Logistics Management*, Vol. 40 No. 3, pp. 202-227
- Ertem, M.A. and Buyurgan, N. (2013), “A procurement auctions-based framework for coordinating platforms in humanitarian operations”, in Zeimpekis, V., Ichoua, S. and Minis, I. (Eds), *Humanitarian and Relief Logistics: Research Issues, Case Studies and Future Trends*, Springer, New York, NY, pp. 111-127.
- Ertem, M. A., İşbilir, M., & Şahin Arslan, A. (2017). Review of intermodal freight transportation in humanitarian logistics. *European Transport Research Review*, 9, 10. DOI 10.1007/s12544-017-0226-z
- European Union (2022). Better environmental performance: European eco-management and audit scheme (EMAS). Collected from: <https://eur->

[lex.europa.eu/EN/legal-content/summary/better-environmental-performance-european-eco-management-and-audit-scheme-emas.html](https://lex.europa.eu/EN/legal-content/summary/better-environmental-performance-european-eco-management-and-audit-scheme-emas.html)

- Frennesson, L., Kembro, J., de Vries, H., Jahre, M., & Van Wassenhove, L. (2022). “International humanitarian organizations’ perspectives on localization efforts”. *International Journal of Disaster Risk Reduction*, 83, 103410. <https://doi.org/10.1016/j.ijdr.2022.103410>
- Gibbs, L., Kealy, M., Willis, K., Green, J., Welch, N., & Daly, J. (2007). What have sampling and data collection got to do with good qualitative research? *Australian and New Zealand Journal of Public Health*, 31(6), 540–544. doi:10.1111/j.1753-6405.2007.00140.x
- Global Education Cluster, Save the Children International, Translators without Borders. (2021). *Humanitarian Coordination and the Cluster Approach: A quick guide for local and national organisations*. Collected from: <https://resourcecentre.savethechildren.net/document/humanitarian-coordination-and-cluster-approach-quick-guide-local-and-national-organisations/>
- Goodland, R. (1995). The concept of environmental sustainability. *Annual review of ecology and systematics*, 26(1), 1-24.
- Gordon, K., Dion, M. (2008) Protection of 'Critical Infrastructure' and the role of investment policies relating to national security. Investment Division, Directorate for Financial and Enterprise Affairs 75116, Organisation for Economic Cooperation and Development, Paris, pp. 6.
- Gray, D. E. (2019). *Doing Research in the Business World*. Los Angeles, USA: Sage Publications Limited.
- Guba, E. G., Lincoln, Y. S., & Denzin, N.K. (1994). *Handbook of qualitative research*. Sage Publishing.
- Haavisto, I., & Kovács, G. (2014). Perspectives on sustainability in humanitarian supply chains. *Disaster Prevention and Management*, 23(5), 610–631. <https://doi.org/10.1108/DPM-10-2013-0192>
- Harrington, H. J. (1994). *Business process improvement*. Association for Quality and Participation
- Hinzpeter, K., & Sandholz, S. (2018). Squaring the circle? Integrating environment, infrastructure and risk reduction in Post Disaster Needs Assessments. *International journal of disaster risk reduction*, 32, 113-124.
- Ho, W., Zheng, T., Yildiz, H. and Talluri, S. (2015), “Supply chain risk management: a literature review”, *International Journal of Production Research*, Vol. 54 No. 16, pp. 5031- 5069.



- Holguín-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*, Vol. 30 No. 7, pp. 494-506
- Jahre, M. (2017). Humanitarian supply chain strategies – a review of how actors mitigate supply chain risks. *Journal of Humanitarian Logistics and Supply Chain Management*, 7(2), 82–101. <https://doi.org/10.1108/JHLSCM-12-2016-0043>
- Jahre, M., Pazirandeh, A., & Van Wassenhove, L. (2016). Defining logistics preparedness: a framework and research agenda. *Journal of Humanitarian Logistics and Supply Chain Management*.
- Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: Developing a framework for a qualitative semi-structured interview guide. *Journal of advanced nursing*, 72(12), 2954–2965. doi:10.1111/jan.13031
- Khan, M., Parvaiz, G. S., Tohirovich Dedahanov, A., Iqbal, M., & Junghan, B. (2022). Research trends in humanitarian logistics and sustainable development: A bibliometric analysis. *Cogent Business & Management*, 9(1), 2143071.
- King, N., Horrocks, C., & Brooks, J. (2018). *Interviews in qualitative research*: SAGE Publications Limited.
- Kovács, G. and Moshtari, M. (2019), “A roadmap for higher research quality in humanitarian operations: a methodological perspective”, *European Journal of Operational Research*, Vol. 276 No. 2, pp. 395-408.
- Kovács, G. and Spens, K.M. (2007), “Humanitarian logistics in disaster relief operations”, *International Journal of Physical Distribution & Logistics Management* , Vol. 37 No. 2, pp. 99-114.
- Kovács, G. and Spens, K.M. (2011), “Trends and developments in humanitarian logistics – a gap analysis”, *International Journal of Physical Distribution and Logistics Management*, Vol. 41 No. 1, pp. 32-45
- Kunz, N., & Gold, S. (2017). Sustainable humanitarian supply chain management – exploring new theory. *International Journal of Logistics Research and Applications*, 20(2), 85–104. <https://doi.org/10.1080/13675567.2015.1103845>
- Kunz, N. and Reiner, G. (2016), “Drivers of government restrictions on humanitarian supply chains: an exploratory study”, *Journal of Humanitarian Logistics and Supply Chain Management*, Vol. 6, No. 3, pp. 329-351.

- Kraljic, P. (1983). HBR. Harvard business review
- Lamenza, A. A. D. S., Fontainha, T. C., & Leiras, A. (2019). Purchasing strategies for relief items in humanitarian operations. *Journal of Humanitarian Logistics and Supply Chain Management*, 9(2), 151-171
- Lewin, R., Besiou, M., Lamarche, J. B., Cahill, S., & Guerrero-Garcia, S. (2018). Delivering in a moving world... looking to our supply chains to meet the increasing scale, cost and complexity of humanitarian needs. *Journal of Humanitarian Logistics and Supply Chain Management*, 8(4), 518-532.
- L'Hermitte, C., Bowles, M., Tatham, P. and Brooks, B. (2015), "An integrated approach to agility in humanitarian logistics", *Journal of Humanitarian Logistics and Supply Chain Management*, Vol. 5 No. 2, pp. 209-23
- Lincoln, Y. S. & Guba, E. (1985). *Naturalistic Inquiry*. Sage Publishing
- Lindgreen, A., Maon, F., & Vanhamme, J. (Eds.). (2013). *Sustainable value chain management: A research anthology*. Gower.
- Livitt, A., Hiscock, D., & Piirtoniemi, K. (2011). *Opportunity from Catastrophe: A Strategic Approach to Sustainability through Pre-Disaster Recovery Planning (Pre-DRP)*.
- Longoni, A., & Cagliano, R. (2018). Sustainable innovativeness and the triple bottom line: The role of organizational time perspective. *Journal of Business Ethics*, 151, 1097-1120
- Logistics Cluster. (2023). WREC Waste Management and Recycling Assessment Guidance. Available at: [https://s3.eu-west-1.amazonaws.com/logcluster-production-files/public/2023-04/WREC\\_WMR%20Infrastructure%20Assessment%20Guidance%20Note\\_Final.pdf](https://s3.eu-west-1.amazonaws.com/logcluster-production-files/public/2023-04/WREC_WMR%20Infrastructure%20Assessment%20Guidance%20Note_Final.pdf) (Accessed April 2023).
- Maghsoudi, A., & Moshtari, M. (2020). *Challenges in disaster relief operations: Evidence from the 2017 Kermanshah earthquake*. *Journal of Humanitarian Logistics and Supply Chain Management*, 11(1), 107–134.  
<https://doi.org/10.1108/JHLSCM-08-2019-0054>
- Martinez, A. J. P., Stapleton, O., & Van Wassenhove, L. N. (2011). Field vehicle fleet management in humanitarian operations: A case-based approach. *Journal of operations management*, 29(5), 404-421
- Médecins sans Frontières (MSF). (2010), "MSF Activity Report 2010". Geneva, Switzerland: MSF International. Available at: [www.msf.org/content-type/annual-report](http://www.msf.org/content-type/annual-report) (Accessed May 2023).

- Médecins Sans Frontières (MSF). (2022). "International Activity Report 2021". Geneva, Switzerland: MSF International. Available at: [https://www.msf.org/sites/default/files/2022-07/MSF\\_IAR\\_2021\\_web\\_version.pdf](https://www.msf.org/sites/default/files/2022-07/MSF_IAR_2021_web_version.pdf) (Accessed May 2023).
- Nichols, B. S., Stolze, H., & Kirchoff, J. F. (2019). Spillover effects of supply chain news on consumers' perceptions of product quality: An examination within the triple bottom line. *Journal of Operations Management*, 65(6), 536–559. doi: 10.1002/joom.1033
- Norsk Folkehjelp. (2022). *Resultatrapport 2021*. Oslo: Norsk Folkehjelp. Available at: <https://folkehjelp.no/publikasjoner/resultatrapport-2021> (Accessed May 2023).
- Norwegian Church Aid (NCA). (n.d). *NORAD Results 2016 - 2019*. Norwegian Church Aid (NCA). Available at: <https://www.kirkensnodhjelp.no/contentassets/c444663064b84321b4da2926c10df361/2021/nca-2016-2019-global-results-report-to-norad-300620.pdf> (Accessed May 2023).
- Norwegian Church Aid (NCA). (2013). *Global Report on Results 2012*. Oslo: Norwegian Church Aid. Available at: [https://www.kirkensnodhjelp.no/globalassets/lanserte-rapporter/nca\\_global-report\\_2012.pdf](https://www.kirkensnodhjelp.no/globalassets/lanserte-rapporter/nca_global-report_2012.pdf) (Accessed May 2023).
- Norwegian Church Aid (NCA). (2014). *Global Report on Results 2013*. Oslo: Norwegian Church Aid. Available at: <https://www.kirkensnodhjelp.no/globalassets/lanserte-rapporter/nca-golbal-report-on-results-2013.pdf> (Accessed May 2023).
- Norwegian Church Aid (NCA). (2016). *Global Report on Results 2015*. Oslo: Norwegian Church Aid. Available at: [https://www.kirkensnodhjelp.no/globalassets/strategiske-dokumenter-og-foringer/2015/globalreportonresults\\_2015\\_en\\_1.pdf](https://www.kirkensnodhjelp.no/globalassets/strategiske-dokumenter-og-foringer/2015/globalreportonresults_2015_en_1.pdf) (Accessed May 2023).
- Norwegian Church Aid (NCA). (2021). *2020 Annual Report*. Oslo: Norwegian Church Aid. Available at: <https://www.kirkensnodhjelp.no/contentassets/8cd0bd357e19491ca53486c3f8342efe/2021-arsrapport-final.pdf> (Accessed May 2023).
- Norwegian Church Aid (NCA). (2022). *2021 Annual Report*. Oslo: Norwegian Church Aid. Available at: [https://www.kirkensnodhjelp.no/contentassets/adbbc47d4a2c4b73a0fc22c7ca5fc6af/2021-annual-report-and-financial-statements-from-nca-board-of-directors-with-auditors-report\\_lowres.pdf](https://www.kirkensnodhjelp.no/contentassets/adbbc47d4a2c4b73a0fc22c7ca5fc6af/2021-annual-report-and-financial-statements-from-nca-board-of-directors-with-auditors-report_lowres.pdf) (Accessed May 2023).

- Norwegian Red Cross. (2016). *Annual Report 2015*. Oslo: Norwegian Red Cross.  
Available at:  
<https://www.rodekors.no/globalassets/rapporter/arsrapporter-rodekors/annual-report-norwegian-red-cross-2015.pdf> (Accessed May 2023).
- Norwegian Red Cross. (2017). *Annual Report 2016*. Oslo: Norwegian Red Cross.  
Available at:  
[https://www.rodekors.no/globalassets/rapporter/arsrapporter-rodekors/annual-report-2016\\_web-eng.pdf](https://www.rodekors.no/globalassets/rapporter/arsrapporter-rodekors/annual-report-2016_web-eng.pdf) (Accessed May 2023).
- Norwegian Red Cross. (2018). *Annual Report 2017*. Oslo: Norwegian Red Cross.  
Available at:  
[https://www.rodekors.no/globalassets/rapporter/arsrapporter-rodekors/annual\\_report\\_2017.pdf](https://www.rodekors.no/globalassets/rapporter/arsrapporter-rodekors/annual_report_2017.pdf) (Accessed May 2023).
- Norwegian Red Cross. (2019). *Annual Report 2018*. Oslo: Norwegian Red Cross.  
Available at:  
<https://www.rodekors.no/globalassets/rapporter/arsrapporter-rodekors/norwegianredcross-annualreport2018.pdf> (Accessed May 2023).
- Norwegian Red Cross. (2020). *Annual Report 2019*. Oslo: Norwegian Red Cross.  
Available at:  
[https://www.rodekors.no/contentassets/b393903b73f24b86840a30834f2ec12e/rk\\_arsrapport\\_2019\\_eng\\_web.pdf](https://www.rodekors.no/contentassets/b393903b73f24b86840a30834f2ec12e/rk_arsrapport_2019_eng_web.pdf) (Accessed May 2023).
- Norwegian Red Cross. (2021). *Annual Report 2020*. Oslo: Norwegian Red Cross.  
Available at:  
[https://www.rodekors.no/contentassets/b393903b73f24b86840a30834f2ec12e/rk\\_arsrapport\\_2020\\_eng\\_web\\_oppslag.pdf](https://www.rodekors.no/contentassets/b393903b73f24b86840a30834f2ec12e/rk_arsrapport_2020_eng_web_oppslag.pdf) (Accessed May 2023).
- Norwegian Red Cross. (2022). *Annual Report 2021*. Oslo: Norwegian Red Cross.  
Available at:  
[https://www.rodekors.no/globalassets/rapporter/arsrapporter-rodekors/rk\\_arsrapport\\_2021\\_eng\\_web.pdf](https://www.rodekors.no/globalassets/rapporter/arsrapporter-rodekors/rk_arsrapport_2021_eng_web.pdf) (Accessed May 2023).
- Norwegian Refugee Council (NRC). (2013). *Annual Report from the Board 2012*. Oslo: Norwegian Refugee Council. Available at:  
<https://www.nrc.no/globalassets/pdf/annual-reports/2012/annual-report-from-the-board-2012.pdf> (Accessed May 2023).
- Norwegian Refugee Council (NRC). (2014). *Annual Report from the Board 2013*. Oslo: Norwegian Refugee Council. Available at:  
<https://www.nrc.no/globalassets/pdf/annual-reports/2013/annual-report-from-the-board-2013.pdf> (Accessed May 2023).

- Norwegian Refugee Council (NRC). (2015). *Annual Report from the Board 2014*. Oslo: Norwegian Refugee Council. Available at: <https://www.nrc.no/globalassets/pdf/annual-reports/2014/annual-report-from-the-board-2014.pdf> (Accessed May 2023).
- Norwegian Refugee Council (NRC). (2016). *Annual Report from the Board 2015*. Oslo: Norwegian Refugee Council. Available at: <https://www.nrc.no/globalassets/pdf/annual-reports/2015/annual-report-from-the-board-2015> (Accessed May 2023).
- Norwegian Refugee Council (NRC). (2017). *Annual Report from the Board 2016*. Oslo: Norwegian Refugee Council. Available at: <https://www.nrc.no/globalassets/pdf/annual-reports/2017/annual-report-from-the-board---english.pdf> (Accessed May 2023).
- Norwegian Refugee Council (NRC). (2018). *Annual Report from the Board 2017*. Oslo: Norwegian Refugee Council. Available at: <https://www.nrc.no/globalassets/pdf/annual-accounts/2017/english/nrc-boards-annual-report-2017-.pdf> (Accessed May 2023).
- Norwegian Refugee Council (NRC). (2019). *Annual Report from the Board 2018*. Oslo: Norwegian Refugee Council. Available at: <https://www.nrc.no/globalassets/pdf/annual-reports/nrc-annual-report-2018/nrc-board-annual-report-2018.pdf> (Accessed May 2023).
- Norwegian Refugee Council (NRC). (2020). *Annual Report from the Board 2019*. Oslo: Norwegian Refugee Council. Available at: <https://www.nrc.no/globalassets/pdf/annual-reports/2019/nrc-annual-report-from-the-board-2019/nrc-annual-report-from-the-board-2019.pdf> (Accessed May 2023).
- Norwegian Refugee Council (NRC). (2021). *Annual Report from the Board 2020*. Oslo: Norwegian Refugee Council. Available at: <https://www.nrc.no/globalassets/pdf/annual-reports/2020/annual-report-from-the-board/nrc-annual-report-from-the-board-2020.pdf> (Accessed May 2023).
- Norwegian Refugee Council (NRC). (2022). *Annual Report from the Board 2021*. Oslo: Norwegian Refugee Council. Available at: <https://www.nrc.no/globalassets/pdf/annual-reports/2021/annual-report-from-the-board/annual-report-from-the-board-2021.pdf> (Accessed May 2023).

- Oxfam (2011), “Oxfam Annual Report 2009/10”, available at:  
[www.oxfam.org/sites/www.oxfam.org/files/oxfam-international-annual-report-2009-2010.pdf](http://www.oxfam.org/sites/www.oxfam.org/files/oxfam-international-annual-report-2009-2010.pdf) (Accessed June 2023).
- Oxfam. (n.d). Oxfam Annual Report 2021/22. London: Oxfam. Available at:  
[https://www.oxfam.org.uk/documents/639/Oxfam\\_Annual\\_Report\\_and\\_Accounts\\_2021\\_22.pdf](https://www.oxfam.org.uk/documents/639/Oxfam_Annual_Report_and_Accounts_2021_22.pdf) (Accessed May 2023).
- Qu, S. Q., & Dumay, J. (2011). The qualitative research interview. *Qualitative Research in Accounting & Management*, 8(3), 238–264.  
doi:10.1108/11766091111162070
- Røde Kors Norge. (2013). *Årsrapport 2012*. Oslo: Kommunikasjons- og markedsavdelingen i Røde Kors Norge. Available at:  
<https://www.rodekors.no/globalassets/rapporter/arsrapporter-rode-kors/arsrapport-2012.pdf> (Accessed May 2023).
- Røde Kors Norge. (2014). *Årsrapport 2013*. Oslo: Kommunikasjons- og markedsavdelingen i Røde Kors Norge. Available at:  
[https://www.rodekors.no/globalassets/rapporter/arsrapporter-rode-kors/aarsrapport\\_2013\\_web.pdf](https://www.rodekors.no/globalassets/rapporter/arsrapporter-rode-kors/aarsrapport_2013_web.pdf) (Accessed May 2023).
- Røde Kors Norge. (2015). *Årsrapport 2014*. Oslo: Kommunikasjons- og markedsavdelingen i Røde Kors Norge. Available at:  
[https://www.rodekors.no/globalassets/rapporter/arsrapporter-rode-kors/aarsrapport\\_2014\\_web.pdf](https://www.rodekors.no/globalassets/rapporter/arsrapporter-rode-kors/aarsrapport_2014_web.pdf) (Accessed May 2023).
- Pazirandeh, A. and Herlin, H. (2014), “Unfruitful cooperative purchasing: a case of humanitarian purchasing power”, *Journal of Humanitarian Logistics and Supply Chain Management*, Vol. 4 No. 1, pp. 24-42.
- Pazirandeh, A. and Norrman, A. (2014), “An interrelation model of power and purchasing strategies: a study of vaccine purchase for developing countries”, *Journal of Purchasing & Supply Management*, Vol. 20 No. 1, pp. 41-53.
- Peretti, U., Tatham, P., Wu, Y., & Sgarbossa, F. (2015). Reverse logistics in humanitarian operations: challenges and opportunities. *Journal of Humanitarian Logistics and Supply Chain Management*, 5(2), 253-274
- RABTA, B., WANKMÜLLER, C. & REINER, G. 2018. A drone fleet model for lastmile distribution in disaster relief operations. *International Journal of Disaster. Risk Reduction*, 28, 107-112.

- Raillani, H., Hammadi, L., Altimari Samed, M. M., Ballouti, A. E., & Barbu, V. S. (2020). Humanitarian logistics in the disaster relief supply chain: state of the art. *WIT Transactions on Engineering Sciences*, 129, 181-193. <https://doi.org/10.2495/RISK200161>
- Rezaei-Malek, M., Tavakkoli-Moghaddam, R., Zahiri, B., & Bozorgi-Amiri, A. (2016). An interactive approach for designing a robust disaster relief logistics network with perishable commodities. *Computers & Industrial Engineering*, 94, 201-215.
- Rødseth, K. L., Wangsness, P. B. & Klæboe, R. (2017). *Marginal external costs of port operations*. Institute of Transport Economics, ISSN: 0808-1190. Collected from: <https://www.toi.no/getfile.php?mmfileid=46061>
- Sarkis, J., Spens, K.M. and Kovács, G. (2011), A study of barriers to greening the relief supply chain, in Kovács, G. and Spens, K.M. (Eds), *Relief Supply Chain Management for Disasters: Humanitarian, Aid, and Emergency Logistics*, Ch. 11, IGI Global, Hershey, PA, pp. 196-207.
- Sarkis, J., Spens, K.M., & Kovács, G. (2013). A study of barriers to greening the relief supply chain. In *Supply Chain Management: Concepts, Methodologies, Tools, and Applications* (pp. 1407-1417). IGI Global.
- Save the Children (STC). (2010/11), "Results for children". Westport, Connecticut, USA: Save the Children. Available at: [www.savethechildren.org/atf/cf/%7B9def2ebe-10ae-432c-9bd0-df91d2eba74a%7D/RESULTS-FOR-CHILDREN-Q1Q2-2011.PDF](http://www.savethechildren.org/atf/cf/%7B9def2ebe-10ae-432c-9bd0-df91d2eba74a%7D/RESULTS-FOR-CHILDREN-Q1Q2-2011.PDF) (Accessed June 2023).
- Save the Children (STC). (2022). Results for Children, 2021 Annual Report. Washington, DC: Save the Children. Available at: <https://www.savethechildren.org/content/dam/usa/reports/annual-report/annual-report/2021-annual-report/2021-annual-report-results-for-children.pdf> (Accessed May 2023).
- Save the Children International. (2022). Trustees' report, strategic report and financial statements for 2021. London, UK: Save the Children International. Available at: <https://resourcecentre.savethechildren.net/pdf/SCI-Trustees-report-and-financial-statements-2021.pdf> / (Accessed May 2023).
- Schulz, S. F. (2009). Disaster relief logistics: benefits of and impediments to cooperation between humanitarian organizations (Vol. 15). Haupt Verlag AG.
- Shaw, S., Grant, D. B., & Mangan, J. (2010). Developing environmental supply chain performance measures. *Benchmarking: An International Journal*.

- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, 22(2), 63–75.  
doi:10.3233/EFI-2004-22201
- SUZUKI, Y. 2019. Impact of material convergence on last-mile distribution in humanitarian logistics. *International Journal of Production Economics*, 107515.
- Swanson, R.D. and Smith, R.J. (2013), “A path to public-private partnerships: commercial logistics concepts applied to disaster”, *Journal of Business Logistics*, Vol. 34 No. 4, pp. 335-346.
- SHAVARANI, S. M. & VIZVARI, B. 2018. Post-disaster transportation of seriously injured people to hospitals. *Journal of Humanitarian Logistics and Supply Chain Management*, 8, 227-251.
- Thomas, A., and Mizushima, M. (2005). Logistics training: necessity or luxury? *Forced Migration Review* 22: 60-61.
- Trivedi, A., Singh, A. and Chauhan, A. (2015), “Analysis of key factors for waste management in humanitarian response: an interpretive structural modelling approach”, *International Journal of Disaster Risk Reduction*, Vol. 14, pp. 527-535
- Tuomala, V., Kovacs, G., Aminoff, A., & Ely, K. (2022). Waste management and reverse logistics in the humanitarian context
- United Nations (1987). *Our Common Future*. Retrieved September 29, 2022. United Nations. Report of the World Commission on Environment and Development.
- United Nations Children's Fund (UNICEF). (2010), “Annual Report 2010”. New York, USA: UNICEF, Division of Communication. Available at: [www.unicef.org/publications/index\\_58840.html](http://www.unicef.org/publications/index_58840.html) (Accessed June 2023)
- United Nations Children's Fund (UNICEF). (2022). *Supply Annual Report 2021*. Copenhagen, Denmark: UNICEF Supply Division. Available at: [https://www.unicef.org/supply/media/12776/file/Supply\\_Annual\\_Report\\_2021.pdf](https://www.unicef.org/supply/media/12776/file/Supply_Annual_Report_2021.pdf) (Accessed June 2023).
- United Nations Children's Fund (UNICEF). (2022). *UNICEF Annual Report 2021*. New York, USA: UNICEF, Division of Global Communication and Advocacy. Available at: <https://www.unicef.org/media/121251/file/UNICEF%20Annual%20Report%202021.pdf> (Accessed May 2023).



- United Nations Children's Fund (UNICEF). (2022). UNICEF Strategic Plan 2022–2025 Renewed ambition towards 2030. New York, USA: UNICEF Global Communication and Advocacy. Available at: <https://www.unicef.org/media/115646/file/Strategic%20Plan%202022-2025%20publication%20English.pdf> (Accessed June 2023).
- United Nations Office for Disaster Risk Reduction. (2022). Global Assessment Report on Disaster Risk Reduction 2022: Our World at Risk:Transforming Governance for a Resilient Future. <https://www.undrr.org/publication/global-assessment-report-disaster-risk-reduction-2022>
- United Nations Office for the Coordination of Humanitarian Affairs (OCHA). (2010), “OCHA Annual Report 2010”. Geneva, Switzerland: United Nations Office for the Coordination of Humanitarian Affairs (OCHA). Available at: [www.unocha.org/about-us/publications/ocha-annual-report-2010](http://www.unocha.org/about-us/publications/ocha-annual-report-2010) (Accessed May 2023).
- United Nations Office for the Coordination of Humanitarian Affairs (OCHA). (2022). Annual Report 2021. Geneva, Switzerland: United Nations Office for the Coordination of Humanitarian Affairs (OCHA). Available at: [https://2021.annualreport.unocha.org/wp-content/uploads/2022/06/2021OCHA\\_annual\\_report\\_FINAL.pdf](https://2021.annualreport.unocha.org/wp-content/uploads/2022/06/2021OCHA_annual_report_FINAL.pdf) (Accessed May 2023).
- Urban, F., Mitchell, T., & Villanueva, P. S. (2011). Issues at the interface of disaster risk management and low-carbon development. *Climate and Development*, 3(3), 259-279.
- Vachon, S., & Mao, Z. (2008). Linking supply chain strength to sustainable development: a country-level analysis. *Journal of Cleaner Production*, 16(15), 1552-1560.
- Van Fan, Y., Perry, S., Klemeš, J. J., & Lee, C. T. (2018). *A review on air emissions assessment: Transportation*. *Journal of Cleaner Production*, 194, 673-684.
- Van Kempen, E. A., Spiliotopoulou, E., Stojanovski, G., & De Leeuw, S. (2017). Using life cycle sustainability assessment to trade off sourcing strategies for humanitarian relief items. *The International Journal of Life Cycle Assessment*, 22(11), 1718-1730. <https://doi.org/10.1007/s11367-016-1245-z>
- Van Wassenhove, L.N. (2006). Humanitarian aid logistics: Supply chain management in high gear[dagger]. *The Journal of the Operational*

Research Society, 57(5), 475-489.  
doi:<https://doi.org/10.1057/palgrave.jors.2602125>

- Vaillancourt, A. 2017. Procurement consolidation in humanitarian supply chains: a case study. *International Journal of Procurement Management*, 10, 178-193.
- World Food Programme (WFP). (2010). "Annual Report 2010". Rome, Italy: World Food Programme, Division of Communications, Public Policy and Private Partnerships. Available at: [www.wfp.org/content/wfp-annual-report-2010-english](http://www.wfp.org/content/wfp-annual-report-2010-english) (Accessed May 2023).
- World Food Programme (WFP). (2019). WFP Aviation Annual Report 2019. Rome, Italy: World Food Programme. Available at: [https://docs.wfp.org/api/documents/WFP-0000114166/download/?\\_ga=2.242897793.267951932.1681588541-1831639720.1681486698&\\_gac=1.158486216.1681641192.CjwKCAjwue6hBhBVEiwA9YTx8K7CQAMUbE12SES\\_iJ99tOMNainZcGq\\_herIpfQIdY46OKQVLvqR-BoC9FUQAvD\\_BwE](https://docs.wfp.org/api/documents/WFP-0000114166/download/?_ga=2.242897793.267951932.1681588541-1831639720.1681486698&_gac=1.158486216.1681641192.CjwKCAjwue6hBhBVEiwA9YTx8K7CQAMUbE12SES_iJ99tOMNainZcGq_herIpfQIdY46OKQVLvqR-BoC9FUQAvD_BwE) (Accessed May 2023).
- World Food Programme (WFP). (2020). WFP Supply Chain Annual Report 2019. Rome, Italy: World Food Programme, Supply Chain Division. Available at: [https://docs.wfp.org/api/documents/WFP-0000117081/download/?\\_ga=2.179531943.267951932.1681588541-1831639720.1681486698&\\_gac=1.258541176.1681641192.CjwKCAjwue6hBhBVEiwA9YTx8K7CQAMUbE12SES\\_iJ99tOMNainZcGq\\_herIpfQIdY46OKQVLvqR-BoC9FUQAvD\\_BwE](https://docs.wfp.org/api/documents/WFP-0000117081/download/?_ga=2.179531943.267951932.1681588541-1831639720.1681486698&_gac=1.258541176.1681641192.CjwKCAjwue6hBhBVEiwA9YTx8K7CQAMUbE12SES_iJ99tOMNainZcGq_herIpfQIdY46OKQVLvqR-BoC9FUQAvD_BwE) (Accessed May 2023).
- World Food Programme (WFP). (2022). Annual Review 2021. Rome, Italy: World Food Programme. Available at: [https://docs.wfp.org/api/documents/WFP-0000140424/download/?\\_ga=2.67322257.1047053447.1685697377-2079964089.1685697377](https://docs.wfp.org/api/documents/WFP-0000140424/download/?_ga=2.67322257.1047053447.1685697377-2079964089.1685697377) (Accessed May 2023).
- YE, Y., JIAO, W. & YAN, H. 2019. Managing Relief Inventories Responding to Natural Disasters: Gaps Between Practice and Literature. *Production and Operations Management*
- Zarei, M. H., Carrasco-Gallego, R., & Ronchi, S. (2019). To greener pastures: An action research study on the environmental sustainability of humanitarian supply chains. *International Journal of Operations & Production Management*, 39(11), 1193-1225.

## 8.0 Appendices

### *Appendix 1: Search strategy*

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Parameters	Subject terms, synonyms, restrictions
Language	English
Database and search engine	Web of Science, Google Scholar
Keyword / subject area / search terms	Humanitarian Logistics, Humanitarian Supply Chain, Humanitarian, Relief Logistics, Disaster Relief, Eco, Environmental, Sustainability, Sustainable Development, Green, Preparedness, Pre-Disaster
Geographical area	Globally
Literature types	Research articles, Literature review

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*Search string: (Humanitarian Logistics\* OR Humanitarian Supply Chain\*) OR (Humanitarian OR Relief Logistics) AND (Sustainability\* OR Sustainable Development\* OR Environment\* OR Eco\* ) AND (Prepare\*). Parts of the search string are based on search words used in Khan et al., (2022) article.*

## Appendix 2: Mapping of existing literature within the field of HL and environmental sustainability

#	Publication year	Authors	Title	Humanitarian logistics	Pre-disaster assessment	Green environment
1	2019	Zarei, M. H., Carrasco-Gallego, R., & Ronchi, S.	To better prepare: An action research study on the environmental sustainability of humanitarian supply chains			
2	2021	Bossumi, A., Jolani, F., & Elzorgi-Amiri, A.	Designing a sustainable humanitarian relief logistics model in pre- and post-disaster management			
3	2019	Chiappetta Jabbur, C. J., Sobrero, V. A., Lopes de Sousa Campos, L. M., Minimo, E. B., & Renwick, D. W. S.	An analysis of the literature on humanitarian logistics and supply chain management: paving the way for future studies			
4	2020	Bag, S., Lathin, S., Venkatesh, V. G., & Yadav, G.	Towards understanding key enablers to green humanitarian supply chain management practices			
5	2023	Sani, S.	Enhancing the environmental sustainability of emergency humanitarian medical cold chains with renewable energy sources			
6	2022	Corbett, C. J., Pedraza-Martinez, A. J., & Van Wassenhove, L. N.	Sustainable humanitarian operations: An integrated perspective			
7	2008	Balek, B., & Beamon, B. M.	Facility location in humanitarian aid			
8	2021	Logistics deire	The WREC Project: Environmental Sustainability in Humanitarian Logistics, October 2021			
9	2022	Toomala, V., Kovacs, G., Aminoff, A., & Ely, K.	Waste management and Reverse Logistics in the Humanitarian Context, September 2022			
10	2016	Dibey, R., & Grunskamm, A.	The sustainable humanitarian supply chain design: agility, adaptability and alignment			
11	2017	Kunz, N., & Gold, S.	Sustainable humanitarian supply chain management – exploring new theory			
12	2022	Zarei, M. H.	Managing medical waste in humanitarian supply chains: lessons for healthcare services			
13	2019	Behl, A., & Datta, P.	Humanitarian supply chain management: a thematic literature review and future directions of research			
14	2014	Huotiso, L., & Kovacs, G.	Perspectives on sustainability in humanitarian supply chains			
15	2020	Klana, K. B.	Measuring environmental impact in humanitarian operations: A case study of an emergency response unit for water treatment and supply from a life cycle perspective			
16	2018	Hinzpeter, K., & Sandholz, S.	Squaring the circle? Integrating environment, infrastructure and risk reduction in Post Disaster Needs Assessments			
17	2013	Fawcett, A. M., & Fawcett, S. E.	Benchmarking the state of humanitarian aid and disaster relief: A systems design perspective and research agenda			
18	2011	Eng-Larsson, F., & Vega, D.	Green Logistics in Temporary Organizations: A Paradox? Learnings from the Humanitarian Context			
19	2006	Van Wassenhove, L. N.	Humanitarian aid logistics: supply chain management in high gear			
20	2021	Feng, Y., & Cui, S.	A review of emergency response in disasters: present and future perspectives			
21	2021	Yilgor Samlioglu, L., Corlis, C. E., & Roy, P. A.	Humanitarian logistics and emergency management: New perspectives to a socio-technical problem and its optimization approach management			
22	2011	Urban, F., Mitchell, T., & Villanueva, P. S.	Issues at the interface of disaster risk management and low carbon development			
23	2011	Lisiri, A., Hiseck, D., & Pirantoni, K.	Opportunity from Catastrophe: A Strategic Approach to Sustainability through Pre-Disaster Recovery Planning (PreDRP)			
24	2020	Makromat, D., & Park, Y.	How ESG Impacted the COVID-19 Response – and Vice Versa			
25	2022	De Silva, A., Anuranga, D., & Hajar, R.	Green and Blue Infrastructure as Nature-Based Resilience Solutions for Disaster Risk Reduction: Key Policy Aspects			
26	2010	Urban, F., Mitchell, T., & Silva Villanueva, P.	Greening disaster risk management: issues at the interface of disaster risk management and low carbon development.			
27	2019	Aligiani, S.	Logistics management in disaster			
28	2016	Goldschmidt, K. H., & Kumar, S.	Humanitarian operations and crisis/disaster management: A retrospective review of the literature and framework for development			
29	2022	Headly, G., & Tatham, P.	From preparedness to partnership: case study research on humanitarian logistics			
30	2009	Tomanin, R. M., & Van Wassenhove, L. N.	Humanitarian aid distribution logistics with accessibility constraints: a systematic literature review			
31	2023	Rojas Tregos, C. A., Mased, J. D., & Adarme Jimenez, W.	Sustainable green supply chain management and impact on organisations			
32	2016	Rahim, S. A., Fernando, Y., & Saad, R.	Supply chain sustainability: learning from the COVID-19 pandemic			
33	2008	Seuring, S., & Müller, M.	Humanitarian aid: an agile supply chain?			
34	2020	Sarkis, J.	The sustainable agenda and energy efficiency: Logistics solutions and supply chains in times of climate change			
35	2006	Olorinbo, R., & Oniyi, R.	The Coasts of Feeding Humanitarian Aid			
36	2010	Halderson, A., & Kovacs, G.	Research trends in humanitarian logistics and sustainable development: A bibliometric analysis			
37	2018	Guthrie, O., & Lathin, G.	A study of Barriers to Greening the relief supply chain			
38	2022	Khan, M., Perutz, G. S., Tóthvári Dethanov, A., Iqbal, M., & Jughan, B.	Trends and developments in humanitarian logistics – a gap analysis			
39	2013	Sarkis, J., Spens, K. M., & Kovacs, G.	Defining logistics preparedness: a framework and research agenda			
40	2011	Kovacs, G., & Spens, K. M.	Supply Chain Strategies in Humanitarian Logistics: A Review of how Actors Mitigate Supply Chain Risks			
41	2016	Jahre, M., Patramahesh, A., & Van Wassenhove, L.	Localisation of Logistics Preparedness in International Humanitarian Organisations			
42	2017	Jahre, M.	Coordination at the 10-year mark of the HLSCM from global response to local preparedness			
43	2021	Fremontson, L., Kembro, J., de Vries, H., Van Wassenhove, L., & Jahre, M.				
44	2021	Jahre, M., & Jansen, L. M.				

### *Appendix 3: Interview guide*

General talking points for these interviews include:

#### Environmental sustainability

1. What is your perception of the focus on environmental sustainability in the organization? Is it a major concern for the employees? (Is it anchored in the strategy?)
2. How do you work to reduce the environmental impact of disaster relief operations?
3. Before a disaster strikes, how do you work to reduce the environmental impact?
4. Do you measure your environmental sustainability performance? If so, which measure do you use?
5. What is the organization's estimated footprint? (CO2 emissions?)

#### Logistics operations

6. Is environmental sustainability important when selecting suppliers? How is it weighted against other factors such as costs, quality, risk, and delivery?
7. Is environmental sustainability important when selecting transportation modes?
8. Is environmental sustainability important when it comes to the product design of relief items?
9. Is environmental sustainability important when it comes to prepositioning relief items (warehousing)?
10. In your opinion, what actions can the industry take to decrease waste? Who should be made responsible?

We also included organizational specific questions about environmental initiatives/projects.

**Appendix 4: Content analysis of environmental sustainability related keywords  
in humanitarian organization's annual reports**

Organisation name	Year	Sustainability/Sustainable	Environment/Environmental*	Emissions* - Greenhouse gas emissions - CO <sub>2</sub> / Carbon - Footprint	Pollution*	Climate*	Green/Greener	
Norwegian Red Cross	2021	10	6	8	0	23	2	
	2020	0	3	5	0	13	1	
	2019	0	2	0	1	16	0	
	2018	1	3	0	1	6	0	
	2017	2	2	0	1	1	0	
	2016	3	2	0	1	1	0	
	2015	2	2	2	1	1	0	
	2014	2	2	1	1	5	0	
	2013	2	2	1	1	2	0	
	2012	2	1	2	1	4	0	
	Norwegian Refugee Council	2021	6	18	7	0	18	8
		2020	2	11	4	0	3	5
2019		6	9	1	0	5	4	
2018		1	2	0	0	4	0	
2017		2	2	0	0	2	0	
2016		0	2	0	0	7	0	
2015		1	2	0	1	3	0	
2014		0	1	0	1	1	0	
2013		1	1	0	0	6	0	
2012		1	1	0	0	2	0	
Norwegian Church Aid		2021	14	8	7	1	21	0
		2020	12	5	5	0	16	1
	2016-2019	34	6	2	0	49	0	
	2015	40	7	2	0	112	0	
	2014	-	-	-	-	-	-	
	2013	33	9	2	4	89	0	
	2012	45	8	2	1	75	0	

\*Environment/Environmental = search results related to the external environment

\*Emission = search results related to greenhouse gas emissions

\*Climate = search results related to climate change/crisis

**Appendix 5: Content analysis of humanitarian organization's annual reports based on Haavisto and Kovács (2014)**

Organization Year	WFP		UNICEF		OCHA		OXFAM		MSF		STC		Total	
	2010*	2021	2010*	2021	2010*	2021	2010*	2021	2010*	2021	2010*	2021	2010*	2021
<i>Keyword</i>														
Sustainability*	1	4	7	2	3	20	4	2	0	1	17	32		
Climate change	0	6	2	10	12	10	0	2	0	1	43	38		
Preparedness	4	0	5	96	12	1	3	6	5	0	114	20		
Green	4	1	0	0	0	4	0	1	0	0	5	6		
Local	14	7	22	35	58	45	45	62	12	4	139	177		
Programme impact	0	0	0	0	0	0	0	0	0	0	0	0		

*\*From Haavisto and Kovács (2014)*

**Appendix 6: Project plan**

