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Human rights for refugees: enhancing sustainable humanitarian supply chain to guarantee a health environment in refugee settlements

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Abstract

Purpose – Despite global efforts for environmental protection, there is a gap in the literature about the contributions of a sustainable humanitarian supply chain (SHSC) to the promotion of human rights in refugee settlements. In this context, this study investigates how the generation of sustainability in the humanitarian supply chain (HSC) acts as an instrument for guaranteeing the human rights for refugees.

Design/methodology/approach – A literature review was conducted to identify the state of the art and research challenges as well as an analysis of international law documents related to refugees, international human rights law and environmental protection, and a critical study of sustainable initiatives already taken by international organizations and humanitarian agencies in refugee camps.

Findings – As a result, ensuring human rights in refugee camps is directly related to the development of a SHSC that contributes without deviation to the enjoyment and exercise of human rights by preserving the local environment.

Originality/value – This study offers a literature review and discusses the generation of sustainability in refugee camps and its relationship with human rights protected by rules of international law. Aspects such as the circular humanitarian supply chain are for the first time discussed, introducing the circular economy to refugee settlements.

Keywords Humanitarian supply chain, Humanitarian logistics, Sustainability, Human rights, Refugee

Paper type Research paper

1. Introduction

The Humanitarian Assistance Report of 2003 (IFRC, 2003, pp. 3–4) defines the situations where humanitarian operations are needed. The term "disaster" means calamitous situations, which can endanger life, health, physical integrity or the right not to be subjected to cruel, inhuman or degrading treatment, or other fundamental human rights or a population's essential needs. It can result from natural origin (such as earthquakes, volcanic eruptions, windstorms, torrential rains, floods, landslides, droughts, fires, famine and epidemics), man-made disasters of technological origin (such as chemical disasters or nuclear explosions)

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or armed conflicts or violence (such as international or internal armed conflicts, internal disturbances or violence, terrorist activities).

In many documents, such as the "Global Strategy for Sustainable Energy," the "UNHCR Environmental Guidelines" and "Refugee Operations and Environmental Management", it is possible to verify that the United Nations High Commissioner for Refugees (UNHCR) recognizes the environmental impacts of refugee settlement and daily activities on the local environment and natural resources. It is crucial to implement sustainable strategies in order to sustain the local environment and natural resources for current populations and future generations. Humanitarian agencies and UNHCR are committed to preventing, mitigating and finding alternative solutions to the refugee-related impacts on the environment, which requires the integration of sustainable management practices into all stages of refugee operations. In this context, there is a connection between ensuring the basic human rights of refugees and the implementation of a sustainable humanitarian supply chain (SHSC) in refugee-related humanitarian operations.

In this context, humanitarian logistics and supply chain has obtained increasing attention in scientific research (Kovács and Spens, 2011), and humanitarian supply chains (HSCs) can contribute to agile responses in humanitarian disaster relief operations, primarily by making humanitarian organizations' responses more effective through the incorporation of sustainable practices in all their dimensions – social, economic and environmental. However, incorporating sustainability into the HSC is still a challenge, and the literature on green or sustainable humanitarian logistics is incipient (Jilani *et al.*, 2018; Kunz and Gold, 2017; Salvadó *et al.*, 2019).

This research aims at investigating how the generation of sustainability in the HSC can be an instrument for ensuring the human rights of refugees. To do so, a literature review was conducted to identify the state of the art related to the subject, as well as an analysis of international legal documents related to refugee rights, human rights and environmental protection, and a critical study of sustainable initiatives already taken by international agencies and organizations in refugee settlements.

Due to the interdisciplinary nature of this research, the methodology we adopted here was related to both the environmental legal sciences and business and management, also doing a literature review on SCOPUS and Web of Science databases. Thus, we also have made a bibliographical research in books and articles related to International Environmental Law, International Refugee Law and Human Rights, combined with a search in the database of the United Nations (UN) for treaties, declarations, conventions and resolutions related to human rights, sustainability, environment and refugees. Finally, we analyzed the operation's reports, strategies and guidelines summarized by many international agencies and organizations. The main works hereby analyzed are the research of Saidan *et al.* (2017) on solid waste composition and recycling at Zaatari Refugee Camp; Bellanca (2014), a research on sustainable energy provision among displaced populations; Elzarov (2018), about the protection of the environment and women in Darfur refugee camp; and the research conducted by Van der Helm *et al.* (2017) on sustainability in Zaatari Camp in Jordan. The most relevant repports are: the Toolkit about the evaluation of the environment in refugee-related operations from CARE and UNHCR (2009), IRENA (2019) a report about sustainable energy access in refugee settlements; and the report from Oxfam (2017) about turning waste into work in Zaatari refugee camp.

This research provides a holistic and critical view of current international regulations regarding the adoption of sustainable practices in the HSC, specifically in refugee camps. Through this research, we intend to emphasize the initiatives and practices already implemented for the protection of the environment combined with the promotion of human rights in humanitarian aid and also in the structuring of refugee camps. Given the scarcity of natural resources and the vulnerability of the refugee camp population, this research also contributes to the improvement of the quality of life and the sustainable management of available natural resources.

The article is structured into five sections. The first presents the research method adopted. The results and discussions are then described and divided according to the three specific research questions, in the second, third and fourth sections of this research: What is the international legal perspective on how to guarantee a healthy and sustainable environment in refugee camps? What are the operations and plans of international agencies to promote sustainability in refugee camps to ensure basic human rights? How do SHSCs build sustainability in refugee camps? The last section summarizes the findings, giving a general conclusion for the research questions.

The first review question seeks to analyze the main international legal documents that have a connection with international refugee law, human rights and environmental protection to build a dialogue between the possibilities of implementing sustainable practices in refugee camps while ensuring basic human rights. The second question aims to identify the documents, operations and strategies taken by international agencies and organizations in promoting sustainability in refugee camps to guarantee basic human rights at the same time as sustainable use of natural resources and preservation of the local environment. Finally, the third intends to evaluate and describe the sustainable humanitarian supply chain, associating its practices with the enhancing of sustainability and human rights.

2. Methodology

In order to explore and describe how the generation of sustainability in the HSC can be an instrument to guarantee human rights for refugees, with a focus on examining practices in a refugee camp context, this study can be characterized as an exploratory descriptive study.

According to Moher *et al.* (2015), systematic reviews should have a protocol that describes the planned methods, foundations and hypotheses adopted for the review. However, even with its remarkable importance, few reviews have well-written, established and detailed protocols that facilitate the evaluation of review methods. The protocol of this study (Table 1) follows orientations of Tranfield *et al.* (2004, 2003), Jesson *et al.* (2011), Wilding *et al.* (2012), Thomé *et al.* (2016) and Karl *et al.* (2018), which follow five steps and describe all the base details.

2.1 Question formulation

Aiming to explore the generation of sustainability in the HSC as an instrument to guarantee the human rights of refugees, we formulated three review questions: What is the international legal perspective to guarantee a healthy and sustainable environment in refugee camps? What are

Steps	Details
Question formulation	-Development of review questions to achieve the study objective
Locating studies	-Develop search queries -Search on databases: ISI Web of Science and Scopus
Study selection and evaluation	-1st selection: title, abstract and choice of keywords -2nd selection: introduction, conclusion and search for the content of the articles -3rd selection: reading and evaluation of the complete articles evaluating four main points: quality of the journal, accessibility, theoretical-empirical content and unit of analysis
Analysis and synthesis	-Meticulous reading of all selected articles -Analysis of the content of the selected articles, observing the environmental performance indicators and initiatives related to humanitarian logistics -Content analysis of the selected papers by observing data
Results presentation	-Answer the review questions based on literature -Critical analysis from the findings

Table 1.
SLR protocol

the operations and plans of international agencies and organizations to promote sustainability in refugee camps to ensure basic human rights? How do SHSCs build sustainability in refugee camps?

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2.2 Locating studies

Based on the review questions established, we listed keywords to build search queries (Table 2). To do so, searches were made in Scopus and Web of Science. According to Jabbour *et al.* (2019), the Scopus database was chosen because it provides a good basis for the numbers and results obtained; in addition, it compiles data on summaries and quotations from scientific journals,

Constructs	Keywords	Search queries
Sustainable humanitarian supply chain	Sustainable humanitarian supply chain Sustainability in humanitarian supply chain Sustainable humanitarian supply chain management Sustainable humanitarian organizations Sustainable humanitarian logistics Sustainable disaster supply chain Sustainable last-mile rescue network Green humanitarian supply chain Circular humanitarian supply chain	((Sustainable) OR (sustainability) OR (green) OR (environment) OR (circular)) AND humanitarian AND (supply chain* OR logistic*)
Refugee and human rights	Refugee camps Refugee settlements Human rights	(Refugee AND (camp* OR settlement*) AND (human rights))
Sustainable humanitarian supply chain and human rights for refugees	Sustainable humanitarian supply chain Sustainability in humanitarian supply chain Sustainable humanitarian supply chain management Sustainable humanitarian organizations Sustainable humanitarian logistics Sustainable disaster supply chain Sustainable last-mile rescue network Green humanitarian supply chain Circular humanitarian supply chain Refugee camps Refugee settlements Human rights	((Sustainable) OR (sustainability) OR (green) OR (environment) OR (circular)) AND humanitarian AND (supply chain* OR logistic*) AND (refugee AND (camp* OR settlement*) AND (human rights))

Table 2.
Search parameters

books and conferences proceedings from 14 of the world's largest publishers. The database Web of Science was selected because of its powerful database that offers different research and navigation options, including more than 10,000 scientific journals, in addition to comprising seven different citation databases, including information collected from journals, conferences, reports and books (López-Illescas *et al.*, 2008; Aghaei Chadegani *et al.*, 2013).

2.3 Search strategy and selection criteria

We conducted a systematic review to identify all studies that investigate SHSCs and human rights for refugees. We made the review in consonance with the PRISMA statement methodology, selecting studies following four steps: *identification* (records identified through database searching and records after duplicates removed), *screening* (records screened according to their title and abstract), *eligibility* (full-text articles assessed for eligibility) and *included* (total studies included in qualitative synthesis).

The selection and evaluation of studies began in the first selection, with the reading of the title, abstract and keywords; second selection: introduction, conclusion and search for the content of the articles; 3rd selection: complete reading of the articles evaluating the quality of the journal, accessibility, theoretical-empirical content and unit of analysis. Thus, the analysis and synthesis were conducted, with a thorough reading of the articles, observing sustainability in the HSC as an instrument to guarantee the human rights of refugees. Finally, the results were presented, with the elaboration of answers to the review questions and critical analysis of sustainable practices.

To answer the first and second research questions, that is, to identify the relationship between guaranteeing the basic conditions inherent to the human being in refugee camps and protecting the environment with sustainable practices in the HSC, due to the interdisciplinary nature of this research, the methodology adopted here has been more strongly related to the legal sciences. Thus, a bibliographical research was made in books and articles related to International Environmental Law, International Refugee Law and Human Rights, as well as search in the database of the United Nations (UN) for treaties, declarations, conventions and resolutions related to human rights, sustainability, environment and refugees. Finally, we analyzed the operation's reports, strategies and guidelines summarized by many international agencies and organizations, such as IFRC, OXFAM, CARE, Norwegian Refugee Council (NRC), OCHA and UNHCR.

2.4 Data extraction and quality assessment

We searched Scopus and Web of Science for peer-reviewed articles published without a temporal limitation. The following inclusion criteria were applied: the study had to examine human rights for refugees and include environmental aspects of the HSC that support the human rights.

In the selection and evaluation of the study, the articles were searched in the proposed databases. For the Scopus database, the research was limited to the final publication stage, type of source journal, the language of the articles in English, besides the chosen thematic areas: business, management and accounting, decision sciences, engineering, computer science, social sciences, environmental science, economics, econometrics and finance, energy, agricultural and biological sciences and arts and humanities, areas that have a direct or indirect relationship in their publications with the proposed theme, helping to answer the proposed review questions. In the initial search, 542 documents were found, which after the first selection resulted in 49 articles; afterward, 29 articles in the second selection and 23 articles in the third selection. For the Web of Science database, other filters were applied because of the different parameters offered by the database, such as type of document article and English language, besides excluding from the categories of base nutrition dietetics and

general internal medicine because they have no relation with the object of study. Thus, 250 articles were identified: 27 applying the first selection, 18 in the second selection, and 9 articles in the third selection. To sum up, 32 articles resulted from the analyses in the two databases, which, in turn, were inserted in the Mendeley software, and the duplicates were eliminated, totaling 31 articles to support the proposed review questions.

Besides the 31 articles, through research on the United Nations database on refugee operations, a total of 9 reports and 4 resolutions were found. Also, regarding the legal sources, the UN Convention relating to the Status of Refugees of 1951 and the protocol relating to the Status of Refugees of 1967, Stockholm Declaration of June 1972 and the Rio Declaration of June 1992 were also found.

3. International legal perspectives on building a healthy and sustainable environment within refugee settlements

International Refugee Law provides a way of securing basic human rights for migrants. Its normative frameworks are the UN Convention relating to the Status of Refugees of 1951 and the protocol relating to the Status of Refugees of 1967.

The activities of the UNHCR also began in 1951 intending to help refugees from Second World War. Later, with the permanence of the activities of the UNHCR, the populations under its mandate were expanded to refugees, asylum seekers, internally displaced persons, stateless persons and returnees. With the removal of temporal and geographical barriers in the 1967 Protocol, the definition of refugee became a person who

> owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it (UNHCR, 2010).

As durable solutions to refugee problems, the UNHCR helps those who wish to return home (voluntary repatriation) or assist their reintegration into their communities. However, if these options are not feasible, the UNHCR works to settle refugees within the region (local settlement). The last option is provided for those who can neither return to their country of origin nor safely remain in their country of refuge is country resettlement. This is becoming more difficult since states are resistant to housing refugees. For Gibney (2010, p. 8), it is important to mention that the Refugee Convention does not provide individuals with the possibility of challenging their treatment, nor has UNHCR the authority to adjudicate individual claims.

There are some specific refugee rights such as non-refoulement (Article 33), freedom from being punished because of unlawful entry in the receiving state (Article 31), the practice of a liberal profession (Article 18), freedom of movement (Article 26) and expulsion (Article 32). Once the refugees have legal residency in a country's territory, they are entitled to additional rights including freedom of association (Article 15), the right to engage in wage-earning employment and to practice a profession (Article 17) and the right to access to housing (Article 21).

As Gibney (2010, p. 27) stresses out, "the Refugee Convention serves as the primary means of ensuring human rights protection for refugees," but refugees are also entitled to human rights stipulated in other treaties, such as the International Covenant on Economic, Social and Cultural Rights, which, if state party denials it, can be understood as a violation of an international human rights law.

Jacobson (1988, pp. 257–258) points out the attention for a new kind of refugees: those who are fleeing from environmental degradation – the environmental refugees. Since some areas around the world become unfit for human habitation, such as what has happened because of

the nuclear explosion in Chernobyl in 1986 that left back more than 10,000 former residents who needed to leave their homes. Those "unnatural disasters" provoked by human interference in the environment, as Jacobson (1988) pointed out, create a new and huge class of displaced persons.

Nowadays, researchers all over the globe are giving new names for those who leave their homes because of an environmental disaster, calling them "environmental refugees" (Bates, 2002; Myers, 1997) or "climate refugees" (Biermann and Boas, 2008). However, those terms are not endorsed by UNHCR, which recommends using the expression "persons displaced in the context of disasters and climate change" (Goodwin-Gill and McAdam, 2017). Currently, as noted by Behrman (2019), those kinds of migrants are not under the protection of the refugee law regime, nor under any other current international legal instrument.

According to the Agenda for the Protection of Cross-Border Displaced Persons in the Context of Disasters and Climate Change of 2015 (Persons, 2015), by Nansen initiative on disaster-induced cross-border displacement, between 2008 and 2014, 184.4 million people were displaced by sudden-onset disasters, while other displacement's causes are related to sea-level rise, desertification or environmental degradation.

In terms of disasters, the humanitarian organizations (Persons, 2015; Goodwin-Gill and McAdam, 2017; Behrman and Kent, 2018) point out sudden-onset disaster situations and slow-onset natural hazards. Although sudden-onset disasters can be the main cause for people's displacement, once one talks about refugees' situation in their settlement, it is possible to analyze the risk of slow-onset natural hazards, which are more challenging because immediate impacts on the environment are not present. Most refugee camps suffer from the interaction between environmental degradation, natural hazards, climate change, the effects of food and water insufficiency, as well as desertification. In this framework, it is possible to make a connection between the effectiveness of international human rights and the global agenda for environmental protection, in this case, concerning refugee camps.

3.1 The global agenda for environmental protection and its relation to human rights for refugees

The global agenda for environmental protection has as legal frameworks the Stockholm Declaration of June 1972, which sought to insert environmental protection as a prerequisite for the enjoyment and exercise of human rights; and the Rio Declaration of June 1992, which reaffirmed countries' commitment to a healthy environment as one of the pillars of human rights.

Following the World Commission on Environment and Development (Brundtland, 1987; UNHCR, 2017), sustainable development "meets the needs of the present generations without compromising the ability of future generations to meet their own needs," so it is directly related to refugee activities since they have an impact on the local and regional environment. Deforestation, desertification, soil erosion and salinization affect significantly the natural environment and quality of life; thus, the UNHCR must keep track of refugee-related operations, so that the natural resources would not be jeopardized for future generations.

UN Human Rights Council Resolution 10/4 of March 25, 2009 (UN, 2009) highlighted that the impacts related to climate change have direct and indirect implications for the effective enjoyment of human rights, especially the right to life, the right to adequate food, the right to health, the right to adequate housing and all human rights related to access to safe water and sanitation, therefore opening space for ideas that seek, at the same time, sustainable results and the guarantee of human rights.

At the United Nations Summit on Sustainable Development 2015 (UN, 2015a, b), 193 UN member states met to define the 17 goals and 169 targets for sustainable development in the document called Transforming our World: The 2030 Agenda for Sustainable Development (UN, 2015a, b). According to the document, among the various goals is the encouragement of international cooperation to strengthen the resilience of refugee host communities, as well as promoting awareness of conservation and sustainable use of natural resources. From this perspective, initiatives linked to the preservation of the environment and natural resources are also related to the development of humanitarian assistance to refugees.

Under Resolution 70/1 adopted by the UN General Assembly on September 25, 2015 (UN, 2015a, b) on the 2030 agenda for sustainable development, recognition of migrants' contribution to the growth and sustainable development is essential. In this regard, the UN has declared its cooperation to ensure safe, orderly and regular migration that fully respects human rights and the humane treatment of migrants, refugees and displaced persons.

The degradation of the environment, as well as slow-onset natural hazards, can greatly increase the poor living situation of refugees, especially health issues, which compromise basic human rights such as the right to a standard of living adequate for health and well-being. Even though the Universal Declaration of Human Rights does not include the right to living on a healthy planet nor the need of preserving the environment as a human basic right, the United Nations position seen in all of the treaties, protocols, declarations and conventions here analyzed, exhibits a pattern of concern about environmental issues.

As Hargreaves *et al.* (2020) highlighted, the migrants in general usually "live in precarious conditions, and face barriers to accessing public health and social services in the countries in which they reside," and those conditions affect directly their hygiene and health sphere and might facilitate spreading diseases such as the COVID-19 pandemic.

For instance, Bellanca (2014) emphasizes that energy issues, in the beginning, were considered part of environmental concern, but soon they have been incorporated into global humanitarian responses. In the case of displaced populations, since their settlements often have limited natural and human resources, it is extremely relevant to seek sustainable energy solutions.

For this reason, in 1996, the UNHCR published the first Environmental Guidelines (the latest version is from 2005), considering that the environmental impacts of humanitarian operations regarding refugees are increasingly being recognized and addressed from all stages of operations (UNHCR, 2005). Those guidelines demonstrate a global engagement of the UNHCR on integrating environmental matters, especially because it recognizes that UNHCR has been successful in its general objective of giving humanitarian assistance for refugees, but it also has brought negative environmental impacts which have a direct bearing on the welfare and well-being of people living in those settlements (UNHCR, 2005).

The best environmental practices related to refugee operations were documented on UNHCR Handbook of Selected Lessons Learned from the Field: Refugee Operations and Environmental Management (UNHCR, 2002), from 1998 and revised in 2002, a book from the project TSEMPRAA – Towards Sustainable Environmental Management Practices in Refugee-Affected Areas, which was financed by the governments of Japan, the Netherlands and the USA. Large-scale movements of displaced persons create a challenge for the international agencies and organizations: at the same time, there is a need to safeguard the well-being of refugees and to implement strategies that will not harm the local environment, or, at least, not cause more damage and neither expend natural resources.

CARE International and UNHCR (2009) in 2001 started the project Framework for Assessing, Monitoring, and Evaluating the Environment in Refugee-related Operations (FRAME), aiming at looking into the issues of environmental assessment, monitoring and evaluation during humanitarian operations. The projects begin recognizing the environmental impact of humanitarian relief activities on refugees and the local community, also emphasizing

that it can turn into a conflict due to the high demand for natural resources in vulnerable regions. It is possible to see that environmental mainstreaming, that is, the "integration of environmental interests and concerns into the culture and activities of refugee operations (UNHCR, 2002, p. 5)," has become a stated policy on UNHCR humanitarian refugee-related operations. Also, for the IFRC, sustainable energy solutions in programs and operations is one of the principles that guide IFRC policy on humanitarian aid (IFRC, 2019).

Another great program established in 2004 was the Camp Management Toolkit (NRC, 2004) applicable to camps for refugees and internally displaced persons. The second edition involved a group of organizations such as the Danish Refugee Council (DRC), International Rescue Committee (IRC), International Organization for Migration (IOM), Norwegian Refugee Council (NRC), UN Refugee Agency (UNHCR) and Office for the Coordination of Humanitarian Affairs (OCHA). The Camp Management Toolkit is actively used in operations and its latest edition is from 2015. This guideline complements others, for example, the Sphere Project's Humanitarian Charter and Minimum Standards in Disaster Response (Sphere, 2011) and the UN Refugee Agency's UNHCR Handbook for Emergencies.

The sustainable use and protection of natural resources directly affect the livelihood of camp residents as well as the local community, which is the reason why environmental matters need to be considered in a camp operation since its establishment. According to the Toolkit, "camps are part of a broader humanitarian context with a significant impact on the environment, often stretching the capacities of host communities, natural resources, and infrastructure to the limits (IOM, NRC, UNHCR and CCCM, 2015, p. 31)," and because of that, it is extremely important to take measures to mitigate impacts of environmental degradation. The main impacts on the environment mentioned by the Toolkit are soil erosion, loss of natural vegetation cover, ground water pollution and soil contamination.

According to Neves *et al.* (2021), usually, in long-term emergency operations such as refugee camps, humanitarian aid faces logistical and budgetary limitations that, in consequence, end in the use of standardized fossil-dependent solutions. Thus, though a multidisciplinary methodology aimed at sustainability, the implementation of hybrid renewable energy systems in refugee camps is viable.

In 2007, the Inter-Agency Standing Committee (IASC), the UN Refugee Agency (UNHCR), the World Food Programme (WFP) and the Women's Refugee Commission (WRC) launched the Task Force on Safe Access to Firewood and Alternative Energy in Humanitarian Settings (SAFE, 2007), aiming, among other objectives, at promoting safe access to energy and reduce environmental impacts. The concerns are not only about the environment but also about the safety and dignity of women in SAFE's purposes (SAFE, 2013). According to the edition from 2013, fuel-efficient stoves and alternative cooking fuel solutions help to protect women from the risk of rape and violence during the collection of firewood (SAFE, 2013). Also, those alternative sources of energy reduce dramatically the indoor air pollution from burning solid fuel, protecting the health of the families.

Frequently, the refugee camps are set up in pour regions where access to natural resources, infrastructure and energy is limited (Neves *et al.*, 2021). Because of this scenario, the authors suggest the production of biogas, using human waste as a resource for the population of refugees in a camp. Besides the economical attractiveness of hybrid renewable energy systems for humanitarian purposes, most humanitarian agencies are reluctant to be associated with the private sector to generate the technology and financial support needed (Neves *et al.*, 2021).

It is also relevant to mention the project Greening the Blue Helmets: Environment, Natural Resources, and UN Peacekeeping Operations, from 2012, whose objective is to find out solutions to reduce the environmental impact of UN peacekeeping operations starting from pre-deployment planning (UNEP, 2012). "The construction of UN peacekeeping compounds and bases can create a high demand for some natural resources leading to environmental

degradation or pollution (UNEP, 2012, p. 21)," so, a positive solution is, for example, to replace the bricks with soil blocks, which is less impactful on the environment.

In 2014, UNHCR published the Global Strategy for Safe Access to Fuel and Energy (SAFE): A UNHCR Strategy, 2014–2018 (UNHCR, 2014), which has sustainability as one of its guiding principles. Essentially, it intends to enable refugees to meet their energy needs by safe and sustainable means while ensuring the basic human rights through the "protection" principle:

> Safe and sustainable access to energy is increasingly being acknowledged as a basic necessity in supporting the enjoyment of rights associated with protection, education, safety, health, nutrition, WASH, food, and livelihoods. Energy programs will aim to further respect human rights as outlined in the Universal Declaration of Human Rights, the International Covenant on Economic, Social, and Cultural Rights, and the 1951 Convention relating to the Status of Refugees. (UNHCR, 2014, p. 19)

In humanitarian situations, having access to a sustainable source of energy improves health and fosters a safe environment for refugees, mostly for women and children, who are often exposed to multiple health and safety risks when collecting or purchasing firewood. Therefore, refugee-related humanitarian operations must search for sustainable energy solutions to improve the well-being and protection of refugees.

In the UNHCR Strategy 2019–2024 (UNHCR, 2019), the main purpose is to increase the sustainable use of renewable energy sources to minimize environmental impact while promoting refugees' well-being. By recognizing that having access to safe and sustainable energy is a basic human need, especially for refugees and other displaced persons, the UNHCR assumes the responsibility, between 2019 and 2024, to promote access to sustainable, safe and affordable household cooking energy and expand sustainable household electrification.

Recently, the International Renewable Energy Agency (IRENA, 2019) developed a project in 2019 aiming at sustainable energy resources for four refugee settlements in Iraq where they have polluting diesel generators, and in Ethiopia where there is a lack of reliable access to electric lighting. Standalone solar systems with battery banks, large solar parks and solar mini-grids are the proposed sustainable solutions for those settlements, also meeting the UN Sustainable Development Goals.

Based on the strategies and regulations mentioned in this chapter, there is a growing concern on how to combine environmental, social and economic matters on refugee settlements, especially due to the international legal perspective of guaranteeing the basic human rights for refugees. Since the 1951 Convention, treaties regarding environmental issues and the concern on how to promote sustainable development, many projects started to be developed on humanitarian operations to seek sustainable solutions to the environmental problems faced on refugee settlements.

4. Sustainable practices in refugee camps and basic human rights: general overview of UNHCR and international humanitarian agencies projects

In order to analyze the operations and plans of international humanitarian agencies to promote sustainability in refugee camps, and thus ensuring basic human rights, the case of Darfur and Zaatari refugee settlements, two of the biggest in the world, can be taken as examples of how to generate sustainability in refugee camps.

The ethnic conflict between 2002 and 2004 in the Darfur region of Sudan caused the forced displacement of 1.6 million people who were sheltered in 60 temporary camps (OCHA, 2018). In addition to the direct impacts on the displaced and refugees, the overcrowding of these camps made the local environment more sensitive, which already had scarce environmental resources and was one of the causes of the armed conflict.

According to the environmental assessment made by the Joint UNEP/OCHA Environment Unit in 2004, the local environmental impacts were already expected, but serious problems were detected related to water and waste management, mainly because refugee populations can contribute to soil erosion and deforestation. Due to the intense flow of people, impacts on natural resource conditions, which were already bad, were also expected. According to the document, "in the case of refugees, the UNHCR recognizes that environmental considerations must be integrated into operations and planning to ensure both environmental quality and the well-being of human populations (Kelly, 2004, p. 4)."

Among the measures recommended to reduce the environmental impacts of the Darfur crisis are improved security and sustainability of natural resource collection, integration of the environment into programs and activities and increased capacity for environmental activities. For Kelly (2004, p. 6), who was responsible for conducting the entire environmental assessment, one of the biggest environmental problems is the need to develop sustainable water management plans. In some places, such as the Kalma field, water was brought in trucks because the existing local wells could not supply the demand. In others, water from taps was not being properly drained, creating puddles of stagnant water that could contribute to the spread of disease.

As Kelly (2004) notes, the Sphere Standards for Humanitarian Assistance identifies the environment as a crucial cross-cutting issue in humanitarian aid operations, and, concerning refugees, UNHCR recognizes the links between human well-being and the environment, so project implementation and programs should aim at integrating environmental components.

It is also relevant to mention the importance of assuring environmental protection among other rights, such as the integrity of women in refugee camps, who are often threatened by violence and sexual assault, especially while finding firewood for daily cooking (Patrick, 2007). One of the largest environment-related problems is the unsustainable livelihood – the unmanaged cutting of trees and shrubs for fuelwood and charcoal production that causes negative impacts on Darfur's fragile ecosystem. Recently, as pointed out by Elzarov (2018), the local environment degradation is driven by climate change (because of clearing forests to power the kilns for firebricks) and human impact on the environment. This unsustainable livelihood leads to poor quality of life since access to natural resources and basic human needs such as clean water is restricted.

As mentioned before, the crescent demand for domestic firewood and construction is the main harmful activity to the environment in Darfur. Elzarov (2018) highlights that, currently, in the Kalma camp people must travel 75 kilometers to find firewood due to the deforestation of the local environment. In contrast, alternative cooking ways such as the mud stove can contribute to reducing the exposure of women to the risks of sexual violence while finding firewood regularly (Food and Agriculture Organization of the United Nations, 2016). Since 2007, the United Nations–African Union Mission in Darfur (UNAMID), established on July 31, 2007, has implemented in Darfur states over 500 quick impact projects. Most of them have outlined that the unsustainable exploitation of natural resources increases the exposure of women and girls to sexual violence and gender-based violence while collecting fuelwood, since this is a women's task in Dafur (Elzarov, 2018).

In summary, using alternative cooking fuels (briquettes, biofuels) and stoves (mud stove, for example) may be simple, but their effects are huge: they increase the quality of life in camps, contribute to the health security of adults and children and reduce greenhouse gas emissions that are responsible for climate change.

Another critical situation is in Zaatari camp, in Jordan, where, the mobile dumpsters, although available in camps, overflow with garbage. In addition, the recyclability rates are inexpressive, so that the transfer cost of waste to existing landfills in the region is tripled (Oxfam, 2017).

Due to the serious problems involving waste management, Oxfam International began working with the local community to develop a waste management process that would meet social, environmental and economic needs. Therefore, in August 2015, Oxfam initiated an innovative recycling project with the objective of mitigating waste management problems in refugee camps, while also providing livelihood opportunities to refugees.

Oxfam's basic idea was to have families separate the waste (solid and liquid) so that voluntary refugees could collect it and send it to transfer areas where it is separated and processed. Subsequently, the waste is sold to companies that sell reusable materials, with profits reinvested back into Oxfam's project in Zaatari camp. The positive results of the project have contributed both to reducing the impact on the environment and to creating new livelihoods for refugees and improving human welfare.

Saidan *et al.* (2017) highlight how recycling, as part of solid waste management, provides employment and a livelihood for vulnerable social groups such as refugees. In this context, Saidan *et al.* (2020) stress how recycling helps women empowerment, especially in the case of women refugees in Jordan. For instance, the "Cash for Work" initiative taken in refugees' camps helped educate Syrian refugee women to sort dry wastes on a household level.

In addition to the problem of solid waste management in Zaatari camp – one of the largest refugee camps in the world located on a poor water-source country, hosting around 80,000 Syrian refugees – the access to water became a relevant environmental matter. As discussed by Van der Helm *et al.* (2017), in the Zaatari refugee camp, the drinking water used to be trucked during the emergency phase, and the water for sanitization was available in communal water, sanitation and hygiene (WASH) blocks including toilets, showers and laundries. Those traditional communal water points resulted in inequity, unregulated and unsustainable wastewater disposal.

As mentioned by the authors, discussions on possible options for sustainable water supply solutions began only in 2012, particularly in May 2014, (REACH, 2014) when a camp-wide, household-level drinking water network was established. Then the settlement accomplished a more integrated sustainable solution: in September 2014, it was decided that "all household facilities would be made safe and hygienic through a household-level wastewater network discharging to a containerized on-site municipal wastewater treatment plant (Van der Helm *et al.*, 2017)." This system started fully operating in 2016, but already in 2015 and due to the solid-free sewer, it was possible to reuse the effluent in animal crops irrigation. Therefore, ensuring operational sustainability in water and sanitation systems in the Zaatari refugee camp is seen as a means to promote basic human rights such as access to water and good health.

Based on the case of Darfur and Zaatari, it is possible to conclude that projects related to renewable energies or "green" fuels in refugee camps may contribute to the generation of sustainability. Initiatives on solving waste management and recyclability rates taken by nongovernmental agencies such as Oxfam and UNHCR add extreme value on building sustainable humanitarian operations.

5. Building sustainability in refugee camps through a sustainable humanitarian supply chain

For the purpose of identifying the contributions of sustainable humanitarian supply chains on building sustainability in refugee camps, besides the case study of Darfur and Zaatari discussed above, it is relevant to analyze the projects put into practice by the UNHCR connected to environmental, economic and social matters.

The UNHCR Cooking Options in Refugee Situations, from 2002, exposes alternative fuels or alternative types of cooking stoves that fit refugees' domestic energy needs and, at the same time, take into account a more sustainable use of local natural resources. The main

objective of that handbook is to summarize alternative ideas for domestic energy in refugee camps to minimize impact on the local environment. Some of the projects put in place were the promotion of fuel briquettes made from rice husks, bamboo or sawdust in Bangladesh and Thailand; the use of dried grass for cooking in Tanzania and Uganda; papyrus peat in Tanzania; biogas in Afghanistan and Nepal; kerosene in Nepal; and solar energy in Ethiopia, Kenya and Pakistan (UNHCR, 2002b, p. 7).

Environmental Working Group (EWG) was launched in 1995 in Dadaab and 2000 in Kakuma camps, in Kenya, to express environmental concerns, monitor the abuse of natural resources and engage methods for protecting the environment, ensuring its importance (UNHCR, 2002c, p. 15). Besides some problems faced, the government recognized the importance of a coordinated and sustainable approach to managing the environment in refugee-hosting areas by creating the National Committee on Environmental Impacts of Refugee Settlements.

Another example is the use of a mud stove for cooking in Laffa, Gulsa and Shagarab refugee camps. Due to the crescent need for firewood for daily cooking, combined with the large influx of refugees in the camps in 2000, an international humanitarian response agency called GOAL established a partnership with UNHCR. Its main purpose was to minimize the environmental impact by implementing a program focused on women which was related to energy-efficient stove technology, cooking techniques, environmental awareness and the use of a renewable source of firewood (UNHCR, 2002b). As a result, 1,200 women received training to build a kind of mud stove by incorporating a pottery cylinder with the traditional mixture of mud and animal manure (UNHCR, 2002c, p. 23). As it is known, the collection of wood for building purposes together with firewood for daily cooking is the most environmentally harmful practice in refugee operations. Therefore, if it is possible to substitute wood for mud, then it is a very efficient way of reducing the impact of refugees on the local environment.

Analyzing the refugee camps built around the world and the initiatives mentioned above, it can be seen that the organizations, now temporary, often become permanent, given the difficulty of the people who inhabit the camps and the individuals' vulnerable situations. From all these aspects, it can be seen that this happens because the disasters that plague the locality are constant, such as financial crises, civil conflicts and wars.

Thus, it is understood that disasters hinder the local economy; according to Baba *et al.* (2015), due to the background of refugee camps even before the disaster, there is a lack of resources such as machinery, electricity, gas, water and workers, because of which the businesses need time to reach a satisfactory level. In the case of refugee camps, there is a tendency for organizations to remain, rather temporary, creating a local economy, which is closely affected by external factors, whether political, environmental or economic.

To develop and boost sustainable development, together with economic growth, Baba *et al.* state that private/public cooperation is needed to strengthen local risk management, promoting resilience to disasters (Baba *et al.*, 2015). In refugee camps, creating resilience to the HSC helps sustainability by developing the ability to deal with unpredictable and unavoidable risks effectively in the chain, returning to its original state of operation after suffering the disruption. In practical cases, one can cite the lack of hygiene products present on-site, which can be replaced by others without affecting the final result, testing the flexibility of the supply chain. In addition, items structured for humanitarian emergencies must be economically viable and environmentally correct, in order not to generate greater impacts to an already fragile community.

Research into sustainable practices in emergencies can be carried out on refugee food by replacing food distribution with cash and coupons (Kunz and Gold, 2017). In practice, the refugee camp's population is usually fed through the physical distribution of food by the site's responsible staff. As a result, inefficiencies permeate the humanitarian work, with

questions of distribution raised but not elucidated, such as who will receive, in what quantity and why. In this sense, the practice is to create a market belonging to the refugee camp, which receives the vulnerable population and offers the goods in exchange for coupons. On the other hand, the money received by the individuals of the responsible organization strengthens and moves the local economy, as trades. For the greater efficiency in the food issue, the camps reduce their waste produced, with each inhabitant using the coupons with conscience and parsimony; moreover, the social results are remarkable, since the streets of the place remain clean, mitigating negative externalities such as large dumps that are formed around the camp, as well as helping social welfare.

Furthermore, it is portrayed that the achievement of sustainability lies in the transparency of information acquired, in addition to assertive, reinforced and reliable communication being the key to sustainable performance, coordinating the HSC (Kunz and Gold, 2017). The information obtained through data collection is still a great challenge for the HSC since the analysis of data from past operations is difficult due to the lack of information. Nevertheless, it is observed that humanitarian operations with 21% of input data represent a high number facts in several cases – data that often lack assertiveness (Kunz *et al.*, 2017). In refugee camps, all stakeholders are hampered by lack of data on all dimensions of sustainability. The unknowns regarding the amount of waste produced, the reception and flow of emergency materials that do not have their reverse flow controlled, required or planned, as well as the type of each recyclable material produced by the site sow doubts and prevent the planning and execution of sustainable practices because they do not know at what level each variable is.

Over the recent years, according to Dubey and Gunasekaran (2016), SHSC has been a subject of debate and research. It is noted that SHSC has on saved lives, as well as contributing to the development of the affected place and decreasing human suffering (Li *et al.*, 2019).

Sustainability is still considered a forgotten aspect in current scientific publications on the HSC, even when analyzing its importance through the Agenda 30 for Sustainable Development Goals and the growing concern and commitment on the part of developing communities (Zarei *et al.*, 2019).

In order to develop economic growth in disaster-affected areas and promote sustainable development, private and public cooperation should be strengthened and improved by fostering the opportunities presented to risk management coordination. Moreover, even with all the progress made, disaster management is observed as a wide field in which much progress can be made. It is worth highlighting that its large-scale management with effective stakeholder participation is a vital point where its progress is a *sine qua non* for enhancing the system of coordinating resilient communities (Baba *et al.*, 2015). In refugee camps, the several stakeholders involved must promote the sustainability of the settlement by redesigning processes, products and flows of materials, people and information to take into account the environment of the place, its social welfare and the investment brought to the camp through donations to effectively measure the triple bottom line.

In environmental performance, all stakeholders should exert pressure on the organizations that receive the funding to manage their supply chain in an environmentally responsible direction, such as purchasing packaging that after being used follows the technological (e.g. more resistant plastics and recycled content that can be reused) or biological (from the biological substitutes for plastic) cycle. In addition, the visibility of the supply chain should be carefully considered to be acquainted with all the organizations that have contributed to final relief supplies. If organizations upstream the chain have non-sustainable processes (for example, child labor or excessive use of natural resources), the actions of relief organizations that purchase these goods will be on the contrary of achieving more global sustainability in all the refugee camps. We endorse further drivers such as increasing the product life cycle to provide relief supplies with a longer life, decreasing the amount of discarded goods in refugee camps and establishing a circular humanitarian supply Chain Management, being part of the

SHSC to generate zero waste and pollution, a business model in which everything that the refugee camp generates – both in the biological and technical spheres – is reinserted at some point in the operational cycle, leaving them in perennial use and regenerating the natural systems.

According to Cullen (2017), these circular operations are derived from the Circular Economy concept, which is an economic model, and for an economy to be fully circular, there must be closed cycles, products recycled indefinitely and zero waste. Stahel (2016) and Haupt and Hellweg (2019) highlight that the circular economy concept is receiving increasing attention from countries around the world as an alternative to the current "take, make, dispose" system.

The need to reduce environmental impacts from the unbridled use of natural resources was a factor that helped to enhance the concepts of circular economy in the last decade (Harris *et al.*, 2020). Thus, it is noted that the transformation from a linear model to a model based on the cycles of nature is the goal of circular economy, which imposes the non-generation of waste disposal and closed cycles, both technological and biological (EMF, 2015).

In financial terms, improved efficiency in all operations of the supply chain management reduces generated waste. According to Christoplos (2006), humanitarian aid, when not coordinated in matters of supplies, financial resources and people, generates inefficiency and uncertainty in its flows. In light of the earthquake in the Indian Ocean in December 2004, it was noted that due to excessive aid in matters of funding, humanitarian organizations were unmotivated, further reducing the efficiency of the operation. This inefficiency, when portrayed in refugee camps, may symbolize settlement families who do not receive proper support because of waste in operations and do not obtain the minimum relief supplies required for their survival. Finally, the flows in the HSC have been hampered, since there have been certain donations of inadequate nature for the disaster scenario, producing excessive waste of time in management and transportation. This wasted time causes unnecessary logistical activities, often performed by vehicles powered by fossil fuels, in addition to the emission of polluting gases that harm the local ecosystem and contribute to the escalation of global warming. In addition, the circular HSC management provides refugees with a source of income, since every waste that was previously disposed of, can be reinserted into the production chain with closed, open or open trans-sector loops. As a result, the profit is used to maintain the circular operations and forwarded to the refugees as well.

The social performance is observed from the outcomes of previously mentioned actions. In refugee camps like Zaatari, there was enhancement of the welfare of individuals after the proper treatment of solid waste, sustainable energy practices and strategic measures that target zero waste. It shall be recalled that the triple bottom line must have the performances – environmental, social and financial – in equal proportion, in other words, must have proportional advances.

Upon dealing with the rehabilitation phase of the disaster, it becomes clear that the main objective has shifted, since aiding the population to regain their pre-disaster standard of living – or even better standard of living than before, if possible – is the primary value. For this to be accomplished, it is necessary to broaden the management perspective in a holistic approach, considering aspects such as the specific area of operation, in order to strengthen all geographical entities. Finally, to obtain the best outcomes, it is recommended to work with networks of local suppliers, empowering them through the dissemination of knowledge; develop local workers for the operations; and select the appropriate raw material to make the rehabilitation phase more sustainable, these being steps of supply chain management (Kunz and Gold, 2017).

The research from Patil *et al.* (2021), for instance, has realized that, although medical and pharmaceutical products are critical elements in humanitarian relief efforts, inappropriate and unusable medical products lead to the wastage of resources and cause harm to the environment. Boostani *et al.* (2020) analyze pre-disaster and post-disaster relief chains to

provide sustainability in humanitarian relief operations. Their research investigates strategic and tactical planning issues to minimize the environmental impacts such as those caused by packaging of relief goods and CO_2 emissions in transportation routes, providing scientific support of more efficient and effective plans for sustainable facility locations, and procurement and delivery of reliefs.

In every phase – pre, during and post-disaster – of a humanitarian operation, there is a need to measure processes to identify operational needs and assemble strategies to allocate resources and people to save lives. Schön *et al.* (2018) presented the initial results of the study on the creation of a Camp Performance Indicator (CPI) system, which addresses infrastructure and service investments in refugee camps, as well as demonstrates the role of self-reliance. As evidenced, measuring the performance of operations plays a vital role in the continuity and success of humanitarian aid in refugee camps, improving all aspects of sustainability. At the same time, as Jilani *et al.* (2018) observe, the concepts, designs and processes used to improve the efficiency of sustainable humanitarian operations have been drawn from disciplines such as green logistics and sustainability.

Analyzing humanitarian operations, Chen *et al.* (2020) employed supply chain management methods that could potentially operationalize the Sustainable Development Goals. As a result, the authors deepen the concept of sustainability in HSCs operation through a multidisciplinary study. In addition, under a different humanitarian perspective, Cao *et al.* (2021) developed an integrated model for decision-making in SHSC by using a bi-level fuzzy optimization model. As a result, the authors investigated that the elaborated model could mitigate environmental risks, emergency costs and the unmet demand rate.

Since the UN 2030 Agenda, there is a gap in the literature on humanitarian logistics and environmental concerns that has attracted the attention of UNHCR. In this context, according to Pascucci (2021, p. 1), "logistics is considered essential to bring refugee aid in line with emerging standards of sustainability."

When we refer to green logistics, it is the minimization of the environmental costs of supply chains. Thus, environmentally aware approaches are gaining space among refugee shelters and humanitarian policies (Pascucci, 2021). For Oloruntoba and Banomyong (2018, p. 290), currently, there is a "need to ensure that shelters provide a safe and suitable environment for both short- and long-term accommodation." Therefore, the need for longer-lasting shelter infrastructures, efficient disposal and alternative fuels open practical room for the implementation of green refugee logistics (Pascucci, 2021).

Considering that a SHSC needs to take into account environmental, economic and social factors, actions aiming at building resilient communities in refugee settlements, effective stakeholder participation along with private/public cooperation, camp performance indicators with transparency of information acquired and sustainable practices build sustainability in refugee camps.

6. Conclusions

Our review has shown that natural disasters, man-made disasters and armed conflicts may force people to flee their homes and leave their relatives and belongings behind. Refugees and other displaced persons often need to seek protection and assistance in camps as their last option in finding assistance, safety and security. Very often, refugee settlements are densely populated and have an ecologically fragile environment due to the crescent flux of displaced persons coming and going, and especially because of the environmental impacts on hosting areas to meet the demands on energy and natural resources.

This literature review has highlighted that by implementing environment-friendly strategies and building a SHSC, it is possible to avoid both the costs of repairing the environmental damage caused by the prolonged presence of refugees and conflicts for natural resources with the local community. Another solution suggested on the guidelines

and operations here analyzed is to have clear policies and recommended practices for environmental matters on settlement management.

Although there are many legal instruments such as international treaties, UN resolutions, protocols and conventions related to environmental protection and human rights, especially about natural resources, there is a lack of integrating environmental matters on refugee settlements. Our analysis also reveals that, despite the strategies set by nongovernmental agencies to build a sustainable environment on refugee camps, there is a contemporary need to review the legal instruments and the international laws concerning the legal possibilities of regulating a SHSC. As such, academia, governments, organizations and nongovernmental agencies are increasingly striving to achieve a comprehensive understanding and valid legal provision for implementing a SHSC in refugee camps to achieve Sustainable Development Goals.

The results have shown that to achieve zero waste in refugee camps, the concept of circular economy was presented, which is incorporated into the HSC and assists the community as well as the environment. Circular economy, being a disruptive business model, is a corollary to sustainability, applying innovative practices to the entire supply chain aiming at the preservation of natural capital; however, the discussion of circular economy in refugee camps is still scarcely explored. Moreover, further studies should define and specify how to effectively implement the circular economy in refugee camps, controlling environmental indicators and proposing circular and sustainable solutions to the real problems encountered and exposed in the case studies. By considering the current environmental aspects of the refugee settlements, it can be an outset point for evaluating the circular performance to inform decision-makers about enhancing the strategies towards a healthy environment.

Despite the remaining challenges, women frequently face many risks while searching for fuel for cooking; for this reason, fuel-efficient stoves and alternative fuels help provide food security and nutrition, health and safety, livelihoods and environmental sustainability. For instance, solid waste management in refugee camps leads to sustainable development and resilience in local communities. Through sustainable initiatives on energy generation, alternative cooking options, proper solid waste management and a safe water system, it is possible to save forests and improve women's safety and security in humanitarian crises and post-conflict situations.

Therefore, this review can help protect the environment by implementing a SHSC as a primary condition to promote human rights in refugee camps. Therefore, the international community needs to seek an improvement of their actions on prevention, preparedness and response capacity of humanitarian assistance in order to halt the climate change and environmental impacts by implementing a sustainable interface in the HSC. Lastly, the international community should include sustainable strategies on humanitarian operations, not only in practice but also in legal documents, as an instrument of strengthening human rights for vulnerable groups, such as refugees.

Finally, for future studies, we analyzed a possible connection between circular economy and HSC, especially in refugee settlements where sustainability is becoming a hot topic and a basic human need because of the lack of natural resources. The main works and reports hereby analyzed state a current concern about HSCs and how to make them sustainable. Therefore, future research could provide suggestions on how to implement sustainability in refugee camps according to circular economy principles.

References

Aghaei Chadegani, A., Salehi, H., Yunus, M., Farhadi, H., Fooladi, M., Farhadi, M. and Ale Ebrahim, N. (2013), "A comparison between two main academic literature collections: web of Science and Scopus databases", *Asian Social Science*, Vol. 9 No. 5, pp. 18-26.

Baba, H., Watanabe, T., Miyata, K. and Matsumoto, H. (2015), "Area business continuity management, a new approach to sustainable local economy", *Journal of Disaster Research*, Vol. 10 No. 2, pp. 204-209, doi: 10.20965/jdr.2015.p0204.

Bates, D.C. (2002), "Environmental refugees? Classifying human migrations caused by environmental change", *Population and Environment*, Vol. 23 No. 5, pp. 465-477, doi: 10.1023/A:1015186001919.

Behrman, S. (2019), "Refugee law as a means of control", *Journal of Refugee Studies*, Vol. 32 No. 1, pp. 42-62, doi: 10.1093/jrs/fey016.

Behrman, S. and Kent, A. (2018), *Climate Refugees: Beyond the Legal Impasse?*, Routledge, London.

Bellanca, R. (2014), "Sustainable energy provision among displaced populations: policy and practice", Chatham House for the Royal Institute of International Affairs, London, available at: https://assets.publishing.service.gov.uk/media/57a089b340f0b652dd000376/61318-ChathamHse-EnergyDisplacedPopulationsPolicyPractice.pdf (accessed 19 July 2020).

Biermann, F. and Boas, I. (2008), "Protecting climate refugees: the case for a global protocol", *Environment: Science and Policy for Sustainable Development*, Vol. 50 No. 6, pp. 8-17, doi: 10.3200/ENVT.50.6.8-17.

Boostani, A., Jolai, F. and Bozorgi-Amiri, A. (2020), "Designing a sustainable humanitarian relief logistics model in pre-and postdisaster management", *International Journal of Sustainable Transportation*, Vol. 15 No. 8, pp. 1-17, doi: 10.1080/15568318.2020.1773975.

Brundtland, G.H. (1987), "Our common future: report of the world commission on environment and development", UN-Dokument A/42/427, Geneva.

Cao, C., Liu, Y., Tang, O. and Gao, X. (2021), "A fuzzy bi-level optimization model for multi-period post-disaster relief distribution in sustainable humanitarian supply chains", *International Journal of Production Economics*, Vol. 235, p. 108081, doi: 10.1016/j.ijpe.2021.108081.

CARE International and UNHCR (2009), "FRAME Toolkit: framework for assessing, monitoring and evaluating the environment in refugee-related operations", available at: http://www.unhcr.org/4a97d1039.html (accessed 2 July 2020).

Chen, H.S.Y., van Wassenhove, L. and Cheng, T.C.E. (2020), "Designing sustainable humanitarian supply chain", *OSF Preprints m82ar*, Center for Open Science, Charlottesville, VA, available at: https://ideas.repec.org/p/osf/osfxxx/m82ar.html (accessed 10 December 2021).

Christoplos, I. (2006), *Links between Relief, Rehabilitation and Development in the Tsunami Response*, Tsunami Evaluation Coalition, London, available at: https://www.sida.se/contentassets/6aa1638098544347b7b2f782308345e6/links-between-relief-rehabilitation-and-development-in-the-tsunami-response_3145.pdf (accessed 26 June 2020).

Cullen, J. (2017), "Circular economy: theoretical benchmark or perpetual motion machine?", *Journal of Industrial Ecology*, Vol. 21 No. 3, pp. 483-486, doi: 10.1111/jiec.12599.

Dubey, R. and Gunasekaran, A. (2016), "The sustainable humanitarian supply chain design: agility, adaptability and alignment", *International Journal of Logistics Research and Applications*, Vol. 19 No. 1, pp. 62-82, doi: 10.1080/13675567.2015.1015511.

Elzarov, Z. (2018), "Protecting the environment and women in Darfur through fuel-efficient stoves", *Conflict Trends*, Vol. 2018 No. 4, pp. 30-37, ISSN: 1561-9818.

EMF, Ellen MacArthur Foundation (2015), "Towards a circular economy - business rationale for an accelerated transition", available at: https://emf.thirdlight.com/link/ip2fh05h21it-6nvypm/@/preview/1?o.pdf (accessed 10 September 2021).

Food and Agriculture Organization of the United Nations (2016), "Cooking up a SAFE solution, fuel-efficient stoves for displaced communities in South Sudan", available at: http://www.fao.org/gender/projects/detail/en/c/449355/ (accessed 21 July 2020).

Gibney, M. (2010), *Global Refugee Crisis: A Reference Handbook*, ABC-CLIO.

Goodwin-Gill, G.S. and McAdam, J. (2017), *UNHCR and Climate Change, Disasters and Displacement*, The United Nations Refugee Agency (UNHCR), Geneva, available at: https://www.refworld.org/pdfid/59413c7115.pdf (accessed 20 July 2020).

Hargreaves, S., Zenner, D., Wickramage, K., Deal, A. and Hayward, S.E. (2020), "Targeting COVID-19 interventions towards migrants in humanitarian settings. The Lancet", *Infectious Diseases*, Vol. 20 No. 6, p. 645, doi: 10.1016/S1473-3099(20)30292-9.

Harris, S., Martin, M. and Diener, D. (2021), "Circularity for circularity's sake? Scoping review of assessment methods for environmental performance in the circular economy", *Sustainable Production and Consumption*, Vol. 26, pp. 172-186, doi: 10.1016/j.spc.2020.09.018.

Haupt, M. and Hellweg, S. (2019), "Measuring the environmental sustainability of a circular economy", *Environmental and Sustainability Indicators*, Vol. 1, p. 100005, doi: 10.1016/j.indic.2019.100005.

IFRC, International Federation of Red Cross and Red Crescent Societies (2019), *The Fundamental Principles of the International Red Cross and Red Crescent Movement*, Geneva.

IFRC, International Federation of Red Cross and Red Crescent Societies (2003), "Humanitarian assistance. Institute of international law: bruges session", available at: https://www.ifrc.org/Docs/idrl/I318EN.pdf (accessed 20 July 2020).

IOM, International Organization for Migration; NRC, Norwegian Refugee Council and UNHCR, UN Refugee Agency (2015), "Global camp coordination and camp management (CCCM) cluster", available at: https://cccmcluster.org/resources/camp-management-toolkit (accessed 15 July 2020).

IRENA (2019), *Renewables for Refugee Settlements: Sustainable Energy Access in Humanitarian Situation*, International Renewable Energy Agency, Abu Dhabi, available at: https://irena.org/publications/2019/Dec/Renewable-solutions-for-refugee-settlements (accessed 14 July 2020).

Jabbour, C.J.C., Sobreiro, V.A., de Sousa Jabbour, A.B.L., de Souza Campos, L.M., Mariano, E.B. and Renwick, D.W.S. (2019), "An analysis of the literature on humanitarian logistics and supply chain management: paving the way for future studies", *Annals of Operations Research*, Vol. 283 No. 1, pp. 289-307, doi: 10.1007/s10479-017-2536-x.

Jacobson, J.L. (1988), "Environmental refugees: a yardstick of habitability", *Bulletin of Science, Technology and Society*, Vol. 8 No. 3, pp. 257-258, doi: 10.1177/027046768800800304.

Jesson, J., Matheson, L. and Lacey, F.M. (2011), *Doing Your Literature Review: Traditional and Systematic Techniques*, Sage, London.

Jilani, A., Ali, Y. and Khan, M.W. (2018), "Greening of humanitarian supply chain with focus on logistics", *International Journal of Business Performance and Supply Chain Modelling*, Vol. 10 No. 1, pp. 49-66, doi: 10.1504/IJBPSCM.2018.093319.

Karl, A.A., Micheluzzi, J., Leite, L.R. and Pereira, C.R. (2018), "Supply chain resilience and key performance indicators: a systematic literature review", *Production*, Vol. 28, doi: 10.1590/0103-6513.20180020.

Kelly, C. (2004), *Darfur Crisis Rapid Environmental Assessment at the Kalma, Otash and Bajoum Camps*, Joint UNEP/OCHA Environment Unit, Sudan.

Kovács, G. and Spens, K.M. (2011), "Humanitarian logistics and supply chain management: the start of a new journal", *Journal of Humanitarian Logistics and Supply Chain Management*, Vol. 1 No. 1, pp. 5-14, doi: 10.1108/20426741111123041.

Kunz, N. and Gold, S. (2017), "Sustainable humanitarian supply chain management–exploring new theory", *International Journal of Logistics Research and Applications*, Vol. 20 No. 2, pp. 85-104, doi: 10.1080/13675567.2015.1103845.

Kunz, N., Van Wassenhove, L.N., Besiou, M., Hambye, C. and Kovacs, G. (2017), "Relevance of humanitarian logistics research: best practices and way forward", *International Journal of Operations and Production Management*, Vol. 37 No. 11, pp. 1585-1599, doi: 10.1108/IJOPM-04-2016-0202.

Laguna-Salvadó, L., Lauras, M., Okongwu, U. and Comes, T. (2019), "A multicriteria Master Planning DSS for a sustainable humanitarian supply chain", *Annals of Operations Research*, Vol. 283 No. 1, pp. 1303-1343, doi: 10.1007/s10479-018-2882-3.

Li, C., Zhang, F., Cao, C., Liu, Y. and Qu, T. (2019), "Organizational coordination in sustainable humanitarian supply chain: an evolutionary game approach", *Journal of Cleaner Production*, Vol. 219, pp. 291-303, doi: 10.1016/j.jclepro.2019.01.233.

López-Illescas, C., de Moya-Anegón, F. and Moed, H.F. (2008), "Coverage and citation impact of oncological journals in the Web of Science and Scopus", *Journal of Informetrics*, Vol. 2 No. 4, pp. 304-316, doi: 10.1016/j.joi.2008.08.001.

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M. and Stewart, L.A. (2015), "Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement", *Systematic Reviews*, Vol. 4 No. 1, p. 1, doi: 10.1186/2046-4053-4-1.

Myers, N. (1997), "Environmental refugees", *Population and Environment*, Vol. 19 No. 2, pp. 167-182, doi: 10.1023/A:1024623431924.

Neves, D., Baptista, P. and Pires, J.M. (2021), "Sustainable and inclusive energy solutions in refugee camps: developing a modelling approach for energy demand and alternative renewable power supply", *Journal of Cleaner Production*, Vol. 298, p. 126745, doi: 10.1016/j.jclepro.2021.126745.

NRC, Norwegian Refugee Council (2004), "Camp management toolkit, the camp management project (CMP)", available at: https://cccmphilippines.iom.int/sites/default/files/ctools/Chapter_0_toolkit_en_9295460.pdf (accessed 25 July 2020).

OCHA, UN Office for the Coordination of Humanitarian Affairs (2018), "Sudan: Darfur humanitarian overview", available at: https://reliefweb.int/report/sudan/sudan-darfur-humanitarian-overview-1-october-2018 (accessed 18 August 2020).

Oloruntoba, R. and Banomyong, R. (2018), "Humanitarian logistics research for the care of refugees and internally displaced persons: a new area of research and a research agenda", *Journal of Humanitarian Logistics and Supply Chain Management*, Vol. 8 No. 3, pp. 282-294.

Oxfam, G.B. (2017), "TRASH TALK turning waste into work in Jordan's Za'atari refugee camp", OXFAM Discussion Paper, available at: https://policy-practice.oxfam.org.uk/publications/trash-talk-turning-waste-into-work-in-jordans-zaatari-refugee-camp-620329 (accessed 20 June 2020).

Pascucci, E. (2021), "More logistics, less aid: humanitarian-business partnerships and sustainability in the refugee camp", *World Development*, Vol. 142, p. 105424, doi: 10.1016/j.worlddev.2021.10542.

Patil, A., Shardeo, V., Dwivedi, A., Madaan, J. and Varma, N. (2021), "Barriers to sustainability in humanitarian medical supply chains", *Sustainable Production and Consumption*, Vol. 27, pp. 1794-1807, doi: 10.1016/j.spc.2021.04.022.

Patrick, E. (2007), "Sexual violence and firewood collection in Darfur", *Forced Migration Review*, No. 27, pp. 40-41.

Persons, C.B.D. (2015), "Agenda for the protection of cross-border displaced persons in the context of disasters and climate change (October 2015)", Nansen Initiative on Disaster-Induced Cross-Border Displacement, Norway, available at: https://www.nanseninitiative.org/global-consultations/ (accessed 10 August 2020).

REACH (2014), "Jordan – Al Zaatari refugee camp: February/March 2014 – private toilets in households", Amman, available at: https://reliefweb.int/map/jordan/jordan-al-zaatari-refugee-camp-february-march-2014-usage-private-toilet-household (accessed 23 July 2020).

SAFE (2007), "Safe access to fuel and energy", available at: http://www.safefuelandenergy.org/ (accessed 4 August 2020).

SAFE (2013), "Safe access to fuel and energy", available at: http://www.safefuelandenergy.org/ (accessed 4 August 2020).

Saidan, M.N., Drais, A.A. and Al-Manaseer, E. (2017), "Solid waste composition analysis and recycling evaluation: Zaatari Syrian Refugees Camp, Jordan", *Waste Management*, Vol. 61, pp. 58-66, doi: 10.1016/j.wasman.2016.12.026.

Saidan, M., Drais, A.A., AL-Manaseer, E., Alshishani, M. and Linton, C. (2020), "Scale and impacts of livelihoods development on women empowerment in the solid waste sector of Jordan", *Demetrius*, Vol. 10, pp. 212-224, doi: 10.31025/2611-4135/2020.13943.

Schön, A.M., Al-Saadi, S., Grubmueller, J. and Schumann-Bölsche, D. (2018), "Developing a camp performance indicator system and its application to Zaatari, Jordan", *Journal of Humanitarian Logistics and Supply Chain Management*, Vol. 8 No. 3, pp. 346-373, doi: 10.1108/JHLSCM-10-2017-0047.

Sphere (2011), *The Sphere Project – Humanitarian Charter and Minimum Standards in Humanitarian Response*, Practical Action Publishing, Bourton on Dunsmore.

Stahel, W.R. (2016), "The circular economy", *Nature News*, Vol. 531 No. 7595, p. 435, doi: 10.1038/531435a.

Tranfield, D., Denyer, D., Marcos, J. and Burr, M. (2004), "Co-producing management knowledge", *Management Decision*, Vol. 42 Nos 3-4, pp. 375-386, doi: 10.1108/00251740410518895.

Thomé, A.M.T., Scavarda, L.F. and Scavarda, A.J. (2016), "Conducting systematic literature review in operations management", *Production Planning and Control*, Vol. 27 No. 5, pp. 408-420, doi: 10.1080/09537287.2015.1129464.

Tranfield, D., Denyer, D. and Smart, P. (2003), "Towards a methodology for developing evidence-informed management knowledge by means of systematic review", *British Journal of Management*, Vol. 14 No. 3, pp. 207-222, doi: 10.1111/1467-8551.00375.

UN, United Nations (2009), "Resolution 10/4. Human rights and climate change", available at: https://ap.ohchr.org/documents/E/HRC/resolutions/A_HRC_RES_10_4.pdf (accessed 22 July 2020).

UN, United Nations (2015a), *Transforming Our World: The 2030 Agenda for Sustainable Development*, Division for Sustainable Development Goals, New York, NY, available at: https://sustainabledevelopment.un.org/post2015/transformingourworld (accessed 4 August 2020).

UN, United Nations (2015b), *Resolution 70/1 Transforming Our World: The 2030 Agenda for Sustainable Development*, General Assembly, Geneva, available at: https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf (accessed 11 July 2020).

UNEP (2012), "Greening the blue helmets: environment, natural resources and UN peacekeeping operations", available at: https://postconflict.unep.ch/publications/UNEP_greening_blue_helmets.pdf (accessed 14 July 2020).

UNHCR (2002a), "Environmental management: a handbook of selected lessons learned from the field", Geneva, available at: https://www.unhcr.org/406c38bd4.pdf (accessed 10 July 2020).

UNHCR (2002b), "Cooking options in refugee situations: a handbook of experiences in energy conservation and alternative fuels", Geneva, available at: http://www.unhcr.org/406c368f2.html (accessed 23 June 2020).

UNHCR (2002c), "Refugee operations and environmental management: selected lessons learned", Geneva, available at: http://www.unhcr.org/3b03b2754.html (accessed 27 June 2020).

UNHCR (2005), "Environmental guidelines", Geneva, available at: https://www.unhcr.org/protection/environment/3b03b2a04/unhcr-environmental-guidelines.html (accessed 18 July 2020).

UNHCR (2010), "Convention and protocol relating to the status of refugees", Geneva, available at: https://www.unhcr.org/protection/basic/3b66c2aa10/convention-protocol-relating-status-refugees.html (accessed 3 July 2020).

UNHCR (2014), "Global strategy for safe access to fuel and energy (SAFE): a UNHCR strategy, 2014-2018", Geneva, available at: https://cms.emergency.unhcr.org/documents/11982/81186/UNHCR%2C+Global+Strategy+for+Safe+Access+to+Fuel+and+Energy%2C+2014/a3c3e187-838f-4590-b963-6be7b8bc7306 (accessed 28 June 2020).

UNHCR (2017), "Key concepts on climate change and disaster displacement", Geneva, available at: https://www.unhcr.org/protection/environment/5943aea97/key-concepts-climate-change-disaster-displacement.htm (accessed 4 June 2020).

UNHCR (2019), "Global strategy for safe access to fuel and Energy: a UNHCR strategy 2019-2024", Geneva, available at: https://www.unhcr.org/5db16a4a4 (accessed 21 June 2020).

Van der Helm, A.W., Bhai, A., Coloni, F., Koning, W.J.G. and De Bakker, P.T. (2017), "Developing water and sanitation services in refugee settings from emergency to sustainability–the case of Zaatari Camp in Jordan", *Journal of Water, Sanitation and Hygiene for Development*, Vol. 7 No. 3, pp. 521-527, doi: 10.2166/washdev.2017.107.

Wilding, R., Wagner, B., Colicchia, C. and Strozzi, F. (2012), "Supply chain risk management: a new methodology for a systematic literature review", *Supply Chain Management: An International Journal*, Vol. 17 No. 4, pp. 403-418, doi: 10.1108/13598541211246558.

Zarei, M.H., Carrasco-Gallego, R. and Ronchi, S. (2019), "On the role of regional hubs in the environmental sustainability of humanitarian supply chains", *Sustainable Development*, Vol. 27 No. 5, pp. 846-859, doi: 10.1002/sd.1945.

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