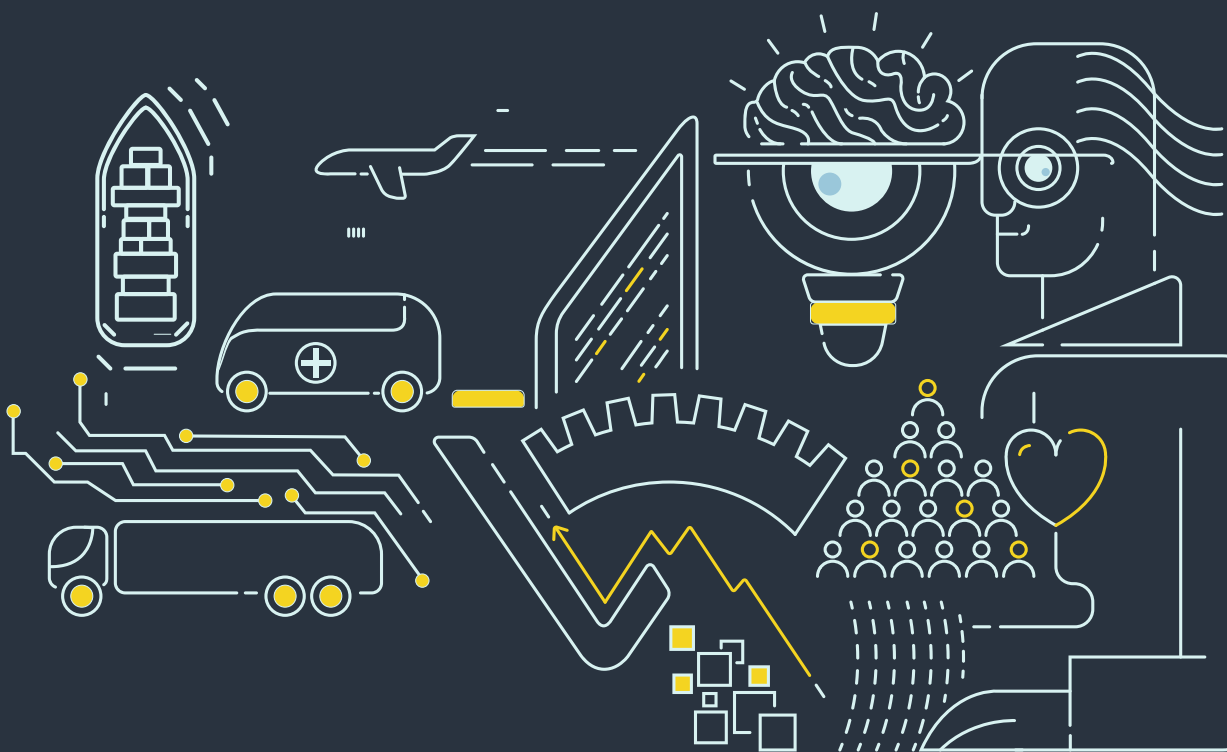


Humanitarian Logistics Guide



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Forewords



The IBL-Social presents this Humanitarian Logistics Guide written by specialists, proposing various mitigation strategies for natural disasters and environmental damages caused by human activities. This aim is to preserve human life, fauna, and flora, promoting humanitarian support.

We believe in cooperation among civil society organisations, government agencies, private sectors, and volunteers from different areas and activities to promote and carry out public interest efforts concerning humanitarian and socio-environmental aspects.

In addition to IBL's core business for Logistics and National Infrastructure, we see IBL-Social as an institutional means for contributing to a better society. The actions range from social responsibility, solidarity, and respect for diversity to constructing citizenship and social inclusion values. We promote technical studies at the national level, inclusively and sustainably, through suggestions for public policies, projects and campaigns.

We seek to deepen our Humanitarian Logistics knowledge. That knowledge is relevant to coping with the natural disaster scenarios verified for years in the country. Hence, we proposed this Guide as significant learning to cooperate with civil society organisations, academic

society, international organisations, government agencies, private companies and volunteering. Furthermore, we understand that the effort started through this study will trigger other essential steps that will directly benefit the country.

Together we can:

1. Seeking innovative solutions through studies and projects concerning transport, infrastructure, warehousing and Humanitarian Logistics sector;
2. Carrying out events that report data related to investments in infrastructure in an integrated way, the application of public resources in a clever way and with decisive solutions;
3. Promote activities associated with Humanitarian Logistics and everything that involves time-response procedures to cope with natural disasters, damages caused by human activities, preservation of people in vulnerable positions, conservation of the indigenous population, and the Brazilian fauna and flora.

Social IBL aligned with the Sustainable Development Goals (ODS/UN):

IBL-Social works in line with the UN 2030 Agenda to reach the Sustainable Development Goals (SDGs). The plan proposes a global call to eliminate poverty, protect the environment and climate, and ensure that people can enjoy peace and prosperity.

Among the 17 goals that encourage development challenges that people face in Brazil and around the world, IBL Social acts directly on eight of these goals - which make up the brand created for IBL Social.



To end poverty in all its forms, everywhere.



To secure healthful lives and foster well-being for all at all ages.



Ensure inclusive and fair quality education and promote lifelong knowledge opportunities for all;



To promote sustained, inclusive and sustainable economic growth, full and productive employment, and proper jobs.



To Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation;



They are making cities and human settlements inclusive, safe, resilient, and sustainable.



To protect, restore and promote the sustainable use of terrestrial ecosystems, sustainably manage them, protect forests, combat desertification, and halt and reverse the planet's degradation.



To empower the means of implementation and revitalise the global partnership for sustainable development.

Have a good read



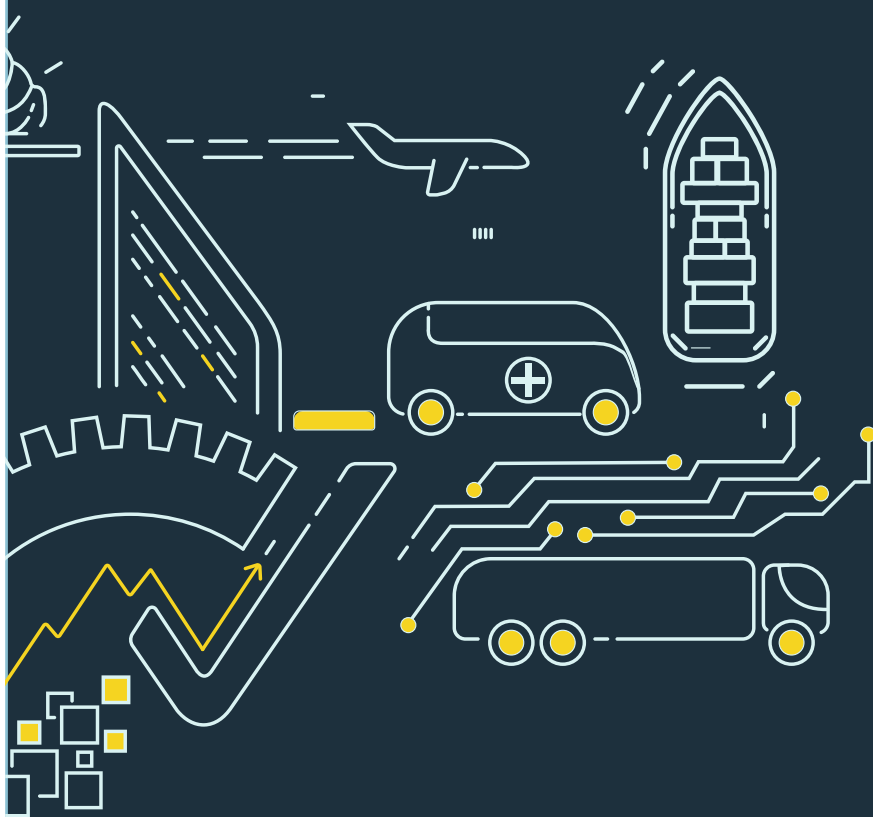


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What is Humanitarian Logistics, and why does it matter?

*By Fabíola Negreiros
(Lab Hands, PUC-Rio)*

*“Logistics is the part [of any disaster relief] that can mean the difference between a successful or unsuccessful operation.”
Van Wassenhove (2006) p. 476*

In December 2004, the earthquake in Sumatra, South Asia, and the destructive tsunami it unleashed on the Indian Ocean captured the world's attention. The disaster affected coastal communities in 14 countries, claimed approximately 230,000 lives and displaced 1.7 million people. More than 40 countries and 700 non-governmental organizations worldwide provided humanitarian aid [2]. However, despite the rapid response, the magnitude of the disaster brought significant logistical and operational challenges to humanitarian assistance operations [2]. Thus, logistics focused on disaster preparedness, and researchers and practitioners began to receive growing interest [3]. Furthermore, the tsunami provided evidence that the effectiveness of humanitarian aid response depends on logistics speed and efficiency, thus highlighting the crucial role of logistics in humanitarian operations [4].

The last decades have been essential for the consolidation of Humanitarian Logistics due to the various disasters that have struck the world:

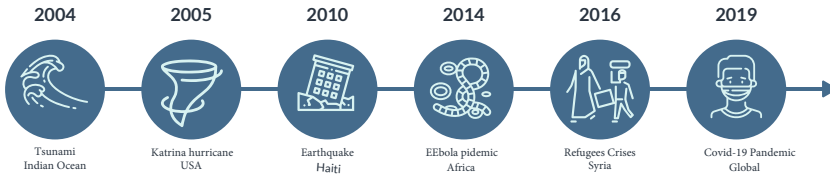


Figure 1: Timeline of major disasters that have occurred around the world. Source: [2].

Brazil and other countries in the world have also faced numerous disasters that have brought consequences on a large scale, these being the best known:

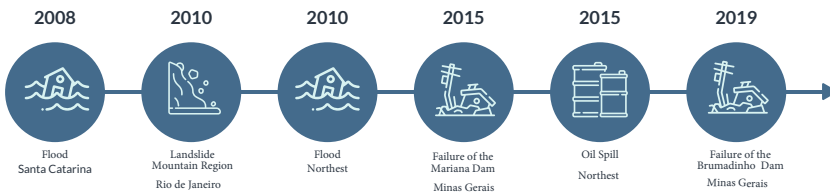


Figure 2 – Timeline of the main disasters that occurred in Brazil [2].

To deep further into the humanitarian context, it is essential to conceptualize the term "disaster" widely mentioned in Humanitarian Logistics. This term refers to an interruption that physically affects a system and threatens its priorities and objectives [1]. When we talk about disaster, it is essential to emphasize that an existing population or property must be affected. That is, for an adverse event to constitute a disaster risk, there must be the presence of an exposed population with a certain degree of vulnerability. Thus, earthquakes, hurricanes, and storms should not be considered disasters. For example, an earthquake on a desert island does not trigger any disaster as there is no population or property to be affected. Figure 3 presents the elements of a disaster [5].



Figure 3 - Components of a disaster [5].

“The intersection of natural hazards, vulnerabilities, and physical exposure materialises disaster risks in extreme events. The great Colombian expert Omar Cardona refers to disaster events as the final incubation process of risks generated over time”.

Frederico Pedroso - Disaster risk management specialist.
World Bank



The Brazilian Classification and Codification of Disasters (COBRADE) [6] categorises disasters into two main classifications: **natural and technological**. There is a group of disasters (geological, hydrological, disasters related to radioactive substances, among others), and within this group, a subgroup (earthquakes, floods, among others), as shown in Figure 4. It is important to note that COBRADE also cites each subgroup's type, subtype, and definition, specifications not represented in Figure 4.

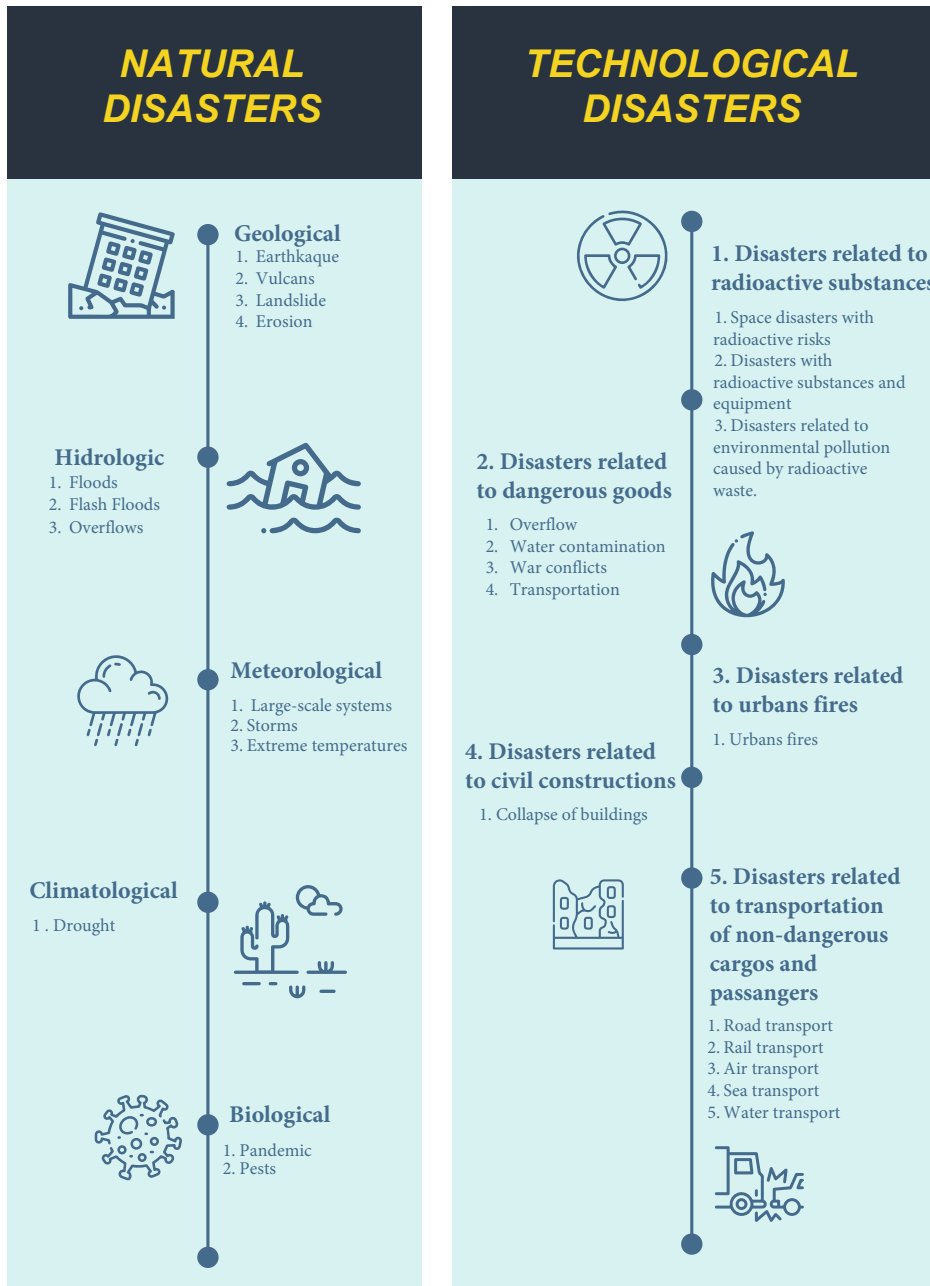


Figure 4 - Classification of disasters. Adjusted from [6]

Thus, in this context of natural (such as floods, hurricanes, earthquakes) and technological (such as building collapse, dam bursting) disaster situations, Humanitarian Logistics is inserted. It covers the processes and systems involved in mobilising people, resources, skills and knowledge to assist vulnerable people affected by disasters [1]. Its concept derives from commercial logistics, with elements peculiar to the humanitarian context. Thus, Humanitarian Logistics are:

“The process of planning, implementing and controlling the efficient and cost-effective flow and storage of goods and materials and related information, from the point of origin to the point of consumption to alleviate the suffering of vulnerable people.” [7]

The focus of Humanitarian Logistics is on how quickly one can assist the vulnerable in terms of items and services, aiming to:



Save lifes



Vulnerable suffering relief.



To contribute to the development of society.

“Humanitarian Logistics is concerned with ensuring the material conditions for disaster preparedness and response to be carried out efficiently, effectively, impartially and equitably. Its importance is increasing due to the increasing frequency and intensity of natural and artificial disasters, such as extreme weather events (rains, droughts, fires), pandemics and human displacements (refugees, migrants). It has a strong interdisciplinary nature and requires the gathering of talents from the most different areas of knowledge. Humanitarian Logistics makes it a major challenge for professionals who wish to work in humanitarian operations, which require the coordination of multiple actors, such as government agencies, NGOs, industry, faith-based organisations, the media and civil society.”

Prof. Dr. Hugo Tsugunabu Yoshida Yoshizaki
 University of San Paul - USP



The components of Humanitarian Logistics involve individuals, equipment and infrastructure, transport, stock management, information and communication technology, planning, policies and procedures. The primary input is humanitarian aid in this system, while the main output is humanitarian aid itself. The secondary inputs are the resources needed to respond to these requests. These inputs are the material, financial and human requirements needed to make the system work. Secondary outputs may include, but are not limited to, planning for future disasters, relationships with other humanitarian organisations, experience and lessons learned [8].

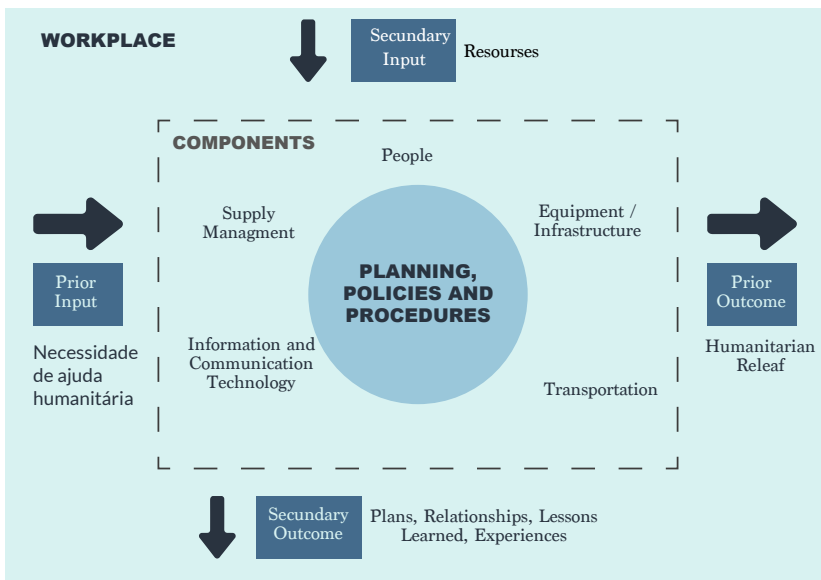


Figure 5 - Structure of Humanitarian Logistics. Source: Adjusted from [8]

Humanitarian Logistics is therefore fundamental to disaster relief for several reasons. Firstly, the effectiveness and speed of response must ensure the continuity of essential services: health and medicine, food and water, energy, communications, transport and security. Continuity of these services reduces risks to health, human life, public safety and the economy - thus ensuring the continued operation of governments' critical functions. Furthermore, these essential services represent the basic services on which a community depends and which, when stable, allow all other activities (e.g. trade and services, industry and agriculture) to occur.



Figure 6 - Key services.

Second, with procurement and transportation included in the function, logistics is one of the most expensive parts of a relief effort, accounting for 60-80% of overall operating costs [9,10]. Finally, since logistics deals with tracking goods along the supply chain, it is often the repository of data to be analyzed or not to provide post-disaster learning [11].

“Humanitarian Logistics, focused on disaster relief operations and the provision of ease supplies, is essential to the success of a disaster response operation.”



Prof. Dra Adriana Leiras

Pontifical Catholic University of Rio de Janeiro - PUC-Rio

Talking about Humanitarian Logistics, it is essential to highlight the so-called **Humanitarian Area**. It usually is represented by a triangle, where the vertices make up the fundamental principles that govern humanitarianism: **humanity, neutrality and impartiality** (Figure 7) guide the management of available resources [12]. Its main objective is to provide aid to all who need it, not favouring one group of beneficiaries[13].

Humanity refers to the rights of victims to receive humanitarian assistance, indicating that human suffering should be alleviated wherever it is found. Neutrality suggests providing aid regardless of political, religious or ideological aspects; assistance should be provided without taking sides on one side or the other. Impartiality, in turn, allocates assistance without discrimination, giving priority to victims who have the most urgent needs [2].



Figure 7 - Humanitarian area. Source: Adjusted from [2]

Humanitarian Logistics has been accumulating importance in the academic world, given the number of disasters that demand humanitarian actions.

"A evolução do tema no Brasil teve início graças ao pioneirismo da Prof. Mirian Buss Gonçalves, que começou a pesquisar o tema na Universidade Federal de Santa Catarina em 2008".

Prof. Dra. Adriana Leiras

Pontifícia Universidade Católica do Rio de Janeiro - PUC-Rio



As of 2008, several projects in the area began to be developed at the Polytechnic School of the University of São Paulo (EP-USP), together with the Centre for Innovation in Logistics Systems Engineering (CISLOG); at the Post-Graduate Programme in Industrial Engineering of the Pontifical Catholic University of Rio de Janeiro (PUC-Rio), through the Humanitarian Assistance and Needs for Disasters (HANDS) laboratory; at the Military Engineering Institute (IME); at the Production Engineering Department of the State University of Maringá (UEM); at the Federal University of Rio de Janeiro (UFRJ) through the Production Engineering Programme (PEP); at the São Paulo State University (UNESP) in the Environmental Engineering Department; among other universities.

"Lab Hands (Humanitarian Assistance and Needs for Disasters) was founded in 2013 to act in an integrated way in research, teaching and practice, aiming to propose innovative solutions for Humanitarian Logistics and Operations Management in disasters, crises and emergencies. HANDS' vision is to be a nationally and internationally recognized centre of excellence with a central role in the debate on Humanitarian Logistics and Disaster Operations Management through research, development, identification and proposal of innovative solutions to the challenges of Brazilian society".

Prof. Dr. Adriana Leiras, founder and coordinator of Lab Hands.

Pontifical Catholic University of Rio de Janeiro - PUC-Rio



It is evident how Humanitarian Logistics is becoming an area of extreme importance for society and the world in which we live.

Humanitarian Crises Response

*By Fabíola Negreiros
(Lab Hands, PUC-Rio)*

Humanitarian aid is a growing market: the period from 1990 to 2000 showed a significant increase in total humanitarian government assistance from US\$2.1 billion to US\$5.9 billion [7]. After the Indian Ocean tsunami in 2004, the budget for humanitarian aid is estimated to have grown to US\$12 billion [7]. The trend is for this figure to increase due to the growing incidence of disasters worldwide. Compared to the previous two decades (2000-2019), 2020 had a more significant impact on recorded events and economic losses. In 2020, 389 natural disasters were recorded in the Emergency Events Database (EM-DAT), leading to 15,080 deaths, affecting another 98.4 million people and costing an estimated US\$ 171.3 billion (Figure 8). In addition to the COVID-19 pandemic, 2020 was marked by climate-related disasters such as floods, storms and heatwaves [14].



Figure 8 - Disaster statistics in the year 2020. Source: [14]

Disasters affect entire communities. The immediate effects of disaster include loss of life and damage to property and infrastructure, with survivors most often injured, traumatized by the experience and less able to provide for their well-being in the short term. In addition, survivors are left without adequate shelter, food, water, and other essential services and items. Therefore, rapid action is required to prevent further loss of life and minimize those affected by the disaster.

The emergency resources and procedures employed immediately after a disaster comprise the response phase [15].

In this phase, organizations join forces to minimise the devastating consequences caused by the disaster, whether natural or human activities. The main objective is to **respond to the disaster as quickly and effectively as possible** by mobilising resources (people, money, humanitarian relief supplies and other goods) and using a coordinated network so that the initial effects of the disaster are countered. As a result, the needs of affected communities are met [16].

More specifically, the main objectives of disaster response are to rescue people affected by the disaster and stabilize the survivors' physical and emotional condition. Parallel to this is restoring essential services such as water, power and transport. The timing of the relief operation varies according to the scale, type and context of the disaster but usually occurs between 1 and 6 months and is composed of a search and rescue phase immediately after the disaster, followed by a medium-term stage dedicated to stabilizing the physical and emotional condition of survivors [16].

The importance of humanitarian logistics in the response phase can be illustrated by several entities that propose to act in various disasters worldwide.

Below, we present brief reports on the response operations to emblematic disasters in recent years and Brazil. Figure 9 illustrates some of these disasters that have occurred around the world.

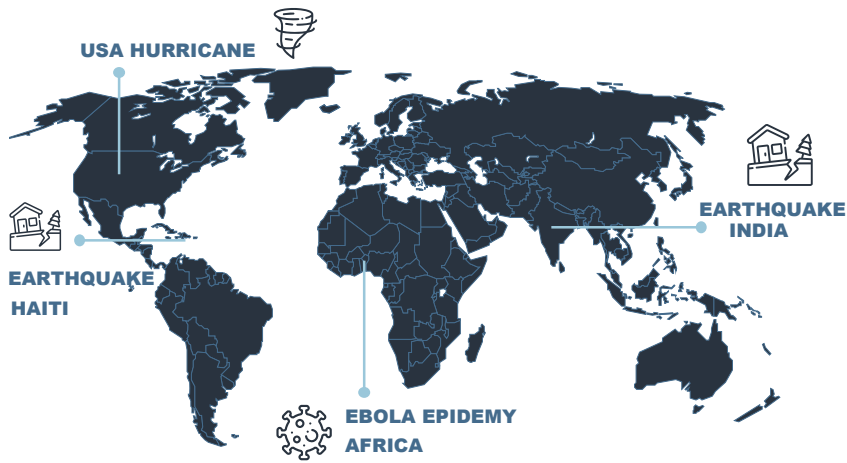


Figure 9 – Disasters around the world.

In January 2001, a strong earthquake measuring 7.9 on the Richter scale hit Gujarat, India. Thousands of people died, the local airport was destroyed, infrastructure was severely damaged, and very little information was available in the first moments after the disaster. Thirty days after the earthquake, together with the assistance of 35 partner organizations, the Emergency Logistics Unit of the International Federation of the Red Cross arranged for the delivery of 255,000 blankets, 34,000 tents, 120,000 sheets and large quantities of other humanitarian relief items, which the Indian Red Cross distributed to the beneficiaries. More than 300 global, national, regional and local non-governmental organizations (NGOs) and United Nations (UN) agencies also mobilized their teams and resources [7].

Another disaster that marked the world in the mid-2000s was the Katrina hurricane. With a Category 5 level in the Atlantic Ocean, Katrina hit the southern coastal region of the United States of America (USA), especially around the metropolitan area of New Orleans, in August 2005.

Katrina Hurricane was the most significant natural disaster in the United States, claiming the lives of more than 1,800 people and causing \$125 billion in damage [17]. However, despite increased attention from the US government, with the creation of the Department of Homeland Security and the National Response Plan, the response to the hurricane was not satisfactory. This unsatisfactory response arose from a failure to manage several risk factors, such as negligence with emergency warnings days before the storm hit and the inability to understand Katrina as an incident of national importance. Furthermore, the response to Katrina involved a network of intergovernmental (federal, state and local) and intersectoral (public, private and not-for-profit) actors. The lack of central coordination made it even more difficult to fully manage and understand all the actors involved due to a sizeable voluntary component, the skills they offered, and how to use those capabilities [17].



Figure 10 - Volunteers come together to help victims of Hurricane Katrina. Source: [18]



Figure 11 - Volunteers gathered to help the victims of Hurricane Katrina. Source: [18]

Another large-scale disaster that shook the world was the 7.0 magnitude earthquake that struck Haiti in 2010, hitting the capital of a country already ravaged by extreme poverty and political instability. About 223,000 people were killed, 300,000 injured, and more than 2 million forced from their homes [19]. Many of the effects were immediate or primary, such as injuries from falling buildings. However, some side effects followed months later, such as cholera outbreaks. In the face of the immense destruction and chaotic situation caused by the earthquake, thousands of international organizations joined forces and overcame logistical challenges to mount a massive humanitarian response. Thus, the answer to the disaster included national governments and charitable and non-profit organizations worldwide, which began to coordinate humanitarian aid to the Haitian people. Some countries arranged for relief and rescue teams and humanitarian supplies sent directly to earthquake-destroyed areas. In contrast, others sought to organize national fundraising to provide financial support to non-profit groups that worked directly in Haiti [19].



Figure 12 - Chinese search and rescue team recovers a victim from the rubble of the United Nations mission headquarters in Port-au-Prince, Haiti. Source: [18]



Figure 13: Brazilian soldiers from the United Nations Stabilization Mission in Haiti (MINUSTAH) distribute water and food in Port-au-Prince, Haiti. Source: [18]



Figure 14 - Haitians on makeshift courses erected on the Port-au-Prince golf course after the devastating earthquake in Haiti. Source: [18]



Figure 15: United Nations Stabilization Mission in Haiti (MINUSTAH) Brazilian peacekeepers and US soldiers distribute food and water in Cité Soleil, Haiti. Source: [18]

In addition to the disasters mentioned above, the world also witnessed, in 2014, a vast epidemic caused by the Ebola virus, which mainly affected West Africa. Countries like Guinea, Sierra Leone, and Liberia had significantly affected populations by the virus. As in the other disasters, the economic losses were also enormous. Guinea and Liberia had their borders closed, which led to trade restrictions and consequently to the destabilization of the economy and the bankruptcy of thousands of producers. That measure has contributed immensely to the increase in violence and suffering in these countries. Due to the rapid spread of the virus and its high degree of contagion, the international community came together to develop an effective and robust response as soon as possible to assist the West African countries affected by the epidemic [20]. Actors such as Doctors Without Borders and the Red Cross were the most involved, experienced and informed and therefore worked on the front lines during the Ebola response phase [21]. The most immediate needs to respond to the disaster included: tracking people in contact with the sick, provisioning treatment centres and equipment, and the safe transport of health workers and supplies. In addition to these activities, awareness of the population regarding the degree of contagion of the virus and basic hygiene, safety and health care, social mobilization, and response to growing food insecurity, especially in quarantined zones, were highlighted [20].



Figure 16 - Secretary-General visits Mangina Ebola Treatment Center in the Democratic Republic of Congo. Source: [18]



Figure 17 - Community Checkpoint in Freetown, Sierra Leone. Source: [18]



Figure 18 - Ebola response logistical base in Monrovia, Liberia. Source: [18]



Figure 19 - Health team in Liberia fight Ebola. Source: [18]

Like other countries, Brazil also suffered from numerous disasters that claimed the lives of thousands of people and had economic and environmental consequences for communities and ecosystems affected by the disasters. Figure 20 illustrates two emblematic disasters that have occurred in Brazil in recent years.

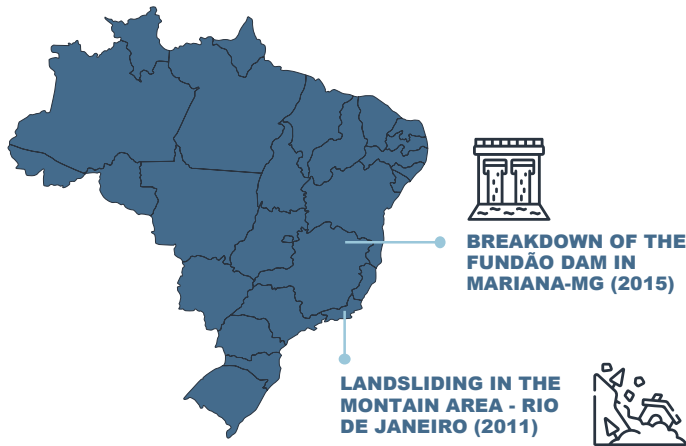


Figure 20 - Disasters that occurred in Brazil

In January 2011, the mountainous region of the State of Rio de Janeiro was the target of intense rains and flooding that, associated with inappropriate use and occupation of the soil, culminated in landslides and floods in the region. As a result, several municipalities were affected and had their essential services interrupted. The disaster caused 9,051 deaths in seven cities and affected more than 300,000 people [2]. Given the magnitude of the event, the disaster was considered the biggest climate disaster in the country's history and the 8th biggest landslide globally [2]. As a result, several stakeholders, such as the state government, the municipalities of the affected cities, the Civil Defense of the State of Rio de Janeiro, the National Security Force, the Military Fire Department of the State of Rio de Janeiro, the Navy, the Air Force and the Brazilian Army, in addition to non-governmental organizations, joined forces for the response operation.

The operation's main objective was to carry out rescues and distribute emergency supplies. The Brazilian Army was in charge of distributing supplies, transporting the homeless/displaced, and evacuating the wounded. There was also a need to control traffic due to access restrictions and the great demand for distribution services [2]. It is common to face enormous difficulties and obstacles of the disasters of this category and their magnitude. The response operation was hampered due to the blockage of some access roads caused by landslides [22]. In addition, numerous roads within the cities were blocked due to falling barriers, which isolated communities. Another difficulty faced was the restriction of vehicles and human resources to assist victims and transport supplies such as food and medicine. Thus, an important decision to be taken in operation contemplated the efficient planning of using available resources to carry out the transport of supplies and the rescue of the wounded and homeless [2].

Another disaster that marked the history of Brazil was the collapse of the Fundão dam in Mariana, Minas Gerais, in 2015. This disaster brought, in addition to irreparable consequences for the lives of those affected, severe damage to the ecosystem. The rupture of the dam had spilt about 40 million cubic meters of iron ore waste with high levels of heavy metals and other toxic chemicals along the Doce River valley and its tributaries. That disaster also reached the state of Espírito Santo, where it flowed into the Atlantic Ocean. In its path of destruction, the avalanche of tailings buried much of the subdistrict of Bento Rodrigues. In addition, it reached other districts and rural communities, decimating 19 lives and displacing hundreds of families [23]. Furthermore, the negative impact on the regional economy, dependent not only on the mining activity but also on agriculture, livestock, trade and services, was enormous, totalling more than R\$ 100 million and R\$ 223 million in financial losses in the private sector [2]. The authorities formed a team of about 200 firemen, firefighters, police officers, members of the Civil Defence and sniffer dogs to carry out search and rescue operations.

Using iron rods made it possible to pierce the mud-covered soil to facilitate the identification of victims and survivors [2]. Drone technology was also used in this search and in assessing future landslide risks in dams [24]. As this disaster received tremendous media attention and moved the country, there were already many donations coming from different locations in Brazil in the first days after the event. Unfortunately, due to the inefficient control and management of these donations, many of the supplies were not delivered to the victims [2], further harming those already in an enormous state of vulnerability.

In fact, from the reports of actions in response to the most varied types of disasters in Brazil and the world, it is noticeable that these actions exert considerable pressure on respondents to be efficient and effective. Any mistake, negligence or delay can be fatal for those affected by the disaster. Thus, the ability to conduct efficient and effective humanitarian operations is a crucial element in a disaster relief process [15].

“The sudden way, even in the face of predictability, in which a disaster occurs requires joint actions by civil society and the public entity. As the National Secretariat for Civil Defense and Protection itself promotes: “civil defence is all of us”. We cannot lose sight of the fact that in emergencies and post-disaster situations, the integrated action of civil society, government and the private sector is essential for success in mitigating socio-economic impacts”.

**Frederico Pedroso - Disaster Risk Management Specialist.
World Bank**



Mapping Demand

*By Fabíola Negreiros
(Lab Hands, PUC-Rio)*

One of the main differences between commercial and humanitarian logistics is the nature of the demand, which, in humanitarian logistics, becomes unpredictable in terms of time, location, type and size [40] and is also characterized as sudden in very high quantities. And short lead times for a wide variety of supplies [2, 25].

In humanitarian logistics, demand mapping consists of analyzing the needs of the population affected by the disaster or whatever is necessary for the provision of humanitarian assistance. When a disaster occurs, demand is estimated within the first 24 hours after the disaster [2, 40]. Then, governments or humanitarian organizations such as local aid organizations – or global depending on the scale of the event – send teams of experts to assess the extent of damage and the number of people affected.

This assessment forms the basis for drawing up lists of specific items and quantities needed to provide immediate relief to affected populations. Humanitarian organizations often use rapid assessment teams, mobilized immediately after the disaster, to assess needs and demands such as the number of beneficiaries, items needed, the window of time during which assistance is required, and population resilience [44]. In addition, identifying victims' demands can help define the location of deposits and dimensioning of resources and the delivery network model to be practised [43]. The set of supplies required after a disaster is very varied and depends on factors such as the type of impact of the disaster, size and characteristics of the affected population, and economic and social conditions in the region [42].

As the primary objective of humanitarian logistics is to save lives and alleviate human suffering, immediate disaster response requires the proper supply, at the right time, in the right place, and distributed to the right people. The quantities of supplies needed referring to the amount demanded, can be calculated according to information generated by the humanitarian organisations responsible for the assistance during the disaster response time. However, a widespread problem these organisations face is the difficulty obtaining information in the response phase since the flow of information is still poorly structured due to the characteristic of disasters, which destroy existing services and infrastructure, including information systems. In addition, communication may compromise the assessment of demands. Thus, as uncertainty in forecasting demand is one of the characteristics of this stage, needs are usually estimated based on approximate forecasts of the number of people affected and the type of supply needed [41], and many actions are guided by estimates and assumptions [42].

In addition, the anticipation of information can assist in the agility of the aid, allowing a quick adaptation to possible changes regarding the needs of the beneficiaries [44].” The identification and accurate understanding of the disaster situation through information technology help in the effectiveness of the response capacity [44]. Information systems have been widely used for this purpose. DesInventar (Disaster Inventory System) (2016) and HDX (Humanitarian Data Exchange) (2016) are examples of free tools containing helpful information that can help identify needs in the disaster response phase [2].”.

Desinvetnar provides information about disasters, such as the number of deaths, injuries, location, type of event, damages and financial losses, damaged routes, and destroyed dwellings, which can be consulted online or in real-time. HDX, in turn, is a platform for sharing information and humanitarian data, such as the context in which a humanitarian crisis is embedded, data on people affected by the disaster and their needs, data on the response of organizations and people who seek to help those who need assistance [2].

In practice, several humanitarian organizations have already used information technology to identify demands in the humanitarian response. For example, the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) used georeferenced information systems to describe a disaster region at different scales. The maps developed provided the number of dead, injured, displaced and missing, coverage areas for various humanitarian aid groups, the location of hospitals, clinics and pharmacies, and the most frequent disease outbreaks in each region [44].

Thus, the immediate response to the disaster is related to demand management [45]. Hence, the previous start for disaster response is mapping the affected population, the need for supplies and essential services, and evaluating the affected region's logistical capacity. Seeking information on possible access routes, fleet capacities, and possible warehouses or shelters makes the Humanitarian Logistics operations possible, specifying the most urgent needs of the affected population. And, consequently, contributes to the efficient management of these needs in the disaster response phase.

Material Flow Management (MFM) in Humanitarian Logistics

By Eduardo Henrique Lima da Paixão (LS Educacional, Brasília/DF)

The logistics in question is more attentive to moving something or someone from one point of origin to another. At the same time, supply chain management concentrates on the relationships between the actors involved so that the movement in question happens, and both crucially linked to the responses to disasters.” [1]. (Tomasini and Wassenhove, 2009).

How efficient is the Supply Chain in Humanitarian Operations to correctly serve the largest number of people who are victims of disasters? Logistics is closely related to the planning process, controlling the flow of materials and information.

The humanitarian aid chain must provide humanitarian support in food, water, medicine, shelter and supplies to areas affected by large-scale emergencies. [two].

Thus, the supply chain in humanitarian logistics is a highly complex procedure since it encompasses challenges such as time, communication, financing, training and equipment.[3]

According to Cozzolino (2012), Humanitarian Supply Chain Management involves several phases, such as the problem identification activity (recognition of the region and initial assistance to victims) until all necessary relief tasks are met. [4]

According to Scarpin and Silva (2014), the logistical process in post-conflict or natural disaster situations depends on suppliers, donors, distribution centres, and beneficiaries.[5] Humanitarian logistics organizations use a leaderboard regarding the distribution of resources, which are divided into the following phases:

Processes to alleviate the suffering of people in vulnerable areas.



Phase 1 A representative is sent to the event site to survey demand and estimate the resources and supplies needed.

Phase 2 Ordering necessary materials from suppliers close to the affected regions to shorten the delivery time of supplies.

Phase 3 Supplies donations must be sent to a distribution centre in a strategic location.

Phase 4 Its purpose is to anticipate problems, working proactively to ensure the quality of food and medicines.

Phase 5 Measurement parameters that are directly linked to the quality of humanitarian operations (Internal and External Performance Measures; Flexibility Measures; Inventory Costs and Transport Cost)

Phase 6 The area that coordinates the movement, stock and order processing of final products, divided into 03 (three) levels of administration

- Strategic Level;
- Tactical Level;
- Operational Level.

Humanitarian logistics challenges regarding material flow

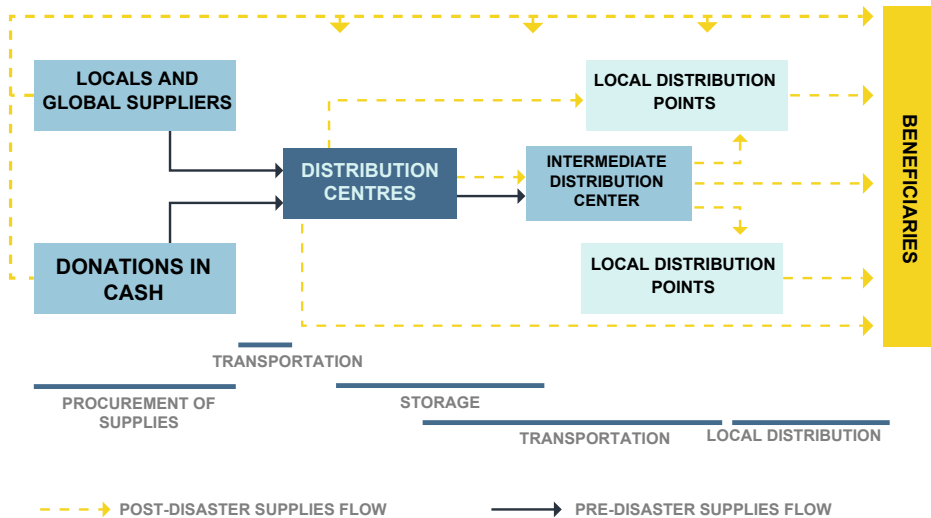
The Humanitarian Operations Supply Chain dynamics in each organization must work during and between disasters, especially in cases where the parties reach a high level of synchronization. Therefore, the steps are divided into the following levels:

- a. Strategic Level: The management team decides the mode of the distribution system. Examples: prepare an emergency plan, supply plan, kit plan, warehouse capacity plan, transport capacity plan, transport network plan and strategic transport plan; [6]
- b. Tactical Level: the level at which the intermediate management teams use their resources in the best and most significant way possible. Their concerns include: the idleness of the request transmission equipment being minimal; optimized occupancy of the storage area and optimization of means of transport, in general at the maximum possible levels for the load;
- c. Operational Level: the level at which supervision ensures the execution of daily tasks to ensure that materials reach the place of need. The knowledge of loading, packaging, adequacy and inventory levels are some of the operational activities, among others.

The phases in the Material Flow Structure

Blecken (2010) found four phases in structuring the flow of materials in this chain. Those can be seen below:

- **Assessment:** in this phase, the impacts caused by the disaster must be quickly, accurately and quantitatively assessed, as well as the needs of the affected communities. Also, the priorities must be set for carrying out humanitarian aid planning;
- **Acquisition:** ensure that all aid supplies were acquired in proper quantities and in good condition, given the planning carried out in the previous stage;
- **Storage:** The purpose of this phase is to store supplies until they are moved to the area affected by the disaster, protecting them from deterioration, damage and theft. It also serves to protect against lead-time variation and demand volatility;
- **Transport:** optimize the movement of the product from the point of collection to the end of the destination. It encompasses the most different modes and their displacements – both nationally and internationally.



Source: Adapted from Balciik et al. (2010, p. 25) [7]

The performance of any disaster response depends on the level of preparedness, i.e. the pre-disaster phase. According to a simulation model created by the Massachusetts Institute of Technology (MIT), small expenses related to disaster preparedness significantly decrease the time and cost of response logistics (Gralla, 2007). [8]

Phase classification of Humanitarian Logistics

Cezar (2014) classifies Humanitarian Logistics into distinct phases: preparation, response, and immediate reconstruction. [9]

The preparation phase is based on working on the capacity to respond to a disaster, which is possible through actions such as working with communities in risk areas. This phase demands a continuous duration due to the unpredictability of a disaster. However, the logistical volume applied and the level of urgency required are small since there are not many flows. In addition, it should be noted that this is a local phase. That is, it depends on those involved in the risk environment.

The response phase is the one that takes place right after the disaster, with activities focused primarily on saving lives and later preventing further damage. This process can take from months to years – depending on the scale of the disaster. The response phase is when extreme urgency is required in the flows and processes, demanding a significant involvement of logistical elements. In addition, the collection is no longer local and expands to the rest of the world that wants to contribute.

Recovery is a crucial point of action. The recovery phase is where we seek to help the affected communities, returning them to the conditions before the disaster. Logistics is losing its ostensible character of action, but it is still very present. It has a certain level of urgency, but it can take months or even years to complete. It occupies most of the time of humanitarian action, taking an average of 5 to 10 years to be solved. (CEZAR, 2014, p.38).

According to Tomasini and Van Wassenhove (2009), the key to competitiveness in the humanitarian chain is to extend the concern with cost efficiency and speed to include agility, adaptability and alignment.

In humanitarian logistics, performance measures are specialized, focusing on assisting people in the shortest possible time. These measures aim to respond with timely response to the uncertain nature of disaster events, understanding that the scenario is unstable, random and demand can increase. According to Nogueira et al (2009) [10], these measures are defined in:

- Volume flexibility: allows the output level of products or supplies to be changed as needed;
- Shipping Flexibility: allows for changing shipping times;
- Mix flexibility: it is possible to vary the set of supplies at any time;
- Product Flexibility: New products can be added to the supply set when needed.

Cash flow, funding and donation

*By Fabíola Negreiros
(Lab Hands, PUC-Rio)*

Most global humanitarian organizations engage in a combination of large-scale development and assistance activities [7]. Large-scale humanitarian assistance or relief refers to food, shelter and emergency services immediately following a natural or disaster by human activities. An example of assistance was the initial 90-120 days of services provided by various humanitarian organizations to help people affected by the Indian Ocean tsunami in December 2004. Development activities refer to long-term assistance to create self-reliance and sustainability in a community. An example of this is development programs, such as the one designed by World Vision India to feed, educate children and teach women basic business skills in the slums of southern India [7].

When we talk about funding within humanitarian logistics, it is necessary to understand some fundamental characteristics, such as the nature and source of funding [46]. For essence, donations are categorized into contributions of supplies (food, medicine, water, etc.) and monetary donations, which can be cash (cash in-kind) or voucher (Bolsa Família type cards, for example).

The volume of humanitarian money and voucher assistance continued to grow in 2020 across all types of humanitarian organizations. In particular, the voucher modality can be rapidly scaled up where markets are functioning well, and payment infrastructure is in place [48]. In addition to nature, funding can be categorized according to the source. Humanitarian logistics distinguishes provider sources into two: private donations from individuals and institutional grants from large funding organizations, such as government development aid agencies (e.g., the US Agency for International Development, USAID). Different characteristics are associated with these various sources. Institutional supporters (donors), for example, more often consider the performance of the humanitarian organization when deciding on a donation than private donors. On the other hand, personal contributions are considered a more flexible and receptive source in a sudden disaster, as institutional donors have longer lead times for the provision of resources [46].



Figure 24 – Classification of funding by nature and source.

Some other important characteristics of funding in humanitarian logistics can be highlighted, such as allocation, quantity, timing, flexibility and unpredictability of funds. As for the allocation, the donors first decide if and to whom to donate. Then, in a second stage, the humanitarian organizations decide how they will use the received resources - if these resources still do not have a certain destination.

In this sense, funding can be earmarked funding or unearmarked funding. The latter allows for more flexible and responsive programming of resources, unlike targeted donations, which already have a specific destination. As a result, the proportion of untargeted humanitarian funding received by United Nations agencies grew in 2020 – rising for the first time in five years to 17% while remaining below 2016 levels of 19% [48].

Another relevant feature of the financing concerns the amount donated. The cost of responding to a disaster is highly related to the danger of the disaster. Earthquakes, tsunamis, cyclones and floods cause extensive damage to infrastructure, requiring significant reconstruction. Drought, in turn, does not damage infrastructure but destroys crops and kills livestock, requiring long-term assistance and livelihood restoration. Most natural hazards are the main drivers of displacement. At the same time, epidemics do not cause massive damage to infrastructure but require expanded health services and generate a broad spectrum of negative economic impacts [47]. In addition, the cost of responding to a disaster will also vary according to contextual factors, such as the degree of infrastructure development in the region exposed to the disaster; how prepared and empowered the government and community leaders are; the geographic distance of affected populations; the levels of political stability and insecurity in the affected area; and whether people can heed early warnings - even a few days' notices of a cyclone or flood can allow people to move their assets out of the danger area [47]. Many factors influence the amount of funding needed. Still, once the needs of disaster or crisis are precise - certainly when resources are issued and national capacities are strained - international allowance must be made available quickly to reduce the short- and long-term human and economic costs. In the literature, several studies address the effects of limited funding on the provision of humanitarian aid and, consequently, the impacts of this limitation on meeting the needs of beneficiaries.

Regarding the timing of funding, it must be timely and not late, as this critically affects the speed of disaster response. **Funding flexibility**, in turn, describes an essential property of funding: the possibility of using funds in the way that humanitarian organizations deem necessary to best fulfil their mission - if these donations do not have a well-defined destination. Finally, the unstable nature of funding, caused by the **volatility of contributions**, makes planning processes difficult. This variability is influenced by a greater preference of donors for short-term needs and emergencies rather than preventive and long-term measures.

Most international aid flows from the world's wealthiest countries to low- and middle-income countries, as populations living in poverty disproportionately risk suffering humanitarian crises [48]. Those living in extreme poverty (on less than US\$1.90 a day), with reduced capacity to manage and respond to disasters, whatever that disaster, are increasingly concentrated in countries facing vulnerabilities and fragility, and currently deal with the high risk of the new Coronavirus, which triggered the Covid-19 pandemic in the world in 2019 [48]. The pandemic has further exacerbated the existing need and fueled new crises in countries that previously did not need humanitarian assistance, thus increasing the number of people in need of humanitarian aid and the number of countries in humanitarian crisis. Moreover, the impacts of the pandemic have exacerbated the need in many existing crises. As a result, the number of countries in a prolonged crisis has grown from 31 in 2019 to 34 in 2020. **The total value of international humanitarian assistance in 2020 amounted to US\$30.9 billion, of which US \$30.9 billion. \$24.1 billion came from European Union (EU) governments and institutions, and the rest (\$6.7 billion) from private sources, which can be individuals, foundations, companies and corporations, and national societies, among others [48].**

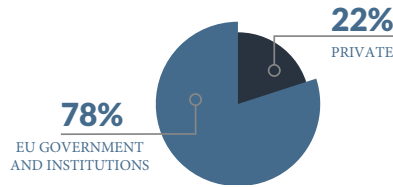


Figure 25 – Proportion of international humanitarian assistance in 2020.

Large government donors strongly influence the humanitarian sector as they provide most of the funding for significant relief and/or development activities. The United States, Germany, and the EU institutions among these donors stand out. Turkey is highlighted as the humanitarian assistance that the country voluntarily reports to the Development Assistance Committee (DAC) is primarily related to expenditure on hosting Syrian refugees and is therefore not strictly comparable to humanitarian assistance. From other donors, which are highlighted in the Figure below – Figure 26 [48]. In addition to Canada and Saudi Arabia, other European countries were essential donors to humanitarian aid agencies responding to disasters and humanitarian crises in 2020. Among the countries receiving humanitarian assistance, the vast majority are African countries.

THE TOP 10 DONOR COUNTRIES OF INTERNATIONAL HUMANITARIAN ASSISTANCE IN 2020

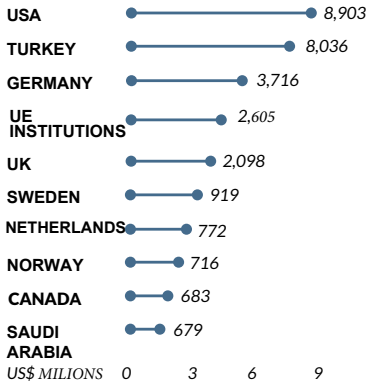


Figure 26 - Top 10 humanitarian aid donor countries in 2020. Source: [48]

THE TOP 10 RECIPIENT COUNTRIES OF INTERNATIONAL HUMANITARIAN ASSISTANCE IN 2020

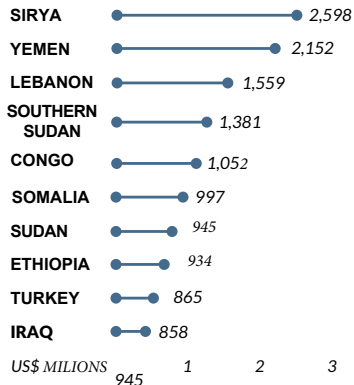


Figure 27 – The ten largest recipient countries of humanitarian aid in 2020. Source: [48]

International financial institutions traditionally associated with development activities are increasingly active in countries facing humanitarian crises, playing an increasingly important role in crisis response. The Bill & Melinda Gates Foundation, for example, is a non-profit organization that fights poverty, disease and inequality in the world's low- and middle-income countries.

In addition to foundations, individual donors and the private sector have also become essential funding sources for aid agencies. Multilateral Development Banks (MDBs) have become increasingly active in crisis contexts in recent years, with assistance volumes doubling since 2014 to more than \$10.7 billion in 2019 [48]. The World Bank, for example, is responsible for a large amount of funding for low- and middle-income countries, with a focus on the world's poorest nations. The Bank's engagement in crisis contexts is driven by its focus on promoting sustainable growth for people living in poverty, recognizing the negative impact of crises on development, and the need to build resilience to disasters and emergencies. Its mission is not directly humanitarian. World Bank funding is generally earmarked for long-term development projects; however, the institution provides funding when developing countries are affected by crises [48].

Despite the substantial increase in the need for humanitarian assistance, funding of resources failed far short of targets in 2020. In total, the proportion of requirements met dropped to a record level (52%), resulting in a shortfall of US\$18.8 billion [48]. Moreover, the response to the Covid-19 pandemic has further highlighted weaknesses in current approaches to the financial crisis. Such funding is often found just after a disaster has occurred and where disbursements can be slow, poorly coordinated and therefore uneven. One solution to this obstacle is previous funding, which seeks to resolve this issue through pre-agreed funding and release protocols. However, despite some promising pilot projects, this solution has yet to be fully integrated, along with the necessary mechanisms to track funding [48].

Funding in humanitarian logistics plays a crucial role in supporting countries during significant crises and disasters. Identifying how best to implement this funding is critical to the efficiency and effectiveness of operations. Nevertheless, in this context of increasing needs and difficulties in humanitarian financing, it is essential to obtain a broader targeting of funds aimed primarily at development activities in countries in crisis [48].

Suppliers in Humanitarian Logistics

*By Ivan Calderon Arrueta Ribeiro
(LS Educacional, Brasília/DF)*

The supply processes within Humanitarian Logistics are often considerable and have few facilities. As one of the most vital points in this area, supply constitutes the gateway and the beginning of the supply chain.

Knowing and developing the processes and establishing and mapping the flows that will see the path from the supplier to the receipt of material policies will be of great importance for the success and efficiency of the operation.

For business logistics, supply is a process that manages the flow of goods, information and finance from the initial point of the chain to the final consumer. Therefore, it is also possible to understand human logistics similarly. It is necessary to manage the flow of goods, information and finances from the actions taken to the people classified as disasters.

However, the main difference is in demand for material goods and food – which occurs irregularly, unexpectedly and with a high degree of uncertainty and volatility. Usually, this pattern is estimated in the first hours of the event (such as natural disasters), so there is no forecast or previous planning. This characteristic makes the organization of processes even more difficult.

Suppliers

Supply in humanitarian logistics is distinguished by having multiple suppliers and supporters (donors) in many cases without prior agreements.

Among the challenges of humanitarian logistics, it is not always possible to fulfil the three processes that business logistics usually meet concerning suppliers: demand, supply and satisfaction management. The difficulty lies in the fact that many of the agents involved in humanitarian logistics are not fully interconnected to meet the needs, making it difficult to control the process



Figure 28 - Agents involved in supply assistance of inputs that support humanitarian logistics.

It is common among humanitarian logistics organizations to use a classification system related to the receipt and distribution of resources, divided into the steps illustrated in the following figure.

Assessment: a representative of a humanitarian assistance organisation or civil defence body is sent to the event site to survey the local demand, estimating the resources and supplies needed.

Procurement: orders for necessary materials are placed with cash donations. It is strategic to look for suppliers close to the affected regions to shorten the delivery time of supplies.

Transport: transport will be differentiated depending on the disaster site.

Distribution: It should be noted that it will not always be possible to count on suppliers close to the affected areas. Therefore, it is recommended to contact the national civil defence service and check whether suppliers who work in disaster situations have a price register.

Suppliers who participate in the humanitarian agenda also become strategic agents, and it is essential to know why these suppliers will be involved in a given demand. There are cases where political issues, for example, can interfere with the result of the delivery process.

Even so, registering those willing to provide the various resources demanded is highly recommended. In addition to keeping a record with information relevant to the process, you can maintain and share a portfolio of suppliers or donors that may be needed at other events. For example, many humanitarian agencies around the world have up-to-date supplier catalogues.

Finally, it is important to emphasize the importance of the supply process for humanitarian logistics, which is the gateway and the beginning of several operations.

Beneficiaries - homeless people, migrants, refugees and animals

*By Fabíola Negreiros
(Lab Hands, PUC-Rio)*

In the humanitarian context, the main users of the service are known as victims or beneficiaries. These are the populations, people, communities or animals directly affected by a disaster, and these are the main stakeholders in humanitarian aid. Therefore, all the actions of the other stakeholders must meet the needs of the beneficiaries. In this way, beneficiaries should not be considered passive stakeholders but active partners in humanitarian operations, as they are often the first responders to a disaster [10, 27].

In this context, it is important to bring to this discussion the situation of vulnerability in which the beneficiary finds himself. Social vulnerability is a multifactorial concept; that is, it can occur due to housing, income, and education. Therefore, it is essential to emphasize that social vulnerability is not synonymous with poverty, as its concept is related to the fragility of a particular group or individual for reasons not only socio-economic but also historical, race or ethnicity [29].

The vulnerable are those who, for various reasons, do not have the developed capacity to prevent, resist or circumvent potential impacts and, therefore, are at risk [32]. They live on the margins of society, people in poverty, informal workers, refugees, the elderly, people with disabilities, and children, among many others.

The global crisis caused by the Covid-19 pandemic has further alerted the world about how disasters can impact social groups **asymmetrically**. For example, several studies have warned about the consequences of the pandemic for vulnerable populations, such as the homeless and community residents. These individuals are vulnerable due to their precarious housing, sanitation, and drinking water conditions. In addition, they usually have a low level of income and education, are subject to underemployment or unemployment, and face family disorganization and lack of social participation. In addition, they lack social and health assistance or receive incomplete services.

Migrants and refugees also fall into vulnerable groups, as they are people who leave their countries of origin to live in another. Refugees are people who have escaped armed conflict, persecution, poverty or any other dangerous situation that has forced them to leave their country of origin, cross international borders and seek safety and help in the closest countries [30]. Migrants, in turn, move not because of a direct threat of persecution or death but mainly to improve their lives in search of work or education, for family reasons or other reasons [30].

Another group of vulnerable beneficiaries to disasters, especially natural ones, is animals. Earthquakes, volcanic eruptions, tsunamis, and forest fires can have serious consequences for animals. Many drown or are buried alive by earth, ash, lava or snow, or even crushed by trees and rocks. Others are hit by hail or suffer serious injuries, including cuts and scrapes; respiratory and digestive disorders; corroded teeth; malnutrition and poisoning from contaminated food and water [31].

In fact, in addition to the magnitude of the event, **conditions such as the community's response capacity; individuals' vulnerability and animals exposed to the disaster directly influence the severity of the consequences of the disaster.** More resilient and less vulnerable communities would be able to respond to disasters more efficiently and effectively, minimizing the loss and damage of whatever catastrophe it may be. **The higher the level of capabilities and opportunities, the lower the vulnerability to adverse events.**

VULNERABILITY X RESILIENCE

Risk of the capabilities of individuals deteriorating

Who is vulnerable?

People in conditions of poverty, casual workers, women, children, the elderly, the socially excluded, disabled people, immigrants, refugees, animals, and minorities, among others.



People's ability to deal with and adapt to crises.

Why?

Because people with limited capacities, unfortunate social positioning, low social cohesion, susceptible periods in the life cycle, and low performance, among others.

To What?

Natural disasters include earthquakes, hurricanes, droughts, floods, epidemics, or tragedies caused by human activities, including wars and refugee crises.

Figure 29 - Vulnerability and Resilience. Source: Adapted from [32].

Finally, just as commercial supply chains integrate consumers into their chain, humanitarian organizations need to focus their actions on the beneficiary, communicating appropriately with them and listening to their voices to create sustainable communities and meet their needs. Urgent when disaster strikes. Beneficiary satisfaction may also be related to the collaboration between stakeholders in providing supplies and the communication of information regarding the tragedy. This communication is an essential factor for identifying possible adverse effects existing in the operations.

Stakeholders - government, civil society organization and armed forces

*By Fabíola Negreiros
(Lab Hands, PUC-Rio)*

The management of humanitarian aid operations involves several actors; as usual, no one actor alone has sufficient resources to respond effectively to a significant disaster. Moreover, each of these actors can have a high degree of heterogeneity in culture, purposes, interests, mandates, capacity and logistical specialization [25]. In this context of humanitarian operations, ten main stakeholders are identified and organized into three groups: People, Private and Public, including the last stakeholder, the beneficiary, centre of the Public-Private-People Stakeholder Relationship Model for disasters and humanitarian operations [10].

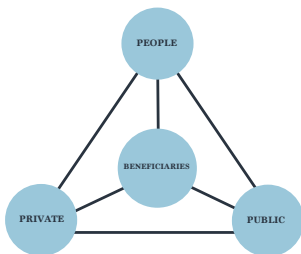


Figure 30 - Public-Private-People Stakeholder Relationship Model for disasters and humanitarian operations. Source: Adapted from [10].

The **Public** group comprise military, government, and legislative and regulatory bodies; the **Private** includes media, direct suppliers and the private sector; while the **People** group involves the local aid network, donors and the international aid network. In the centre, the beneficiary stands out, the target of all actions in humanitarian operations by previous stakeholders. Therefore, the **beneficiary** is the recipient of help from other interested parties or those affected by a disaster [10].



The **militaries** stand out as essential actors in humanitarian operations, summoned to provide prompt assistance (installation of hospitals and fields, telecommunications, repair of routes) due to their high capacity and experience in planning and logistics associated with the rapid coordination of the flow. Large amounts of supplies and people [3, 25]. Military forces have immediately available: food, medicine and fuel, and engineering and logistical resources for transport, communication and human resources to distribute all these necessary supplies in case of disasters [26].



The **governments** are the enablers of the flow of humanitarian logistics after a disaster has occurred. They have the power to authorize operations and mobilize resources. It is, therefore, the stakeholder with the political capacity to govern assets and operations among stakeholders [3, 10]. Moreover, without the authorization of the host government, no other actor - except national aid agencies and the military - can operate in the disaster scenario [11].

The **Legislative and Regulatory** system is responsible for developing national and state laws to provide guidance and authoritative power. In addition, such a system influences communication between organizations, creating agendas and developing knowledge and technology [27]. It is also one of the actors responsible for overseeing policies and programs at the national level and the actions of other stakeholders [28].



The **private sector** comprises companies that generally do not play a vital role in decision-making in humanitarian operations. Thus, this sector is driven to participate in humanitarian efforts as they are affected by heavy losses when disasters interrupt the flow of their business. Therefore, companies invest in restoring business continuity, mitigating the economic impact of such interruptions [10].



The **direct supplier** differs from the generic private sector. Certain companies have the experience and resources to play more direct roles in creating safer artificial environments [27]. The relevance of this stakeholder is due to its investment activities, mainly in risk areas, such as partnerships between construction companies, entrepreneurs, infrastructure developers, insurance agents, farmers and owners of tourist enterprises [10].





Donors provide most of the funding for major humanitarian relief activities. Generally, donations consist of providing financial means (cash donations) to support humanitarian operations or providing goods and or services free of charge (in-kind donations) during logistical operations [10]. This stakeholder comprises foundations, the private sector, governments and individual donors as sources of funds for aid agencies [3, 10, 25]. Hence, a stakeholder within its specific role can provide in-kind donations. Regarding the Stakeholder Relationship model, the term “donor” refers to one that provides financial resources exclusively to finance humanitarian assistance operations [10].



The **media** has been active in publishing news, especially about the post-disaster impact [10]. This stakeholder is often critical and affects relief operations as humanitarian organizations seek visibility to attract more resources from key donors and the public and exert pressure on relief agencies [25].



The **international aid network** contains key actors who coordinate, from outside the country, the aid provided to the country affected by a disaster. In addition, volunteers from outside the disaster site are also considered this stakeholder [10]. This stakeholder operates under the international laws of the affected country, provides, transports and delivers its aid and has political motivations for giving humanitarian relief [3, 10].

The **local aid network** comprises a range of organizations such as universities, non-governmental organizations (NGOs) and community organizations. These entities characterize themselves as regional and specific aid agencies of the country affected by a disaster, with their political motivations to provide humanitarian aid [3,10]. In this sense, those stakeholders have the potential to achieve better results in the distribution of support. Moreover, they have an extensive network already based locally in several regions, generally associated with social and religious causes. Hence, it contributes to greater cohesion and collaboration by relying on people willing to help those in need. In addition, independent volunteers from the disaster-affected country can also be considered part of local aid networks [10].



“The issue of humanitarian logistics stands out as a critical instrument for the success or failure of the response process. The governance power attributed to the public entity is not enough to provide the affected citizen with their primary needs (mention hygiene, food, and clothing, among others). On the other hand, the private sector, which often has inventory and logistical distribution capacity, needs coordination and control of operations. Finally, civil society must engage the protocols and procedures that are socially and economically fair and effective toward a complex response process. Those protocols are the only way to create a synergistic and suitable relationship between the public entity, the private sector and the population affected by disasters. In this complex environment in which the social network is intended to be preserved, the basic principle of cooperation and coordination must be respected by civil society. Thus, mitigating as much as possible the impacts of disasters to protect life and offer dignity to those affected.”

Frederico Pedroso - Disaster Risk Management Specialist.
World Bank



Performance measures - response time to disaster, demand suppressed, and beneficiary expectations

*By Fabíola Negreiros
(Lab Hands, PUC-Rio)*

Performance measurement is the technique used to quantify the efficiency and effectiveness of business activities. Efficiency deals with the relationship between the economical use of resources and the level of satisfaction. Effectiveness assesses whether the outcome of an activity is in line with what was previously planned [33]. While in commercial logistics, the focus is on financial performance, in humanitarian logistics, the main objective is to meet the different needs of stakeholders [34] with a focus on alleviating the human suffering of those in need.

For a humanitarian operation to be considered successful, it is necessary to meet the urgent needs of the population to reduce the vulnerability of victims in the shortest possible time [1]. In this sense, in the humanitarian context, performance evaluation is related to the efficiency and effectiveness of organisations conducting their operations to assist beneficiaries [35, 36].

Efficiency objectives minimise operating costs and travel times. In contrast, effectiveness objectives maximise, for example, the speed of service or the amount of demand served [37]. In addition to the goals of efficiency and effectiveness, humanitarian operations must also be carried out, taking into account the objectives of equity. These objectives refer, in turn, to the equal distribution of goods and services to beneficiaries [37].

To measure and analyze the real performance of activities and decision-making of humanitarian organizations is necessary to develop indicators. It allows the monitoring of the main variables of interest to the organization and enables planning actions to improve performance. Therefore, performance indicators are designed to help organizations towards the objectives and monitoring of processes and compare the current situation with a goal or with previous conditions, according to pre-established criteria [38, 39].

In the humanitarian context, performance indicators can be used, for example, to assess the quality of relief provided by humanitarian organizations to victims of a disaster. Monitoring these indicators also contributes to improving humanitarian operations. It allows organizations to determine why specific actions achieve better or worse results than others.

In this way, by making use of performance indicators, humanitarian organizations are able to:

- **Analyze current performance and use it as a basis for plans in the future;**
- **Identify and eliminate causes of failed processes;**
- **Inform donors, partners, or even civil society about the continuous improvement of their processes;**
- **Use accurate data to have more negotiation power with donors, suppliers and service providers; and**
- **Improve its image and reputation of its logistical capacity [7].**

For the definition and construction of indicators, some elements need to be considered. Firstly, it is important to emphasize that the units of analysis of the indicators vary in time, quality, cost and quantity. In addition, indicators must be: understandable, based on collected data, actionable and usable [35].

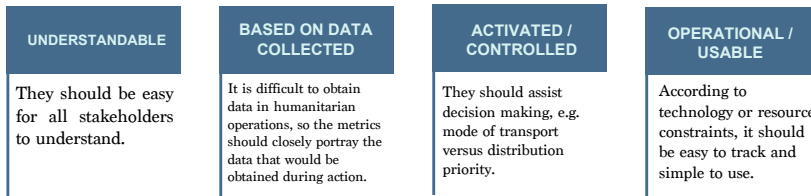


Figure 31 – Principles of indicators [35].

Some useful indicators for evaluating the performance of humanitarian operations include:



% OF MEDICINES DELIVERED ON TIME TO THE CORRECT LOCATION

Area of Interest:	<i>Health and care</i>
Measurement unit:	<i>Quantity</i>
Principles for use definition.	<i>Understandable, Based on collected data, Actionable, Usable.</i>



TIME RESPONSE

Area of Interest:	<i>Attendance</i>
Measurement Unit	<i>Time</i>
Principles for use definition	<i>Understandable, Collected-based, Actionable, Usable.</i>

Therefore, performance indicators help humanitarian organizations to define, evaluate and improve their performance in areas considered essential to the organization.

Vehicles and supply

*By Eduardo Henrique Lima da Paixão
(LS Educacional, Brasília/DF)*

Planning from previous disaster experiences can provide better future demand for vehicle and equipment needs.

Novaes (2007) describes that the supply chain corresponding to humanitarian assistance uses a similar scheme. The objective is to ensure that the flow of resources originating from the collection of donations can reach the places [2] of people in difficulty through distribution means – such as shelters, relatives' houses, and churches.

Thus, the stakeholders must share knowledge and information to coordinate response actions (SAMED; GONÇALVES, 2017). [3]

One of the priorities will be to carry out a survey of transport service providers (as well as government entities or private organizations with available fleets) that can assist in humanitarian operations, identifying the types of vehicles and their capacities.

In general, humanitarian operations broadly use road and air transport. However, it is necessary to evaluate the best way to use other modes (waterways and helicopters, for example). The idea is to provide more efficient support to distribution activities in terms of loading strategy and logistical support for the operation.

Vehicle operations must consider current road conditions, fuel availability, and damage to airports and ports. Victorian et al. (2011) [4] consider the development of mathematical models and algorithms that find solutions for a better strategy. Experts present a model for optimising aid delivery based on time, cost, trust, security and equity.

The priority of Humanitarian Logistics is the transport of first aid materials, food, equipment and rescue personnel from the supply sites to the various destinations within the region affected by the disaster. This transport also covers the evacuation and transfer of affected people to hospitals or outpatient centres safely and rapidly.

In this sense, the decision-makers (Public-Private-People Stakeholders) must have the processes organised to minimise improvisation toward maximising the efficiency of the activities. Thus, providing and reducing the response time to the needs of the affected people.

One of the problems with vehicles is calculating the distribution and the best routes and necessary equipment. For this, it is required to observe the following questions:

- To minimize physical distribution problems of the materials and the number of vehicles and equipment needed, it is possible to separate the geographic region into smaller zones;
- The vehicles required for the operation and a service team are allocated to each zone;
- A route is appointed to each vehicle – including stopping places, collected or delivery points, service attendance, etc.;
- The service must be performed within a predetermined cycle time;
- Vehicles are dispatched from a warehouse, where goods (or services) are allocated according to the zones.

Finally – The following questions may be asked (so that a specific configuration is structured in the answer for each occasion) to assist in configuring the need for vehicles and equipment:

- How to separate the service region into service zones?
- How to choose the most suitable vehicle/team for the service?
- What fraction of the service (collected or distributed load, number of calls, etc.)?
- What is the ideal frequency of services?
- How, finally, to select the most appropriate configuration?

References

- [1] Van Wassenhove, L. N. (2006). Humanitarian aid logistics: supply chain management in high gear. *Journal of the Operational research Society*, 57(5), 475-489.
- [2] Leiras, A.; Yoshizaki, H. T. Y.; Samed, M. M. A.; Goncalves, M. B. (2017). *Logística Humanitária*. 1. ed. Rio de Janeiro: Elsevier, v. 1.
- [3] Kovács, G., & Spens, K. M. (2007). Humanitarian logistics in disaster relief operations. *International journal of physical distribution & logistics management*.
- [4] Tatham, P., & Christopher, M. (Eds.). (2018). *Humanitarian logistics: Meeting the challenge of preparing for and responding to disasters*. Kogan Page Publishers.
- [5] Licco, E. A. (2013). Vulnerabilidade social e desastres naturais: uma análise preliminar sobre Petrópolis, Rio de Janeiro. *InterfacEHS-Revista de Saúde, Meio Ambiente e Sustentabilidade*, 8(1).

[6] Classificação e codificação brasileira de desastres (COBRADE). (2012). Disponível em: <https://www.bombeiros.go.gov.br/wp-content/uploads/2012/06/1.-Codifica%C3%A7%C3%A3o-e-Classifica%C3%A7%C3%A3o-Brasileira-de-Desastres-COBRADE2.pdf>. Acesso em 24 de Junho 2021.

[7] Thomas, A. S., & Kopczak, L. R. (2005). From logistics to supply chain management: the path forward in the humanitarian sector. Fritz Institute, 15(1), 1-15.

[8] Overstreet, R. E., Hall, D., Hanna, J. B., & Rainer, R. K. (2011). Research in humanitarian logistics. *Journal of Humanitarian Logistics and Supply Chain Management*.

[9] Tatham, P. H., & Pettit, S. J. (2010). Transforming humanitarian logistics: the journey to supply network management. *International Journal of Physical Distribution & Logistics Management*.

[10] Fontainha, T. C., Leiras, A., de Mello Bandeira, R. A., & Scavarda, L. F. (2017). Public-private-people relationship stakeholder model for disaster and humanitarian operations. *International journal of disaster risk reduction*, 22, 371-386.

[11] Cozzolino, A. (2012). Humanitarian Logistics. *Cross-Sector Cooperation in Disaster Relief*.

[12] Tomasini, R. M., & Van Wassenhove, L. N. (2009). From preparedness to partnerships: case study research on humanitarian logistics. *International Transactions in operational research*, 16(5), 549-559.

[13] Varella, L., Maciel Neto, T., & Buss, M. B. (2013). Logística militar x logística humanitária: conceitos, relações e operações das forças armadas brasileiras. *Anais do XXVII Congresso de Pesquisa e Ensino de Transportes - ANPET*, Belém.

[14] Centre for Research on the Epidemiology of Disasters (CRED) (2020). *Disaster Year in Review 2020 Global Trends and Perspectives*. Disponível em: [CredCrunch62.pdf](#). Acesso em 2 de julho 2021.

[15] Leiras, A., de Brito Jr, I., Peres, E. Q., Bertazzo, T. R., & Yoshizaki, H. T. Y. (2014). Literature review of humanitarian logistics research: trends and challenges. *Journal of Humanitarian Logistics and Supply Chain Management*.

[16] International federation of red cross (IFRC). Responding to disasters (2021). Disponível em: <https://www.ifrc.org/en/what-we-do/disaster-management/responding/>. Acesso em 2 de julho 2021.

[17] Moynihan, D. P. (2009). The response to hurricane Katrina. Geneva (Italy): International Risk Governance Council, 27-45.

[18] United nations. UN Photo Digital Asset Management System. Banco de dados de direito livre. Disponível em: <https://dam.media.un.org//>. Acesso em 2 de julho de 2021.

[19] Haver, K. (2011). Haiti Earthquake Response: Mapping and analysis of gaps and duplications in evaluations. In *Haiti Earthquake Response: Mapping and analysis of gaps and duplications in evaluations* (pp. 26-26).

[20] Llanes, I. R., De Oliveira, F. N., & Leiras, A. (2019). Análise das operações humanitárias durante a resposta à epidemia de Ebola na África. *Anais do XXXIX Encontro Nacional de Engenharia de Produção - ENEGEP*, Santos.

[21] Goerens, Charles. Relatório sobre a crise do Ebola: lições a longo prazo e como reforçar os sistemas de saúde nos países em desenvolvimento para evitar crises futuras. (2015). Disponível em: http://www.europarl.europa.eu/doceo/document/A-8-2015-0281_PT.pdf Acesso 10 julho 2021.

[22] De Mello Bandeira, R. A., Campos, V. B. G., & Bandeira, A. D. P. F. (2011). Uma visão da logística de atendimento à população atingida por desastre natural. *Anais do XXV Congresso de Pesquisa e Ensino em Transportes - ANPET*, Belo Horizonte.

[23] Ministério Público Federal. Caso Samarco (2015). Disponível em: <http://www.mpf.mp.br/grandes-casos/caso-samarco/o-desastre>. Acesso 2 de julho 2021.

[24] Mathias, M. Drone é utilizado para monitoramento e procura de sobreviventes em Mariana, MG, Drone 42, 2015 Reportagem disponível em: < <http://www.drone42.com/drones-do-bem/drone-e-utilizado-para-monitoramento-e-procura-de-sobreviventes-em-mariana-mg/>>. Acesso em 2 julho 2021.

[25] Balcik, B., Beamon, B. M., Krejci, C. C., Muramatsu, K. M., & Ramirez, M. (2010). Coordination in humanitarian relief chains: Practices, challenges and opportunities. *International Journal of production economics*, 126(1), 22-34.

[26] Heaslip, G., Sharif, A. M., & Althonayan, A. (2012). Employing a systems-based perspective to the identification of inter-relationships within humanitarian logistics. *International Journal of Production Economics*, 139(2), 377-392.

[27] Buergelt, P. T., & Paton, D. (2014). An ecological risk management and capacity building model. *Human Ecology*, 42(4), 591-603.

[28] Khan, M. R., & Rahman, M. A. (2007). Partnership approach to disaster management in Bangladesh: a critical policy assessment. *Natural Hazards*, 41(2), 359-378.

[29] Politize. Vulnerabilidade Social: o que significa esse conceito? (2020). Disponível em: <https://www.politize.com.br/vulnerabilidade-social/>. Acesso em 2 de julho 2021.

[30] Agência da ONU para refugiados. Refugiado ou Migrante? O ACNUR incentiva a usar o termo correto. (2015). Disponível em: <https://www.acnur.org/portugues/2015/10/01/refugiado-ou-migrante-o-acnur-incentiva-a-usar-o-termo-correto/>. Acesso em 2 de julho de 2021.

[31] Ética animal. Animais em desastres naturais. (2021). Disponível em: <https://www.animal-ethics.org/animais-desastres-naturais/>. Acesso em 2 de julho de 2021.

[32] Dicionário do desenvolvimento. Vulnerabilidade. (2021). Disponível em: https://ddesenvolvimento.com/wp-content/uploads/2019/01/DD_VULNERABILIDADE.pdf. Acesso em 2 de julho de 2021.

[33] Neely, A., Gregory, M., & Platts, K. (1995). Performance measurement system design: a literature review and research agenda. *International journal of operations & production management*.

[34] Schiffing, S., & Piecyk, M. (2014). Performance measurement in humanitarian logistics: a customer-oriented approach. *Journal of Humanitarian Logistics and Supply Chain Management*.

[35] Beamon, B. M., & Balcik, B. (2008). Performance measurement in humanitarian relief chains. *International Journal of Public Sector Management*.

[36] Çelik, M., Ergun, Ö., Johnson, B., Keskinocak, P., Lorca, Á., Pekkün, P., & Swann, J. (2012). Humanitarian logistics. In *New directions in informatics, optimization, logistics, and production* (pp. 18-49). INFORMS.

[37] Gralla, E., Goentzel, J., & Fine, C. (2014). Assessing trade-offs among multiple objectives for humanitarian aid delivery using expert preferences. *Production and Operations Management*, 23(6), 978-989.

[38] Jayaram, J., Dixit, M., & Motwani, J. (2014). Supply chain management capability of small and medium sized family businesses in India: A multiple case study approach. *International Journal of Production Economics*, 147, 472-485.

[39] Ramezankhani, M. J., Torabi, S. A., & Vahidi, F. (2018). Supply chain performance measurement and evaluation: A mixed sustainability and resilience approach. *Computers & Industrial Engineering*, 126, 531-548.

[40] Nogueira, C. W., Gonçalves, M. B., & Oliveira, D. D. (2009). O enfoque da logística humanitária no desenvolvimento de uma rede dinâmica para situações emergenciais: o caso do Vale do Itajaí em Santa Catarina. *Anais do XXIV Congresso de Pesquisa e Ensino em Transportes - ANPET, Salvador*.

[41] Balcik, B., & Beamon, B. M. (2008). Facility location in humanitarian relief. *International Journal of Logistics*, 11(2), 101-121.

[42] Neto, T. M., Varella, Leonardo., & Gonçalves, M. Buss. (2012). Avaliação de desempenho logístico: a assistência humanitária e o efeito da sazonalidade nos rios do estado do Amazonas. Anais do XXXII Encontro Nacional de Engenharia de Produção - ENEGEP, Bento Gonçalves.

[43] Costa, S. R. A. D., Bandeira, R. A. D. M., Campos, V. B. G., & Mello, L. C. B. D. B. (2015). Cadeia de suprimentos humanitária: uma análise dos processos de atuação em desastres naturais. Production, 25, 876-893.

[44] Lima, F. S. (2014). Logística humanitária: modelagem de processos para a fase de aquisição na resposta a desastres naturais. Tese (doutorado) - Universidade Federal de Santa Catarina, Centro Tecnológico, Programa de Pós-Graduação em Engenharia de Produção, Florianópolis.

[45] De Mello Bandeira, R. A., Campos, V. B. G., & Bandeira, A. D. P. F. (2011) Uma Visão Da Logística de Atendimento à População Atingida por Desastre Natural. XXV Congresso De Pesquisa e Ensino em Transporte - ANPET, Belo Horizonte.

[46] Burkart, C., Besiou, M., & Wakolbinger, T. (2016). The funding—Humanitarian supply chain interface. Surveys in Operations Research and Management Science, 21(2), 31-45.

[47] Crossley, E., Hillier, D., Plichta, M., Rieger, N., & Waygood, S. (2021). Funding disasters: tracking global humanitarian and development funding for response to natural hazards. Centre for disaster Protection & Development initiatives.

[48] Global Humanitarian Assistance. (2021). Global Humanitarian Assistance Report 2021. Disponível em: [Global-Humanitarian-Assistance-Report-2021.pdf](#). Acesso em 26 de julho de 2021.

[49] Tomassini, R.; Van Wassenhove, L. (2009) Humanitarian logistics. Macmillan Palgrave: London.

[50] BEAMON, B.M.; BALCIK, B (2008) Facility location in humanitarian relief, International J. of Logistics: Res. and Applications, 11:2, 101-121

[51] VARELLA, L. ; GONCALVES, M. B. . A Gestão das Doações na Logística Humanitária: Estratégias para evitar o caos. In: XXIX Congresso Nacional de Pesquisa em Transporte da ANPET, 2015, Ouro Preto. Anais do XXIX Congresso Nacional de Pesquisa em Transporte da ANPET, 2015.

[52] COZZOLINO, A. (2012) Humanitarian Logistics: Cross-Sector Cooperation in Disaster Relief Management. Springer. ISBN 978-3-642-30186-5 doi 10.1007/978-3-642-30186-5

[53] SCARPIN, Marcia Regina Santiago; SILVA, Renata de Oliveira. Humanitarian logistics: empirical evidences from a natural disaster. Procedia Engineering, nº 78, p. 102-111, 2014.

[54] BLECKEN, A. Supply chain process modelling for humanitarian organizations. International Journal of Physical Distribution & Logistics Management, v. 40, n. 8/9 p. 675-692, 2010.

[55] BALCIK, B. et al. Coordination in humanitarian relief chains: practices, challenges and opportunities. International Journal of Production Economics, v. 126, p. 22- 34, 2010.

[56] GRALLA E. Preparing for Disasters: The Importance of Logistics. Massachusetts Institute of Technology, Boston, MA, Working Paper. 2007.

[57] CEZAR, Paulo Augusto de Souza. Logística Humanitária. A Atuação do Exército Brasileiro do Haiti Pós Sismo De 2010. 2014. 95 f. TCC (Graduação) - Curso de Administração, Faculdade de Economia, Administração e Contabilidade, Universidade de Brasília, Brasília, 2014.

[58] Nogueira, C., Gonçalves, M. & Oliveira A. (2009). O Enfoque da Logística Humanitária no Desenvolvimento de uma Rede Dinâmica para Situações Emergenciais: o Caso do Vale do Itajaí em Santa Catarina. In: Anais do XXII Congresso de Pesquisa e Ensino em Transportes. Novembro

[59] BLECKEN, A. Supply chain process modelling for humanitarian organizations. Journal of Physical Distribution & Logistics Management, 40(8/9), pp. 675-692, 2010.

[60] NOVAES, Antonio Galvão. Logística e Gerenciamento da Cadeia de Distribuição. Rio de Janeiro: Elsevier, 2007.

[61] SAMED, Maria Marcondes Altimari; GONÇALVES, Mirian Buss. Introdução à Logística Humanitária. In: LEIRAS, Adriana et al. (Org.). Logística Humanitária. 1. ed. Rio de Janeiro: Elsevier Editora Ltda, 2017. cap. 3, p. 27-38

[62] VITORIANO, B., Ortuño, M. T., Tirado, G., & Montero, J. 2011. A multi-criteria optimization model for humanitarian aid distribution. Journal of Global Optimization, 51: 189-208.



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