

## HUMANITARIAN LOGISTICS – MAP OF PROCESSES AND LINKS OF HUMANITARIAN LOGISTICS

<sup>1</sup>Marian SOFRANKO, <sup>2</sup>Marek ONDOV, <sup>2</sup>Andrea ROSOVA, <sup>1</sup>Kristina HORIZRALOVA

<sup>1</sup>*Technical University of Kosice, Institute of Earth Sources, Kosice, Slovakia, EU,*  
[marian.sofranko@tuke.sk](mailto:marian.sofranko@tuke.sk), [kristina.horizralova@tuke.sk](mailto:kristina.horizralova@tuke.sk)

<sup>2</sup>*Technical University of Kosice, Institute of Logistics and Transport, Kosice, Slovakia, EU,*  
[marek.ondov@tuke.sk](mailto:marek.ondov@tuke.sk), [andrea.rosova@tuke.sk](mailto:andrea.rosova@tuke.sk)

<https://doi.org/10.37904/clc.2022.4543>

### Abstract

The article deals with a very current topic, which is humanitarian logistics. Although logistics is mostly used in commercial supply chains, it is also an important tool in disaster relief operations. Humanitarian logistics is one of the types of applied logistics. It is gaining great importance in solving the preparation for eliminating possible conditions in a certain area and its subsystems due to unexpected events. It is applied logistics refers to a set of applied principles, knowledge, and logistics methods to solve problems of physical distribution, the flow of goods and services (tangible and intangible) in various areas of the economy and society. Humanitarian logistics includes elements of all circulation processes (procurement logistics, sales logistics, warehousing logistics, sales logistics, supply, distribution, order fulfilment, market) and, for example, own production, reverse logistics, and waste management, recycling.

**Keywords:** Logistics, Humanitarian logistics, Humanitarian logistics system, Processes, Strategy

### 1. INTRODUCTION

Although logistics is mostly used in commercial supply chains, it is also an important tool in disaster relief operations. Humanitarian logistics is a branch of logistics specializing in organizing the supply and storage of supplies in natural disasters or complex emergencies for the affected area and people. Earthquakes, floods, avalanches, tsunamis, or wars often have radical consequences for the people living in the affected areas. Due to the constant increase in natural and man-made disasters, attention has begun to be paid to disaster relief operations [1]. Over the last 30 years, the average number of natural disasters has risen from 125 to about 500 per year. Experts say the number of natural and man-made disasters will increase fivefold over the next 50 years; therefore, the need for effective disaster mitigation operations is essential [2]. The efficiency and effectiveness of the supply of medicines and goods necessary for survival are essential in a disaster. Several statistics demonstrate the central role of logistics in catastrophic operations by stating that logistics efforts account for 80 per cent of disaster mitigation costs [3]. The paper's main goal is to process the topic related to humanitarian logistics by systems analysis and to point out the elements and links of humanitarian logistics through a map of humanitarian logistics processes. An overview of current issues and challenges in humanitarian logistics can be set as a partial goal.

### 2. SYSTEMATIC LITERATURE REVIEW

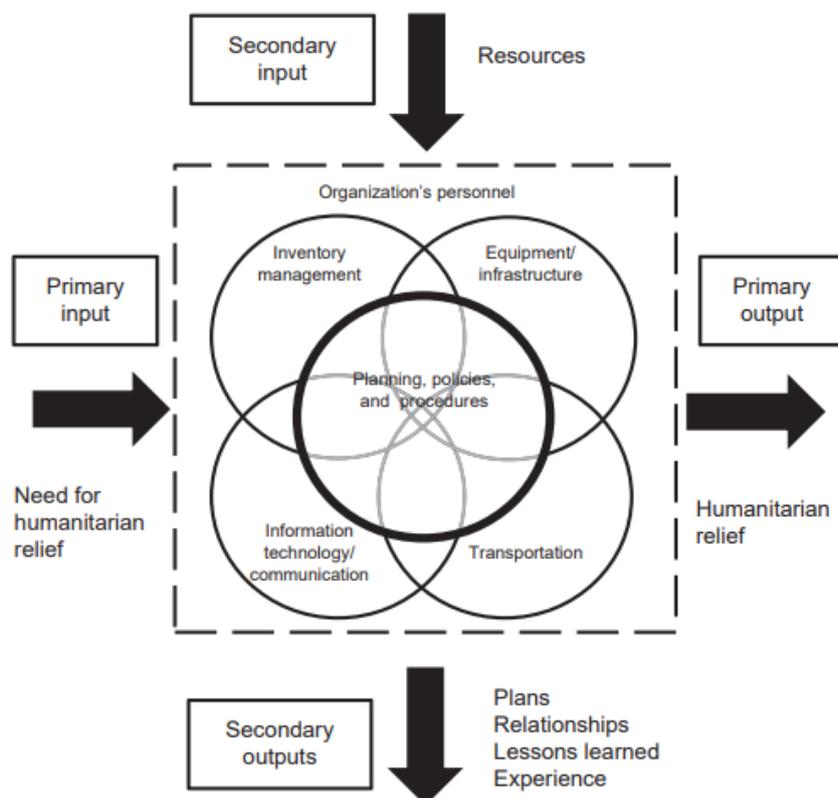
System analysis is a group of tasks and methods aimed at securing or determining the properties of the investigated process, object, or system. In the analysis of the system, the main focus is on these areas [4]:

- Links between the system and the environment,

- System functions,
- The internal structure of the system (subsystems and system elements),
- The level of management organization in the system,
- Formulation and recognition of information needs,
- Rationalization of algorithm structures in the system,
- Improving and maintaining the system,
- The adaptability of the system to the environment.

## 2.1. Definition of the term humanitarian logistics

Humanitarian logistics is a branch of logistics specializing in organizing the supply and storage of supplies in natural disasters or complex emergencies for the affected area and people. The primary task of humanitarian logistics is to acquire and provide tangible goods and services on time and in places where it is needed. Immediately after the accident, it is a matter of survival. It is mainly food, water, temporary shelter and medicine [1]. A more detailed description was made by Thomas and Mizushima [5], stating that humanitarian logistics is the process of planning, implementing, and controlling the efficient, cost-effective flow and storage of goods and materials as well as related information from the point of origin to the point of consumption to alleviate the suffering of vulnerable people. Humanitarian logistics is one of the types of applied logistics. It is gaining significant importance in solving the preparation for eliminating possible conditions in a particular area and its subsystems due to unexpected events. It is applied logistics, denoting a set of applied principles, knowledge, and logistics methods to solve problems of physical distribution and flow of goods and services in various areas of the economy and society. The ultimate goal of humanitarian logistics is to minimize distribution time, cost minimization, and response maximization [6]. A schematic view of humanitarian logistics is shown in **Figure 1**.



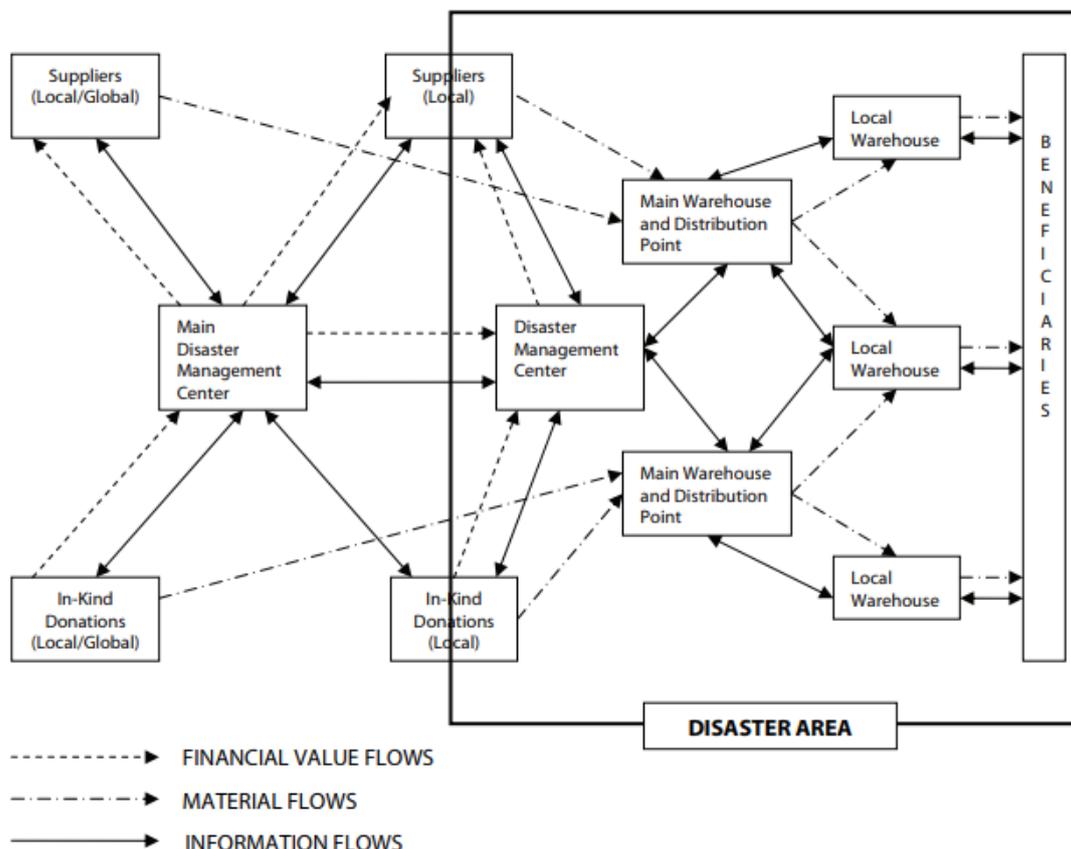
**Figure 1** Visualization of humanitarian logistics [6]

## 2.2. Humanitarian logistics tasks

Managing the flow of goods, information, and finances from a specific source to the end customer applies to commercial and humanitarian logistics. In addition, the various activities involved in commercial logistics, such as planning and procurement or transport and storage, also apply to humanitarian logistics [7]. Therefore, the importance of profitability determines. The value of commercial logistics lies in the "contribution to profitability". Therefore, business logistics focuses on reducing costs, while the primary purpose of logisticians in a humanitarian context is to aid people affected by the crisis. [8]. The concept of profit in a humanitarian context is directly related to donation agencies. Inefficient use of resources can lead to the loss of donations, and therefore the profit depends on the donor's satisfaction. To ensure high efficiency, it would be appropriate to standardize processes [9]. Firstly, humanitarian logistics aims to mitigate the adverse effects of natural disasters in terms of loss of life and economic costs. Second, humanitarian logistics is considered a data repository that can be analysed to provide post-crisis learning. Logistics data reflect all aspects, from the efficiency of suppliers and transport providers, through costs and timeliness of response, to the suitability of donated goods and information management. Therefore, it is crucial for the performance of current and future operations and programs. The organization of emergency response plans will assist in the preparation and subsequent mobilization in the event of disasters [1,10].

## 2.3. Humanitarian logistics processes

Humanitarian logistics refers to the processes and systems involved in mobilizing people, resources, skills, and knowledge to help vulnerable people affected by natural disasters and complex emergencies. By modelling the activities of the humanitarian logistics subsystems and optimizing them, we can ensure improved preparation for crisis management to ensure the basic requirements for citizens' survival in the region in significant emergencies. [11]. **Figure 2** shows a map of humanitarian logistics processes.



**Figure 1** Map of humanitarian logistics processes [12]

As can be seen from the figure above, the process is complicated by the involvement of different persons in different places. More specifically, the process brings together a variety of involved persons, including donors, local/international donor organizations, local authorities, and beneficiaries. In this process, there are three basic flows [12]:

- **Material flow:** the flow of products from donors to recipients, including food, blankets, medicines and water, and return of returned products after disasters.
- **Information flow:** includes demand forecasts, order transfers and order status reports to ensure readiness and communication.
- **Cash flow:** includes checks, cash and payment documents such as letters of credit, invoices and commercial contracts.

Developing a logistics warehouse to store all essential goods plays a crucial role in disaster response planning. Warehouses should be designed to consider precautionary measures against contamination or waste from materials. They should be arranged to facilitate deliveries to the required area in the required time and quantity. Humanitarian warehouses can be divided into four main types depending on their functions and location [13,14]:

- **General delivery warehouses,** where products are stored for a long time,
- **Slow-moving warehouses** where urgent or reserve stocks are stored,
- **Rapid rotation warehouses** where emergency stocks move in and out quickly every day or at most weekly,
- **Temporary pickup points:** where incoming supplies are stored.

Transport plays a key role in mobilizing supplies to help emergency humanitarian aid reach the affected regions. In humanitarian logistics, it is important to determine the feasibility of different modes of transport based on the level of urgency, the total cost, and the geographical characteristics of the affected zones. Different product categories require different handling methods as well as temperature control. For example, hazardous materials must be stored separately from pharmaceuticals and food. The weight and volume of the cargo are decisive factors that determine the capacity of the vehicles and the type of transport. Distance and access options also enter transport decisions, e.g., the mobilization of goods from ports to their final destinations is often limited by poor local infrastructure and unforeseen events. In most emergencies, the necessary goods, especially food and fuel, are sent by air to destinations. Although this option is expensive, saving lives is a priority in humanitarian logistics. [1,15].

### **3. RESULTS**

Evidence in recent years suggests that agencies and programs do not pay enough attention to logistics in humanitarian aid. Donors usually allocate funds to programs focusing on short-term direct relief rather than investing in systems and processes that reduce costs in the long run. The field assessment team often does not include a logistician to determine the needs of the disaster-stricken population. Logistics workers are informed about what needs to be procured and take responsibility [1]. However, most people with logistics responsibilities do not have logistics training. They achieved their positions by trial and error and improved their skills by engaging in several catastrophic situations. However, logistics and supply chain management are still largely insufficiently supported by technology in the humanitarian sector. In most cases, MS Excel is the most used software. The main reasons are the inexperience of employees in the IT sector and the keyword of financial managers in deciding on software used in organizations. Standardized processes are crucial elements for many companies to succeed, so there is a clear need to standardize processes for humanitarian logistics. Many experts believe that the ever-changing operational environment of humanitarian aid precludes complete standardization of processes. In a disaster-stricken region,

humanitarian agencies must be prepared for inadequate infrastructure. If it is not possible to deliver goods by land in extreme situations, humanitarian aid agencies can use air transport as a last resort. Another infrastructure issue is the last-mile delivery. For example, sometimes, it is impossible to provide adequate temperature control for drugs. Other shortcomings appear to be inadequate stakeholder cooperation and coordination. The main challenge for better cooperation between humanitarian aid agencies is a competitive environment with limited donor resources. Organizations tend to manage their supply chains, which they have been developing for many years. This makes the coordination of materials and human resources between organizations very difficult. The approach to the coordination solution lies in the development and dissemination of cooperation tools in information technology [2,3,7,9,16].

#### 4. CONCLUSION

After analysing the humanitarian aid logistics problems, applying the following strategies to improve humanitarian logistics will be beneficial. Each of these five strategies contributes as follows:

- Creating a professional logistics community will allow humanitarian logisticians to share knowledge and experience on common issues and create a consistent and strong voice with all stakeholders in the sector [2].
- Investing in standardized logistics training and certification will help build a group of logistics professionals who share standard processes and vocabulary and support professionalism and cooperation [9].
- Focusing on metrics and performance measurement will enable logisticians to demonstrate and improve the efficiency of humanitarian supply chains [3].
- Communicating the strategic importance of logistics will enable logistics to raise awareness of logistics' benefits and obtain the necessary funding and resources [1].
- The development of flexible technological solutions will improve responsiveness by making material flow visible and increasing the efficiency of people and processes. Furthermore, advanced information systems will create the infrastructure for knowledge management, performance measurement and training [1,7].

**Table 1** shows how each strategy addresses the specific problems of humanitarian logistics.

**Table 1** Problems affected by proposed strategies [1]

	Lack of recognition	Lack of specialist staff	Insufficient technology	Lack of institutional education	Limited cooperation
<b>Create a professional logistics community</b>	•	•		•	•
<b>Standardized logistics training</b>		•		•	•
<b>Performance measurement</b>	•		•		
<b>Communicate the importance of logistics</b>	•		•	•	
<b>Development of flexible technological solutions</b>		•	•		•

## ACKNOWLEDGEMENTS

***This work is supported by the Scientific Grant Agency of the Ministry of Education, Science, Research, and Sport of the Slovak Republic and the Slovak Academy of Sciences as part of the research VEGA 1/0588/21 and as part of the research project VEGA 1/0430/22.***

## REFERENCES

- [1] KLEINOVA, A. *Humanitarian logistics*. Bachelor thesis. 2021, p. 46. Technical University of Kosice.
- [2] MAON, F., LINDGREEN, A., VANHAMME, J. Developing supply chains in disaster relief operations through cross-sector socially oriented collaborations: a theoretical model. *Supply chain management: an international journal*. 2009, p. 38.
- [3] ABIDI, H., DE LEEUW, S., KLUMPP, M. Humanitarian supply chain performance management: a systematic literature review. *Supply Chain Management: An International Journal*. 2014, p. 24.
- [4] BALOG, M. STRAKA, M. *Logistické informačné systémy. Logistics information systems*. Bratislava: EPOS, 2005, p. 208. ISBN 80-8057-660-2.
- [5] THOMAS, A., MIZUSHIMA, M. Logistics training: necessity or luxury. *Forced migration review*. 2005, vol. 22, pp. 60-61.
- [6] OVERSTREET, R. E., et al. Research in humanitarian logistics. *Journal of Humanitarian Logistics and Supply Chain Management*. 2011, vol. 1, pp. 114–131.
- [7] KOVÁCS, G., SPENS, K. M. Humanitarian logistics in disaster relief operations. *International journal of physical distribution & logistics management*. 2007, vol. 37, pp. 99-114.
- [8] ROSOVÁ, A. *Logistika a náklady podniku. Logistics and costs of business*. Kosice: Dekanat - Edicne stredisko, 2011, p. 100. ISBN 978-80-553-0637-7.
- [9] CHANDES, J., PACHÉ, G. Investigating humanitarian logistics issues: from operations management to strategic action. *Journal of Manufacturing Technology Management*. 2010, vol. 21, pp. 320-340.
- [10] MALINDŽÁK, D., et al. *Teória logistiky. Theory of logistics*. Kosice: Karnat, 2007, p. 215. ISBN 978-80-8073-893-8.
- [11] LEHRER, S. *Humanitarian Logistics. Which challenges do aid-agencies have to face in disaster relief operations and how can these operations be efficient? Based on South-East Asia 2004*. GRIN Verlag, 2017.
- [12] ÍLHAN, A. The Humanitarian Relief Chain. *Southeast European Journal of Economics and Business*. 2012, vol. 6, pp. 45-54.
- [13] SCHWARZ, J., KESSLER, M. *Humanitarian Logistics: Why Logistics is Central to Disaster Management* [Online]. [Viewed: 2022-05-29]. Available from: [Kessler\\_Schwarz\\_final \(tu-berlin.de\)](https://www.kessler-schwarz-final.tu-berlin.de)
- [14] Humanitarian-aid-logistics-supply-chain-management. [Online]. [Viewed: 2022-05-29]. Available from: [Humanitarian aid logistics supply chain management in high gear \(slideshare.net\)](https://www.slideshare.net/Humanitarian-aid-logistics-supply-chain-management-in-high-gear)
- [15] BERTAZZO, T. R., et al. Coordination mechanisms in humanitarian operations management: a conceptual model of a simulator and a proposal for a humanitarian logistics game. *Gestão & Produção*. 2018, vol. 25, pp. 219-232.
- [16] SUHADA, T., PURNOMO, B. *Humanitarian Logistics in the Merapi Volcanic Eruption 2010: A case study on MER-C Yogyakarta*. 2017.