

Chapter 2

Humanitarian Logistics and Supply Chain Management

“Since disaster relief is about 80 % logistics it would follow then that the only way to achieve this is through slick, efficient and effective logistics operations and more precisely, supply chain management.”

Van Wassenhove (2006) p. 475

Abstract Chapter 2 defines humanitarian logistics. Section 1 underlines the crucial role of logistics and supply chain management in the humanitarian context; it identifies the main categories of disasters and describes disaster-relief operations. Section 2 delineates the phases that constitute the disaster management cycle; in particular, it identifies the specific phase of the humanitarian logistics stream that demand agile and lean principles. Section 3 indicates the different key actors in the humanitarian system, and it describes their role in disaster relief, underlining the complexity of humanitarian supply chain relationships. The chapter provides the reader with a brief introduction on the key concepts of humanitarian logistics and supply chain management, and underlines the complexity of an emergency relief operation.

Keywords Humanitarian logistics · Humanitarian supply chain · Types of disaster · Disaster relief operations · Disaster management cycle · Humanitarian logistics stream · Disaster preparation phase · Disaster response phase · Agility and leanness principles · Humanitarian players

2.1 Humanitarian Logistics and Disaster Relief Operations

“Logistics is the part [of any disaster relief] that can mean the difference between a successful or failed operation.”

Van Wassenhove (2006) p. 476

The 2004 earthquake and resulting tsunami in South Asia claimed approximately 230,000 lives and displaced 1.7 million people. Over 40 countries and 700 non-governmental organizations (NGOs) provided humanitarian assistance. The response in the private sector was unprecedented: for example, US companies alone mobilized more than US\$565 million (cash and in kind), and the role of

logistics companies (e.g., UPS, FedEx, and DHL)—together with their existing aid agency partners—was also crucial in providing free or subsidized transportation and logistics. The world responded by donating more than \$13 billion and initiating the largest relief effort in history (Thomas and Fritz 2006).

As a result of the Indian Ocean tsunami in 2004, logistics applied to disasters has received increasing interest from both researchers and practitioners (Kovács and Spens 2007). In fact, the tsunami provided evidence that the effectiveness of the emergency aid response hinges on logistic speed and efficiency (Pettit et al. 2011), thereby increasing the awareness of the crucial role of logistics in humanitarian relief operations (Christopher and Tatham 2011).

Specifically, the activities of “planning, implementing and controlling the efficient, cost-effective flow of and storage of goods and materials as well as related information, from point of origin to point of consumption for the purpose of alleviating the suffering of vulnerable people” are known as “humanitarian logistics” (Thomas and Kopczak 2005 p. 2). Briefly, “for humanitarians, logistics is the processes and systems involved in mobilizing people, resources, skills and knowledge to help vulnerable people affected by disaster” (Van Wassenhove 2006 p. 476).

In a disaster context, it is of course important to ensure efficient and effective delivery, such that the appropriate commodities and people reach the victims of the emergency (logistic point of view). However, optimizing the logistic performance requires that all the relationships among the actors involved are managed through an integrated approach to efficiently and effectively coordinate inter-organizational performance, eliminate redundancy, and maximize efficiency along the entire emergency supply chain (supply chain management point of view). In fact, though logistics is more focused on moving something or someone from a point of origin to a destination, supply chain management mainly focuses on relationships among the actors that make such movement possible. Logistics and supply chain management are both crucial to properly set the response to a disaster.

Usually, the term “disaster” refers to a “disruption that physically affects a system as a whole and threatens its priorities and goals” (Van Wassenhove 2006 p. 476). With respect to cause, it is possible to distinguish between a natural and a man-made disaster; with respect to predictability and speed of occurrence, it is possible to distinguish between a sudden-onset and a slow-onset disaster (Van Wassenhove 2006). Taking into account also the different impact in terms of required logistic effort (from higher to lower), it is possible to identify four types of disaster (Fig. 2.1):

- Calamities, characterized by natural causes and sudden-onset occurrences (e.g., earthquakes, hurricanes, tornadoes);
- Destructive actions, characterized by man-made causes and sudden-onset occurrences (e.g., terrorist attacks, coups d'état, industrial accidents);
- Plagues, characterized by natural causes and slow-onset occurrence (e.g., famines, droughts, poverty);

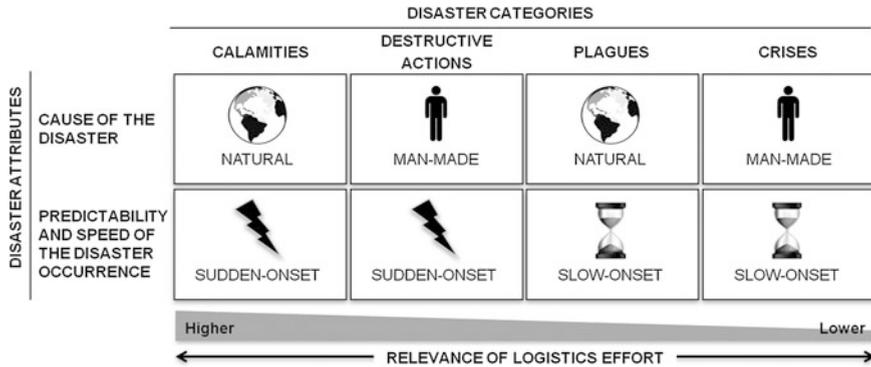


Fig. 2.1 Types of disaster

- Crises, characterized by man-made causes and slow-onsets occurrence (e.g., political and refugee crises).

Calamities and destructive actions are disasters that demand a higher logistic effort in terms of knowledge and cost because sudden-onset occurrences require a very fast response in devastated areas. The four categories may be interlinked: a calamity (such as an earthquake) may cause plagues (such as an epidemic disease) and crises (such as an economic crisis). Thus, it is sometimes more appropriate to talk about disasters instead of a single disaster.

Different types of disasters need to be managed in different ways: the aid provided to assist in a region’s development is distinct from that given to deal with famine and drought; running refugee camps is very different to providing the kind of aid that is needed after a sudden-onset natural disaster or a nuclear accident. Humanitarian efforts are organized along two broad lines (Kovács and Spens 2007):

- Disaster relief;
- Continuous aid work.

Ordinarily, disaster relief deals with calamities, destructive actions, and plagues (Long 1997). Continuous aid work is mainly required in the case of plagues and crises.

Logistics is the most important element in any disaster relief effort, and it is the one that makes the difference between a successful and a failed operation (Van Wassenhove 2006). But it is also the most expensive part of any disaster relief: it has been estimated that logistics accounts for about 80 % of the total costs in disaster relief (Van Wassenhove 2006). And given that the overall annual expenditure of aid agencies is of the order of \$20 billion, the resultant logistic spending is around \$15 billion (Christopher and Tatham 2011).

Thus, proper investment in logistics in disaster relief provides the main opportunity to develop and implement effective and efficient use of resources in

humanitarian operations (Cozzolino et al. 2012). In addition, a more strategic use of resources allows humanitarian organizations to raise donor trust and long-term commitment by increasingly skeptical benefactors (Scholten et al. 2010). Humanitarian organizations are therefore under greater scrutiny to monitor the impact of aid and the arrangement of their entire operations; they have to prove to donors, who are pledging millions in aid and goods, that they are really reaching the ones in need (Van Wassenhove 2006).

As a consequence, it would be useful identify each of the different phases that constitute the overall logistics process to provide a better guide for potential improvements. In the next section, therefore, the typical stages of an emergency supply chain are described.

2.2 Humanitarian Logistics and Stages in the Emergency Supply Chain

*“A successful response to a disaster is not improvised.
The better one is prepared the more effective the response.”*

Van Wassenhove 2006 p. 480

Since disaster relief efforts are characterized by considerable uncertainty and complexity, they need to be properly managed in order to address and implement better responses. Thus, disaster management is a key factor that drives successful execution of relief efforts, and it begins with strategic process design (Tomasini and Van Wassenhove 2009).

Disaster management is often described as a process composed of several stages, even though there is disagreement among authors as to the structure and nomenclature of the stages (Kovács and Spens 2007, 2009; Altay and Green 2006; Pettit and Beresford 2005; Van Wassenhove 2006; Lee and Zbinden 2003; Thomas 2003; Cottrill 2002; Nisha de Silva 2001; Long 1997). However, for the most part, the literature concurs on the existence of the following phases:

- Mitigation;
- Preparation;
- Response;
- Reconstruction.

These four phases constitute the *disaster management cycle*. With the focus on logistics and supply chain management, the process that involves logisticians mainly concerns the preparation, response and reconstruction; together these constitute *humanitarian logistics stream* (Fig. 2.2).

The *mitigation phase* refers to laws and mechanisms that reduce social vulnerability. These are issues that relate to the responsibilities of governments and do not involve the direct participation of logisticians.

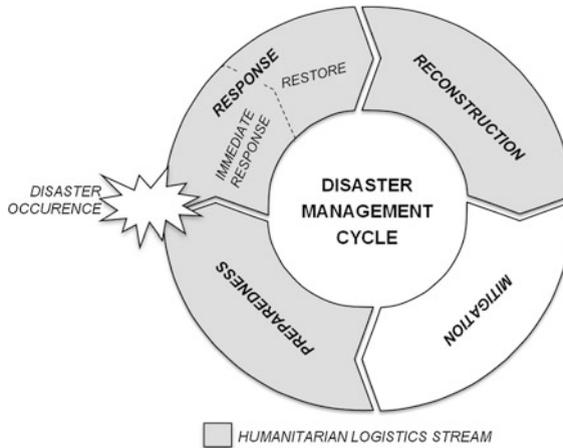


Fig. 2.2 The humanitarian logistics stream

The *preparation phase* refers to various operations that occur during the period before a disaster strikes. This phase incorporates the strategies put into place that allow the implementation of a successful operational response. This phase is crucial because it is the one in which the physical network design, information and communications technology systems, and the bases for collaboration are developed. The aim of this stage is to avoid the gravest possible consequences of a disaster. This phase also incorporates the efforts that are made between disasters in learning and adapting from past experiences so as to meet new challenges.

The *response phase* refers to the various operations that are instantly implemented after a disaster occurs. This phase has two main objectives; they are consecutive and constitute two sub-phases (Cozzolino et al. 2012):

- The first objective is to immediately respond by activating the “silent network” or “temporary networks,” as defined by Jahre et al. (2009); this is the *immediate-response sub-phase*;
- The second objective is to restore in the shortest time possible the basic services and delivery of goods to the highest possible number of beneficiaries; this is the *restore sub-phase*.

In the response stage, coordination and collaboration among all the actors involved in the humanitarian emergency deserve particular attention (Balcik et al. 2010; Kovács and Spens 2007, 2009; Maon et al. 2009; Tomasini and Van Wassenhove 2009). Connections to feasible donors, suppliers, NGOs, and other partners are made in the first phase, but they are not activated until the catastrophic event takes place. Then, all the actors involved operate as quickly as possible: at the start, speed—at any cost—is of the essence, and the first 72 h are crucial (Van Wassenhove 2006).

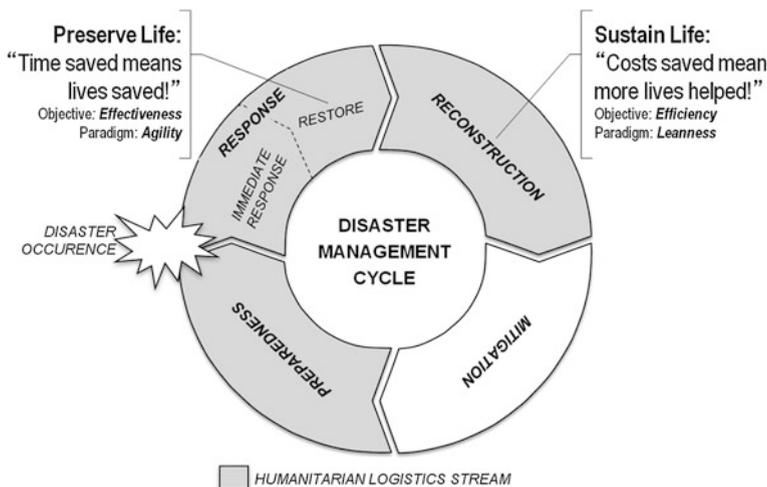


Fig. 2.3 Agility and leanness in the humanitarian logistics stream

The *reconstruction phase* refers to different operations in the aftermath of a disaster. It involves rehabilitation, and this phase aims to address the problem from a long-term perspective. The effects of a disaster can continue for a long period of time, and they have severe consequences on the affected population. In addition, disasters can also have long-term effects on the management of companies. For example, immediately after a disaster, transportation companies may undergo a modal shift from road to rail that prevails long after the occurrence of the disaster (Kovács and Spens 2007).

With regard to *humanitarian logistics stream*, it is interesting that the transition between the stages involves the shift in focus from speed to cost reduction in terms of operational performance (Tomasini and Van Wassenhove 2009b). Each stage of the process has a specific objective that can be achieved through the application of two supply chain principles: agility and leanness (Cozzolino et al. 2012).

Agility is usually defined as the ability to respond to unexpected changes (Sheffi 2005) when an unpredictable demand is combined with short lead times (Christopher 2005). Leanness usually refers to doing more and better with less when demand is relatively stable and predictable (Childerhouse and Towill 2000). Briefly, while agility focuses on effectiveness and speed, leanness focuses on efficiency and cost saving (Charles et al. 2010; Scholten et al. 2010; Kovács and Spens 2009; Pettit and Beresford 2009; Taylor and Pettit 2009; Oloruntoba and Grey 2006; Narasimhan et al. 2006; Christopher 2005; Sheffi 2005; Aitken et al. 2002; Towill and Christopher 2002; Christopher and Towill 2001; Childerhouse and Towill 2000; Mason-Jones et al. 2000; Naylor et al. 1999). In consideration of their specific objectives, agility and leanness may be applied to the stages of humanitarian logistics.

In humanitarian supply chains, effectiveness ensures that we save time, and time saved means more lives saved; efficiency ensures that we save costs, and costs saved means more lives helped. The objective of the restoring sub-stage (as part of the response phase) is saving as much time as possible, and it can be achieved through agility. The objective of the reconstruction phase is saving as many costs as possible, and it can be achieved through leanness (Fig. 2.3 and Box 2.1). It is through preparedness and the immediate response that agility and leanness can be used to design and develop processes and procedures to be performed in the following steps, restore and reconstruction (Fig. 2.3).

Box 2.1. The United Nations World Food Programme humanitarian logistics. In the case of an emergency, the Emergency Preparedness and Contingency Planning team ensures that United Nations World Food Programme (WFP) is ready to act at any time because time saved amounts to lives saved. In the early days of an emergency, the WFP quickly establishes how much food assistance is needed and the best way to deliver that assistance to the hungry. To do so, it works with Emergency Assessment Teams. On the basis of their assessment, the WFP draws up a detailed plan of action and budget, which is termed Emergency Needs Assessment and Operational Planning. Equipped with answers to its questions, the WFP draws up an Emergency Operation (EMOP), which includes a plan of action and a budget. This lists who will receive food assistance, what rations are required, the type of transport the WFP will use, and which humanitarian corridors should lead to the crisis zone. EMOPs usually last for between three and 12 months. If further assistance is required, the WFP prepares a Protracted Relief and Recovery Operation (PRRO), which helps to sustain disaster-hit communities as they re-establish their livelihoods and stabilize food security in more efficient way such that costs saved amount to more lives being saved.

It is possible to propose a correspondence between the theoretical phases of the humanitarian supply chain process and the empirical stages of the emergency relief process of the WFP (Table 2.1).

Table 2.1 Humanitarian logistics stream: literature and the WFP case (Cozzolino et al. 2012)

Literature		WFP
Preparedness		Emergency preparedness and contingency planning
Response	Immediate response	Emergency needs assessment and operational planning
	Restore	EMergency OPERATION—EMOP
Reconstruction		Protracted Relief and Recovery Operation—PRRO

Table 2.2 Principle-stage correspondences: literature and the WFP case (Cozzolino et al. 2012)

Principle	Stages in literature	Stage in WFP
Agility	Restore	EMOP
Leanness	Reconstruction	PRRO

The WFP humanitarian supply chain exhibits (Table 2.2):

- Agile principle—according to the objective of urgent effectiveness—in the EMOP stage, which corresponds to the restoring stage in the response;
- Lean principle—according to the objective of efficiency—in the PRRO stage, which corresponds to the reconstruction stage.

Source: Cozzolino et al. 2012.

In each of these phases many different actors are involved in meeting the challenge of answering to disasters, as described in the following section.

2.3 Humanitarian Logistics and the Players Involved

“The diversity of the humanitarian community is an asset if we build on our comparative advantages and complement each other’s contributions.”

Global Humanitarian Platform 2007

Humanitarian relief-operation management engages very different players, who may have a high degree of heterogeneity in terms of culture, purposes, interests, mandates, capacity, and logistics expertise (Balcik et al. 2010). Key players can be categorized as follow: governments, the military, aid agencies, donors, non-governmental organizations (NGOs), and private sector companies—among which logistics service providers are preeminent (Kovács and Spens 2007; Kaatrud et al. 2003). Considering the whole players and relationships among them, the *humanitarian relationships model* can be defined (Fig. 2.4).

Governments—host governments, neighboring country governments, and other country governments within the international community—are the activators of humanitarian logistics stream after a disaster strikes since they have the power to authorize operations and mobilize resources. In fact, without the host government authorization, no other player—with the exception of national aid agencies and the military—can operate in the disaster theater. Host government authorization is fundamental for the involvement of other countries (neighbors or not). The engagement of other countries is a delicate matter since it can be facilitated or blocked as a consequence of the relationship quality between the host government and the international community (in many cases host countries do not enjoy good

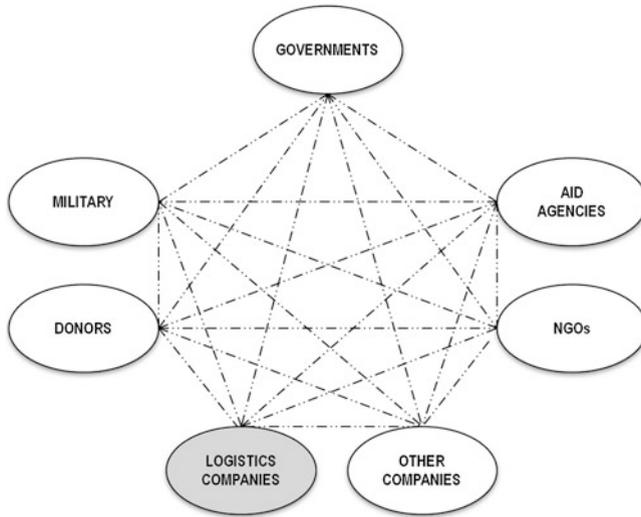


Fig. 2.4 The humanitarian relationships model

relations with their neighbors). Another important role in the aid process can be played by international agreements to which the host government subscribes with other countries (e.g., the European Union, North American Free Trade Agreement, Asia–Pacific Economic Cooperation, Arab League, African Union). Moreover, host governments have the responsibility to put into place protocols and take action to reduce the probability of disasters (mitigation).

On many occasions, the military has been a very important actor since soldiers are called upon to provide primary assistance (i.e., hospital and camp installation, telecommunications, and route repair) thanks to their high planning and logistic capabilities.

Aid agencies are actors through which governments are able to alleviate the suffering caused by disasters. The largest agencies are global actors, but there are also many small regional and country-specific aid agencies. One of the most important for its logistic role and contribution is the WFP.

Donors provide the bulk of funding for major relief activities. Generally, donations consist of giving financial means (in-cash donations) to support humanitarian operations or providing goods and/or services for free (in-kind donations) while performing logistics operations. Since each player within its own specific role can provide in-kind donations, in the humanitarian relationship model the term “donor” refers to those who exclusively give financial means to fund aid operations. Thus, in addition to country-specific funding provided by governments in recent years, foundations, individual donors, and companies have become important sources of funds for aid agencies.

NGOs include several and disparate actors, ranging from influential and international players, such as CARE (a leading humanitarian organization fighting global poverty), to small and micro-organizations that develop within local communities but are also able to operate at the international level. Some of these players are temporary, being created just to address one particular crisis.

The presence of private-sector companies (logistics and others companies) is increasingly growing in the humanitarian relief environment. In the humanitarian logistics, companies can play one or more of the following roles:

- Donors;
- Collectors;
- Providers.

As a *donor*, a company can support humanitarian logistics by giving financial contributions (in cash) to fund aid operations. As a *collector*, a company can gather financial means from its customers, its employees, and its suppliers in order to fund aid operations. As a *provider*, a company can offer its goods and services for free (in-kind donation) or as a consequence of a selling action. In the humanitarian relationship model, when a company exclusively plays the role of donor and/or collector, it simply belongs to the donors category. The model refers to the company category only when the organization in question acts only or also as a provider.

Companies are capable of providing technological support and logistics staff and managers. They also provide specific services that may no longer be available on the ground immediately after a disaster has occurred, such as electricity supply, engineering solutions, banking support, and postal services. Initially, companies are moved to participate in humanitarian efforts because they have observed that enormous losses are inflicted when disasters interrupt the flow of their business; so they invest in re-establishing their business continuity. Working to alleviate the economic impact of such disruptions “makes good business sense” (Thomas and Fritz 2006).

Within the company category, logistics service providers are excellent contributors at each stage of a disaster-relief operation through their logistics and supply chain management core capabilities. Leading international logistics service providers, such as Agility, DHL, FedEx, Maersk, TNT, and UPS, have raised their importance in terms of the resources, assets, and knowledge shared with their humanitarian counterparts. Thanks to their capabilities in enhancing the speed and efficiency of relief efforts, logistics companies are assuming a more prominent role as the partners of humanitarian organizations.

In the next chapter, the inter-organizational interactions among actors in the humanitarian relationship model are described, with particular attention being paid to partnerships between profit and non-profit organizations.

References

- Aitken, J., Christopher, M., & Towill, D. (2002). Understanding, implementing and exploiting agility and leanness. *International Journal of Logistics: Research & Applications*, 5(1), 59–74.
- Altay, N., & Green, W. G. (2006). OR/MS research in disaster operations management. *European Journal of Operational Research*, 175(1), 475–493.
- 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.
- Charles, A., Lauras, M., & Van Wassenhove, L. N. (2010). A model to define and assess the agility of supply chains: Building on humanitarian experience. *International Journal of Physical Distribution & Logistics Management*, 40(8/9), 722–741.
- Childerhouse, P., & Towill, D. (2000). Engineering supply chains to match customer requirements. *Logistics Information Management*, 13(6), 337–345.
- Christopher, M., & Towill, D. (2001). An integrated model for the design of agile supply chains. *International Journal of Physical Distribution & Logistics Management*, 31(4), 235–246.
- Christopher, M. (2005). *Logistics and supply chain management. Creating value adding networks*. London: Prentice Hall.
- Christopher, M., & Tatham, P. (2011). Introduction. In M. Christopher & P. Tatham (Eds.), *Humanitarian logistics. Meeting the challenge of preparing for and responding to disasters* (pp. 1–14). London: Kogan Page
- Cottrill, K. (2002). Preparing for the worst. *Traffic World*, 266(40), 15
- Cozzolino, A., Rossi, S., & Conforti, A. (2012). Agile and Lean Principles in the humanitarian supply chain. The case of the United Nations world food programme. *Journal of Humanitarian Logistics and Supply Chain Management*, 2(1), 16–33.
- Global Humanitarian Platform (2007). Principles of partnership. A statement of commitment. www.globalhumanitarianplatform.org
- Jahre, M., Jensen, L., & Listou, T. (2009). Theory development in humanitarian logistics: A framework and three cases. *Management Research News*, 32(11), 1008–1023.
- Kaatrud, D. B., Samii, R., & Van Wassenhove, L. N. (2003). UN joint logistics centre: A coordinated response to common humanitarian logistics concerns. *Forced Migration Review*, 18, 11–14.
- Kovács, G., & Spens, K. M. (2007). Humanitarian logistics in disaster relief operations. *International Journal of Physical Distribution & Logistics Management*, 37(2), 99–114.
- Kovács, G., & Spens, K. M. (2009). Identifying challenges in humanitarian logistics. *International Journal of Physical Distribution & Logistics Management*, 39(6), 506–528.
- Lee, H. W., & Zbinden, M. (2003). Marrying logistics and technology for effective relief. *Forced Migration Review*, 18, 34–35.
- Long, D. (1997). Logistics for disaster relief: Engineering on the run. *IIE Solutions*, 29(6), 26–29.
- Maon, F., Lindgreen, A. & Vanhamme, J. (2009). Developing supply chains in disaster relief operations through cross-sector socially oriented collaborations: a theoretical model. *Supply Chain Management: An International Journal*, 14(2), 149–164.
- Mason-Jones, R., Naylor, B., & Towill, D. R. (2000). Lean, agile or leagile? Matching your supply chain to the marketplace. *International Journal of Production Research*, 38(17), 4061–4070.
- Narasimhan, R., Swink, M., & Kim, S. W. (2006). Disentangling leanness and agility: An empirical investigation. *Journal of Operations Management*, 24(5), 440–457.
- Naylor, J. B., Naim, M. M., & Berry, D. (1999). Leagility: Interfacing the lean and agile manufacturing paradigm in the total supply chain. *International Journal of Production Economics*, 62, 107–118.
- Nisha de Silva, F. (2001). Providing special decision support for evacuation planning: A challenge in integrating technologies. *Disaster Prevention and Management*, 10(1), 11–20.

- Oloruntoba, R., & Gray, R. (2006). Humanitarian aid: An agile supply chain? *Supply Chain Management: An International Journal*, 11(2), 115–120.
- Pettit, S., Beresford, A., Whiting, M., & Banomyong R. (2011). The 2004 Thailand tsunami reviewed: Lesson learned. In M. Christopher & P. Tatham (Eds.) *Humanitarian logistics. Meeting the challenge of preparing for and responding to disasters* (pp. 103–119). London: Kogan Page.
- Pettit, S. J., & Beresford, A. K. C. (2005). Emergency relief logistics: An evaluation of military, non-military, and composite response models. *International Journal of Logistics: Research and Applications*, 8(4), 313–331
- Pettit, S. J., & Beresford, A. K. C. (2009). Critical success factors in the context of humanitarian aid supply chains. *International Journal of Physical Distribution & Logistics Management*, 39(6), 450–468.
- Scholten, K., Scott, P. S., & Fynes, B. (2010). (Le) agility in humanitarian aid (NGO) supply chains. *International Journal of Physical Distribution & Logistics Management*, 40(8/9), 623–635.
- Sheffi, Y. (2005). *The resilient enterprise: Overcoming vulnerability for competitive advantage*. Cambridge, MA: MIT Press.
- Taylor, D., & Pettit, S. (2009). A consideration of the relevance of lean supply chain concepts for humanitarian aid provision. *International Journal of Services, Technology and Management*, 12(4), 430–444.
- Thomas, A. (2003). Why logistics? *Forced Migration Review*, 18, 4.
- Thomas, A. & Fritz, L. (2006). Disaster relief, Inc. *Harvard Business Review*, 84(11), 114–26.
- Thomas, A. & Kopczak, L. (2005). From logistics to supply chain management: The path forward in the humanitarian sector, white paper, Fritz Institute, San Francisco, CA.
- Tomasini, R. & Van Wassenhove, L. N. (2009a). From preparedness to partnerships: Case study research on humanitarian logistics. *International Transactions in Operational Research*, 16(5), 549–559.
- Tomasini, R. & Van Wassenhove, L. N. (2009b). *Humanitarian Logistics*. London: Palgrave Macmillan.
- Towill, D., & Christopher, M. (2002). The supply chain strategy conundrum: To be lean or agile or to be lean and agile? *International Journal of Logistics: Research and Applications*, 5, 299–309.
- Van Wassenhove, L. N. (2006). Blackett memorial lecture. Humanitarian aid logistics: Supply chain management in high gear. *Journal of the Operational Research Society*, 57(5), 475–489.



<http://www.springer.com/978-3-642-30185-8>

Humanitarian Logistics
Cross-Sector Cooperation in Disaster Relief
Management
Cozzolino, A.
2012, IX, 48 p. 7 illus., Softcover
ISBN: 978-3-642-30185-8