
A Peek into the Future of Humanitarian Logistics: Forewarned Is Forearmed

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Following the 2004 tsunami in the Indian Ocean there has been widespread recognition of the importance of humanitarian logistics among its various stakeholders, including academics, humanitarian organizations, practitioners, and donors. The purpose of this article is to anticipate the numerous challenges that are likely to confront the field of humanitarian logistics in the near future. The study found that humanitarian organisations will increasingly need to achieve greater levels of efficiency, professionalism, and quality in order to remain relevant and competitive. To do this, these organisations will need to identify the most practical and effective means of establishing professional supply chain management and humanitarian logistics arrangements that use technology and emerging best practices. This can be achieved through the development of in-house capacity, partnership arrangements with larger humanitarian organisations and the private sector, or a combination of both.

Introduction, Background, and Purpose

Between 1975 and 2009, the number of natural disasters and the number of people affected by these disasters have both increased almost five-fold.¹ During the same period, the estimated economic damage caused by natural disasters increased almost twelve fold; in 2009 it represented approximately \$US43.44 billion.² The increasing magnitude, complexity, and unpredictability of these emergencies have made it very difficult for humanitarian organisations to provide effective relief to the victims. At the heart of any international disaster relief operation is the establishment and management of an emergency supply chain (Pettit & Beresford, 2005). Considering the trends noted previously, the need for humanitarian logistics services will need to increase.

The logistics involved in disaster relief operations is unique because it is subject to irregular demand patterns and unusual constraints. The logistical needs of humanitarian organisations frequently exceed the capabilities of current emergency response approaches (Beamon & Kotleba, 2006). Despite this, many organisations continue to underestimate the importance of logistics in disaster relief operations (Murray, 2005). The humanitarian sector lacks operational knowledge and there is a shortage of investment in technology, communication, and the latest techniques, such as mathematical modelling (Beamon & Kotleba, 2006). One European ambassador at a post-2004 Indian

1. <http://www.emdat.be/final-result-request>, 7 November 2010.

2. <http://www.emdat.be/final-result-request>, 7 November 2010.

Ocean tsunami donor conference said, "We don't need a donor's conference, we need a logistics conference" (Thomas & Kopczak, 2005, p.1). Similarly, a spokesman for Doctors Without Borders, in announcing the organisation's decision not to accept any more money for the tsunami relief operations, said, "What are needed are supply managers without borders: people to sort goods, identify priorities, track deliveries, and direct the traffic of a relief effort in full gear" (Thomas & Kopczak, 2005, p.1). Humanitarian logistics, the function that is charged with ensuring the efficient and cost-effective flow and storage of goods and materials for the purpose of alleviating the suffering of vulnerable people, came of age during this tsunami relief effort (Thomas & Kopczak, 2005).

The recent increase in awareness about the critical importance of humanitarian logistics for effective disaster relief has led to a corresponding increase in academic research into humanitarian logistics. Appropriately, much of this research has focused on the various challenges the sector is currently experiencing. The research has also focused, in large part, on the key humanitarian organisations without looking at the full range of actors involved in humanitarian logistics. The approach to date has tended to be reactive: mostly learning from past mistakes and finding ways to adapt to the changing demands of this sector. Indeed, several scholars have highlighted the importance of general preparedness activities. However, no effort has been made to broadly anticipate the challenges and opportunities that are likely to confront this sector in the future. Attempts to anticipate the challenges and opportunities in advance could allow all stakeholders to respond more effectively to future crisis situations. This study represents a step in this direction.

Section two of this article describes the research design for the study and section three presents the findings derived from both primary

and secondary data sources. These findings are analysed in section four, and section five presents some conclusions and recommendations.

Research Design

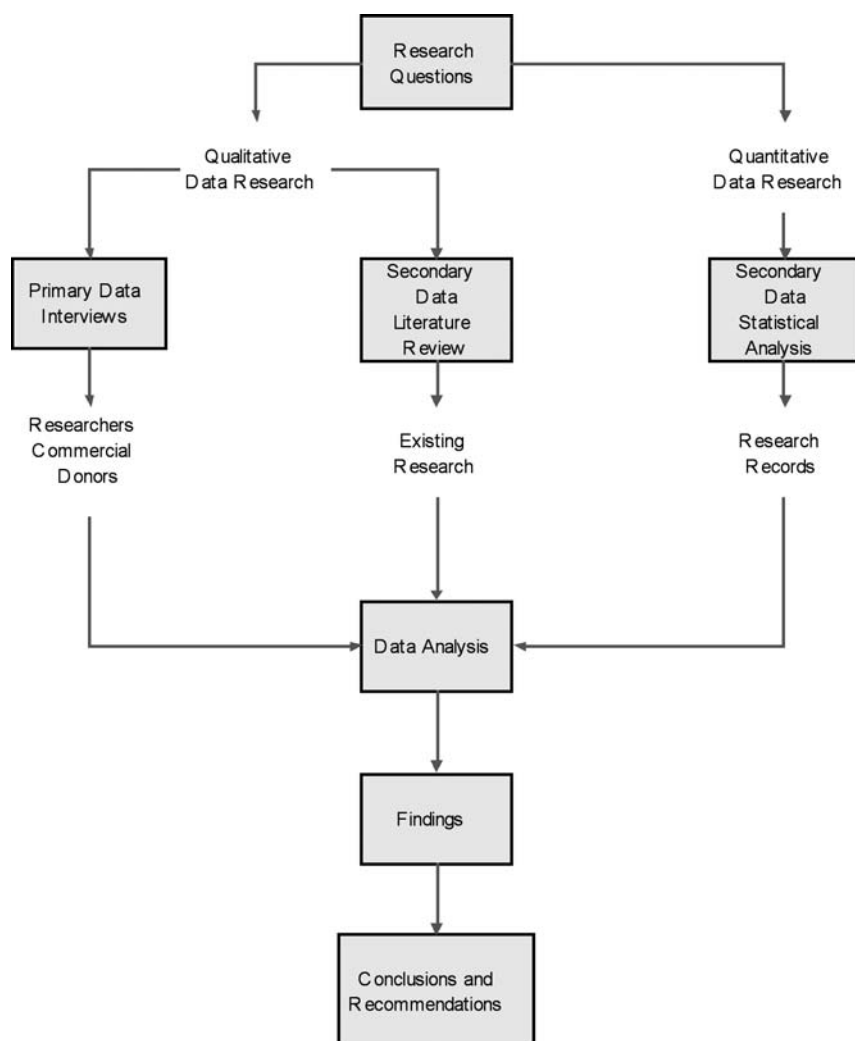
This article does not claim to make perfectly accurate predictions; however, it does investigate some of the important factors and trends that are likely to shape the future of the humanitarian logistics sector. The research and analysis was originally commissioned by the International Federation of Red Cross and Red Crescent Societies' (IFRC) Logistics Department in order to inform the development of its long-term strategy and it has

subsequently been broadened to make it applicable to the humanitarian logistics sector at large. Figure 1 details the methodology framework.

In line with the purpose of this article, as described in section one, the following questions were developed to identify the scope and direction of the data collection and analysis:

- What is the current and likely future scope and size of the humanitarian industry and its logistics component?
- What are the current and likely future locations of the most vulnerable people?
- Which hazards are currently the most prevalent and likely to be the most prevalent in the future?

Figure 1
Methodology framework



- What are the current and likely future primary activities related to humanitarian logistics preparedness and response?
- What are the current and likely future global logistics resource requirements and capacity?
- What funding is available today for humanitarian logistics activities and what are the likely trends that will affect the availability of funding?

Having established the key questions, the appropriate primary and secondary sources of data were identified. The secondary data were obtained from the literature review and the primary data were collected from the interviews conducted for this research. The data were triangulated, which led to a set of findings that were analysed, resulting in the creation of a set of recommendations. These recommendations were then cross-referenced with the original questions to confirm that they had been addressed. Each step of the methodology is described in the following subsections.

The United Nations World Food Program (WFP), the lead agency for the Logistics Cluster,³ is an important player in today's global humanitarian logistics landscape. IFRC is the world's largest humanitarian organisation and its programmes reached over 30 million vulnerable people in 2005 (Jahre et al., 2009). Furthermore, IFRC's initiative to establish the regional logistics units (RLUs) has made an important contribution towards raising the profile of humanitarian logistics worldwide (Jahre et al., 2009). The present study acknowledges the significant roles played by these two players and, when appropriate, has tried to gain deeper insights into how they function.

Primary data collection

Qualitative and semi-structured interview guidelines were applied during collection of the primary data. These guidelines were adapted slightly during the course of research because of successively

Table 1
Criteria for selection of stakeholders for interviewing

Category of stakeholder	Targeted Number	Number interviewed	Criteria for selection
Academia, research institutions, and strategists	5	4	Ranking of publications in major logistics journals; focus and influence on humanitarian issues
Large institutional donors	5	2	Leading institutional and government donors to humanitarian annual and emergency appeals
Commercial logistics firms or philanthropic foundations established by such firms	5	6	Global scope; increasing humanitarian involvement; World Economic Forum humanitarian relief initiative members

gained insights and also to follow up on key points made during interviews. Three main sources were used:

- Academia, research institutions, and strategists
- Large institutional donors
- Commercial logistics firms or philanthropic foundations established by such firms

A unique questionnaire was developed for each group. Along with the questions, the reasons for their inclusion were also clarified, when appropriate. The interviewed stakeholders were chosen on the basis of rigorous selection criteria, as shown in Table 1. Appendix I provides the list of interviewees.

Interviews were primarily conducted by telephone, with all relevant details being duly recorded and organised systematically in a data file for further analysis.

Secondary data collection

Qualitative and statistical data were collected through a literature review in order to provide a baseline of the state of knowledge on a topic and to stimulate ideas, both substantive and methodological (Ticehurst & Veal, 2000). The review was conducted in three steps. First, publications were identified and selected from a range of sources, including the following:

- Operational evaluations and case studies, especially those that include details on volume/throughput/timeliness and bottlenecks in supply chains and last-mile delivery
- Studies and reports on the subject of humanitarian spending

(preparedness and relief) and efficiency

- Hazard, vulnerability, and disaster risk data and mapping studies (e.g., World Bank/Pro Vention publications)
- Annual reports and industry reviews of corporate logistics capacities, volumes, and costs
- Disaster incidence, frequency, and impact data (e.g., EM-DAT)
- Data on funding and global studies of humanitarian financing
- Other studies and reports on external stakeholders' expectations of humanitarian logistics

In the second step, the most relevant and updated sources were chosen for closer scrutiny and use in this research. By critically reviewing the available literature, an attempt was made to establish the following aspects of humanitarian logistics:

- Main characteristics and recent trends
- Important factors shaping the future of this sector
- Possible trends in the future

Data analysis

The information collected from the literature review and the interviews was duly categorised and incorporated in tables. The key issues were identified and the data were compared and contrasted across stakeholder groups and between primary and secondary data in order to produce the following findings and analysis.

3. <http://www.logcluster.org/about/logistics-cluster>, 3 June 2010.

Table 2
Natural disasters and their consequences⁴

Criteria	1975	2009
Number of natural disasters	76	396
Estimated economic losses (approximate figures)	US\$3.55 billion	US\$43.44 billion
Number of people dead	133,858	14,878
Number of people affected	41,119,085	209,119,886

Figure 2
Natural disasters reported, 1975-2009⁵

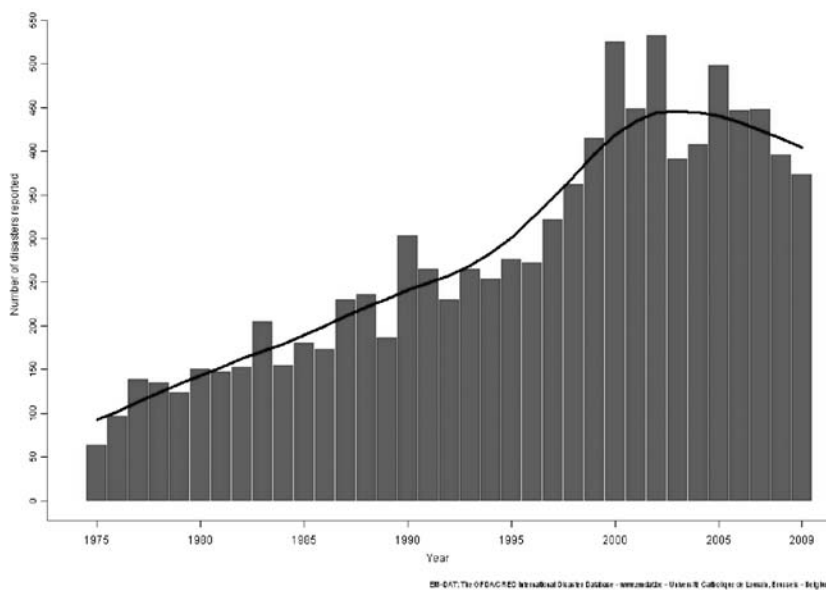
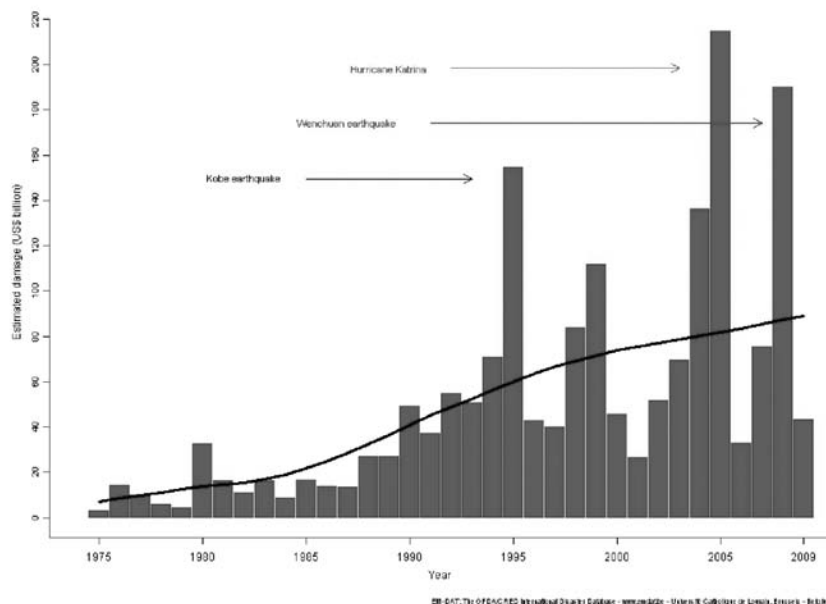


Figure 3
Estimated damages (US\$ billions) caused by reported natural disasters: 1975-2009⁶



Findings

The results and findings described following are organised in line with the questions identified in section two.

Scope and size of humanitarian logistics

The scope and size of humanitarian logistics is driven by demand that is based on vulnerability and hazards. The Emergency Events Database (EM-DAT), a global disaster database maintained by the Centre for Research on the Epidemiology of Disasters (CRED) in Brussels, records more than six hundred disasters globally each year. EM-DAT's figures show that the number of natural disasters has increased five-fold since 1975. During the same period, the estimated economic damage caused by natural disasters has increased almost twelve-fold. Academic and research stakeholders in humanitarian logistics consistently agreed with these findings. Table 2, Figure 2, and Figure 3 show the documented increase in the number and effect of disasters.

Each bar in Figure 2 represents the number of disasters recorded in the EM-DAT database for a given year. This graph shows a significant growth in the number of disasters since 1975.

As a consequence of the increasing number of natural disasters, the number of people affected by these disasters has also increased significantly. It should be noted that although the "numbers affected" have been increasing, the number of people killed by natural disasters appears to have declined steeply over the last few decades. Figure 4 and Figure 5 demonstrate these trends graphically. Ironically, higher survival rates may actually

4. <http://www.emdat.be/final-result-request>, 7 November 2010.

5. http://www.emdat.be/sites/default/files/Trends/natural/world_1900_2009/2a.jpg, 5 November 2010.

6. http://www.emdat.be/sites/default/files/Trends/natural/world_1900_2009/2d.jpg, 5 November 2010.

Figure 4
Number of people reported killed by natural disasters:
1975-2009⁷

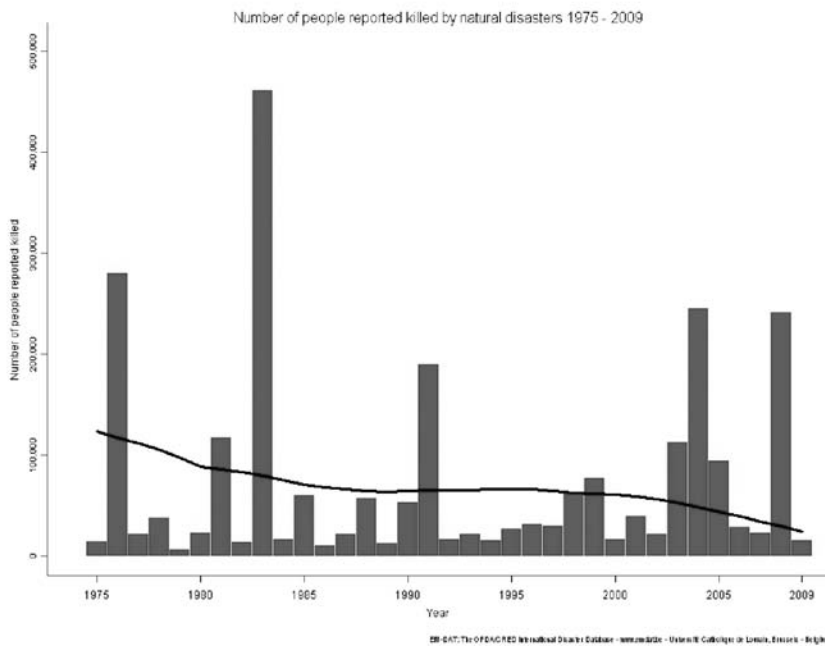
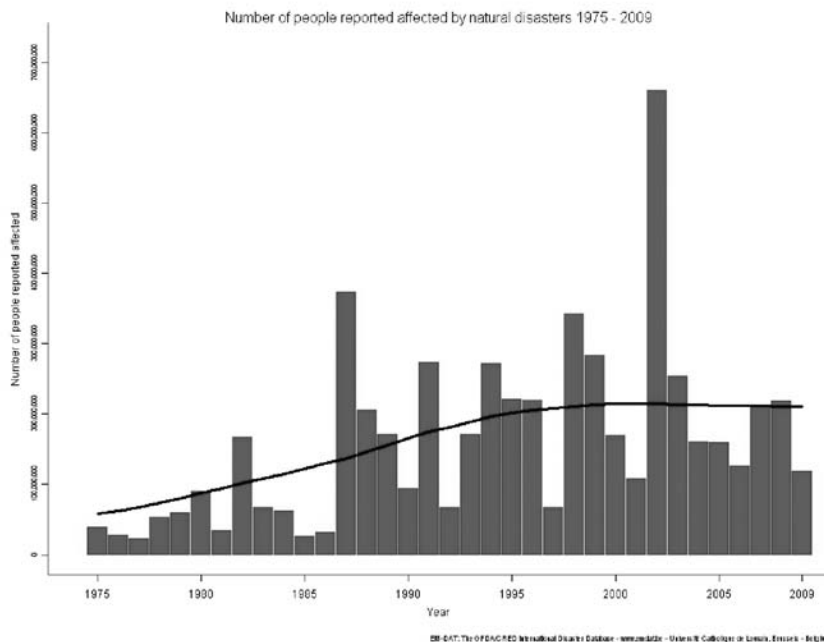


Figure 5
Number of people reported affected by natural disasters:
1975-2009⁸



place a larger burden on humanitarian agencies and governments, which must shoulder the costs of evacuating, sheltering, feeding, and restoring livelihoods for survivors. It should also be

noted that data on mortality attributable to conflicts, which is not reliably available on a global basis, may show trends that are quite different from those for natural disasters (Borton, 2009).

There seems to be a general consensus and awareness among the stakeholders, particularly among the academic and research groups, with respect to these trends.

When stakeholders were asked specifically about the percentage of costs attributed to logistics in disaster relief operations, they offered differing views on this matter. Some were not aware of the figures and others felt that these costs depended on the context in which the operations are carried out. According to the 2009 Global Humanitarian Assistance Report,⁹ the international resources allocated to humanitarian assistance totalled just over US\$15 billion in 2007 and were in the region of US\$18 billion in 2008. Furthermore, according to claims made in academic publications, about 80 percent of disaster relief operations consist of logistical efforts (Van Wassenhove, 2006).

Based on the size of the overall humanitarian industry and estimates of the percentage attributable to logistics efforts (ranging from 40 to 80 percent), the size of humanitarian logistics in financial terms is probably somewhere between US\$7 billion and US\$14 billion per year.

The scope of activities performed in humanitarian logistics within individual organisations appears to vary widely based on capacities and competencies as well as partnerships and outsourcing arrangements. As a whole, however, the scope of humanitarian logistics is extensive, spanning all geographic regions and encompassing all elements of supply chain management, including planning, training, procurement, warehouse management, transport, distribution, tracking, monitoring, and evaluation of performance.

7. http://www.emdat.be/sites/default/files/Trends/natural/world_1900_2009/2b.jpg, 5 November 2010.

8. http://www.emdat.be/sites/default/files/Trends/natural/world_1900_2009/2c.jpg, 5 November 2010.

9. *Development Initiatives*. (2009).

Locations of most vulnerable people

Vulnerability, which is closely linked to poverty, has been identified as one of the main determinants of humanitarian risk. Climate change has also been identified in recent years as a global driver of risk that has a magnifying effect on vulnerability (*Global Assessment Report on Disaster Risk Reduction 2009*, cited in Borton, 2009). According to the Centre for Research on the Epidemiology of Disasters (CRED), 68 percent of deaths and 89 percent of all economic losses between 2000 and 2007 resulted from hazards that were exacerbated

because of climate change (Ehrhart et al, 2008). Concerns regarding climate change were also highlighted by the majority of interviewed stakeholders in the present study. Accordingly, it is vital to understand vulnerability in the context of climate change.

There are different notions of what human vulnerability is and how it is related to risk and adaptive capacity, especially in relation to climate change. Ehrhart et al. (2008) argued that human vulnerability refers to the likelihood that individuals, communities, or societies will be harmed by a hazard. Here the factors shaping human

vulnerability are divided into five groups-natural, human, social, financial, and physical-and constitute the basis for the human vulnerability index. Ehrhart et al. (2008) combined this with information on the distribution of hazards to identify climate change-risk hotspots.

Figure 6 shows the global distribution of human vulnerability. The areas with the highest levels of vulnerability are located in three main regions:

- Africa, particularly the Sahel, the Horn of Africa, and central Africa, although there are isolated pockets of high vulnerability across much of the continent
- Central/south Asia, particularly Iran/Afghanistan/Pakistan/India and the Caspian region
- Southeast Asia, particularly Myanmar, Laos, Cambodia, and Indonesia

In addition to these locations the stakeholders also identified the Middle East as an area that could be highly vulnerable to natural hazards (especially drought) as well as conflict-related hazards.

Most prevalent hazards

EM-DAT provides rich data on the occurrence and effects of over 18,000 mass disasters in the world from 1900 to present. In terms of the number of people affected, floods, droughts, and storms seem to have been the most destructive hazards since the 1960s (see Table 3).

Historical trends related to the frequency and effect of disasters may not be sufficient predictors of the future when forecasting incorporates the effect of climate change. Studies indicate that human-induced climate change is modifying patterns of extreme

Figure 6
Human vulnerability (Ehrhart et al., 2008)

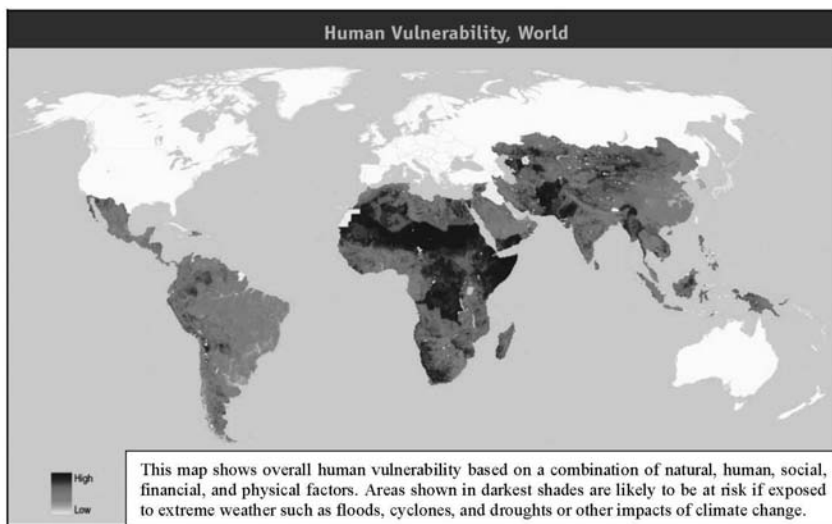


Table 3
Natural disasters and their consequences¹⁰

Disaster Type	Number	In %	Number of people affected (billions)
Flood	3537	32.87	3.019
Drought	548	5.09	2.023
Storm	3017	28.03	0.796
Earthquake	928	8.62	0.137
Extreme temperature	374	3.48	0.090
Epidemic	1199	11.14	0.022
Mass movement wet ¹¹	514	4.78	0.007
Wildfire	339	3.15	0.005
Volcano	179	1.66	0.004
Insect infestation	81	0.75	Relatively insignificant
Mass movement dry ¹²	46	0.43	Relatively insignificant
Total	10716	100	6.108

10. <http://www.emdat.be/final-result-request>, 6 November 2010.

11. Rockfall caused by deviations in the normal water cycle and/or overflow of bodies of water caused by wind set-up.

12. Events such as rockfall, avalanche, landslide, or subsidence originating from solid earth.

Table 4
Humanitarian logistics activities in preparedness and response and related challenges (adapted from Petit and Beresford, 2005)

Activities	Findings from literature	Reactions from the stakeholders
Disaster policy	Risk reduction will be an important criterion (Borton, 2009).	Stakeholders concur that strategic thinking is needed in order to reduce vulnerability. Donors in particular are expected to be more discriminating when it comes to funding humanitarian activities.
Organisational structure	Clear and workable structures are required for effective relief (Petit & Beresford, 2005). The importance of logistics is not well understood (Thomas & Kopczak, 2005).	Logistics is often poorly positioned in humanitarian organisations. The donor community, it appears, is still not well informed about the importance of logistics.
Assessment of need	Accurate assessments of needs including casualties; damage to infrastructure, crops, services; the national infrastructure; and disease are required (Petit & Beresford, 2005).	Surprisingly, stakeholders did not place a great deal of emphasis on this topic. Only a few noted that humanitarian logistics effectiveness depends highly on the quality of assessments.
Planning	Preparedness plans should devolve responsibilities and resources to appropriate groups or organisations (Petit & Beresford, 2005).	Strategic thinking, creation of framework agreements with key suppliers, and relationship building between actors are some of the main concerns.
Coordination	A system is required to achieve a coordinated effort (Petit & Beresford, 2005; Thomas & Kopczak, 2005).	Increasing number of actors. Partnerships with commercial logistics service providers. Formation of UN clusters. The sector is fragmented. Improving coordination is one of the top priorities for all the stakeholders.
Technology	Insufficient use of technology (Thomas & Kopczak, 2005; Alexander, 2006). Use of GIS/GPS for track and trace (Borton, 2009). Humanitarian organisations could deliver aid in the form of money by using cell phone money transfer facilities (ultimate form of postponement) (Borton, 2009). Technology for converting polluted water to potable water, thus saving resources used in transportation of water (Borton, 2009).	IT systems have improved. Humanitarian organisations need to collaborate with the commercial players in order to take full advantage of the available technologies in logistics. In some cases, commercial actors are supporting humanitarian organisations in the implementation of technology.
Prepositioning of equipment and supplies	Prepositioning of stocks in regional warehouses (Jahre & Heigh, 2008; Petit & Beresford, 2005).	Regional warehouses are being set up. Sharing of warehouses, supplies, and equipment has been suggested. United Nations Humanitarian Response Depots (HRD) are generally viewed as a step in the right direction.
Procurement	Regional sourcing and procurement, framing agreements, more decentralised purchasing, standardisation of procurement processes, and standard specifications of items (Jahre & Heigh, 2008).	Regional procurement has been only partly successful and requires better coordination. There is a risk of goods becoming redundant. There is a lack of high-quality personnel. Satellite hubs should be developed when required. Africa was noted specifically as an area of concern with regards to timely coverage.
Training	Important for effective and adaptable response (Petit & Beresford, 2005; Thomas & Kopczak, 2005).	Commercial actors are taking steps to train humanitarian organisations and share their expertise. The Fritz Institute is conducting recognised and certified training programmes in humanitarian logistics.
Performance measurement	Performance measurement is difficult. Some models have been proposed and are being tested (Davidson, 2006; Schulz & Heigh, 2009; Beamon & Balcik, 2008).	This was only referenced occasionally but was implicitly raised as being important to maintain confidence and raise the profile.
Problem of last-mile delivery	The cost and speed of disaster relief operations is often largely driven by transportation distances (Global Emergency Group, 2008). Some of the most noteworthy logistical last-mile problems are generally related to difficulties due to damaged transportation infrastructure and lack of coordination among relief actors (Murray, 2005). Local response quality depends on the effectiveness of the plan that governs their deployment and usage (Alexander, 2006).	This problem is acknowledged by almost all the stakeholders. One proposed solution is more decentralisation. Building relationships with local suppliers and service providers are steps in this direction.
Other issues		Waste management, environmental issues, and lack of understanding of practice by academia.

weather, including floods, cyclones, and droughts. In many cases, climate change is making these hazards more intense, more frequent, less predictable, and longer lasting (Ehrhart et al., 2008). Not surprisingly, these unfortunate developments are increasing the strain on the response capacity of humanitarian actors.

Demographic trends likely to affect demand for humanitarian logistics

Research also suggests that population trends and settlement patterns will significantly affect the overall and geographic specificity of demand for humanitarian logistics during the next few decades.

Population growth is occurring at a disproportionate level in the developing world, which also faces some of the most prevalent hazards and likely effects of climate change. From 1900 to 2009, 86 percent of global population growth took place in the developing world. Predictions for the next half-century are dire—the population of Sub-Saharan Africa alone is expected to double by 2050 and the same is true for the least developed countries, as a category. Some particularly vulnerable countries face even faster growth; for example, the population of Ethiopia is expected to triple by 2050. Concentrations of population growth are predicted to be highest in urban areas, many of which are in coastal cities most at risk from climate change-induced disasters (Haub, 2009).

Logistics preparedness and response and related challenges

There is growing recognition in the humanitarian sector that disaster risk must be addressed as a development issue rather than one

13. UN Humanitarian Response Depot (UNHRD) is a WFP network able to deliver humanitarian relief items worldwide within 24/48 hours (www.logisticscluster.org/about/depots, 6 June 2010).

of humanitarian assistance only (Dilley et al., 2005). Until vulnerability and, consequently, risks, are reduced, countries with high proportions of population or gross domestic product (GDP) in hotspots are particularly likely to incur repeated disaster-related losses and costs (Dilley et al., 2005). In this context, the linkages between preparedness and response activities are vitally important and, if managed properly, have a huge potential to reduce the risks and effect of disasters. Table 4 summarises the recurring themes that highlight the major concerns related to these activities, both in the literature and in the reactions from the stakeholders. In most cases, these activities are interdependent and must be properly coordinated in order for the disaster relief operations to be carried out effectively and efficiently.

Global humanitarian logistics capacity and competence

It is difficult to measure global humanitarian logistics capacity and competence. It is misleading to apply the 80-percent estimate of the percentage of disaster relief efforts that can be categorised as logistics to the overall size of the humanitarian industry. This is because capacities and expertise are highly concentrated among a select few large international humanitarian actors and also within the commercial sector, which handles a significant amount of this work through contracts.

Spending is also a poor determinant of capacity within the humanitarian sector because of where and when the balance of spending takes place. Based on data from the UN Office for the Coordination of Humanitarian Affairs' Financial Tracking Service, approximately 2.1 percent of all international project allocations from 2001-2008 were dedicated to preparedness and risk reduction, with the remainder dedicated to response, recovery, and traditional development. Approximately 51 percent of preparedness funding was allocated to countries in Asia

Table 5
Key actors and their respective capacities

Key actors	Respective logistics capacity
Multilateral agencies, for example United Nations (UN) bodies such as the World Food Programme (WFP)	WFP has assumed a de facto lead role among UN agencies for logistics and has been instrumental in the development of humanitarian response depots (HRDs). Interviewees acknowledged the positive effects of HRDs on capacity.
International nongovernmental organisations (INGOs)	There is an increased recognition of the importance of the logistics function. They are trying to jointly develop capacities with the corporate sector.
Red Cross Red Crescent Movement	There is an improvement in capacity since 2005. Establishment of the regional logistics units (RLUs) has helped boost capacity as well as performance. Interviewees noted inadequate geographical coverage by the RLUs as a potential weakness of this system.
Smaller and medium-sized NGOs	They have poor or nonexistent capacities. Resource constraints, staff expertise, and poor preparedness were cited as reasons.
Global third-party logistics service providers (3PL)	Significant capacities are available. They view the humanitarian sector as a growing business opportunity. In some cases, their involvement in humanitarian logistics is also motivated by philanthropy and corporate social responsibility. Examples of this include logistics emergency teams (LETs) formed by some players jointly with WFP.

and 91 percent was channelled through UN mechanisms; this leaves less than 9 percent for governments, NGOs, and the Red Cross Red Crescent Movement. Spending levels fluctuate widely from year to year, typically coming after major sudden-onset disasters (Humanitarian Outcomes, 2009).

This suggests that the capacity for humanitarian logistics follows the same boom-bust curve that the industry as a whole often follows; capacity and contracting slowly ramps up then grows exponentially during the weeks immediately following a disaster but is not sustained afterwards. However, a number of key actors and qualitative information on their capacities have been identified through this research, which warrants further description (see Table 5).

Initiatives to assess capacity

Further efforts are being made to understand the capacity requirement at various levels. The UN Logistics Cluster attempts to achieve this through its logistics capacity assessment (LCA) initiative. LCAs are formal assessments designed to obtain a fundamental understanding of a country's or region's transportation infrastructure.¹⁴

LCAs are operational in nature and concentrate on important elements of logistics links, such as port/airport capacities, road and rail networks, storage facilities, labour rates, local transportation resources, and so on.¹⁵ LCAs are conducted in areas that are unfamiliar to the humanitarian community or where updated current information is deemed as vital. LCAs for various regions are then maintained in an LCA data bank¹⁶ and updated regularly.

Another important source for understanding the global logistics capacity is the Logistics Performance Index (LPI), which was first published in 2007 by the World Bank (Figure 7). The LPI provides a comprehensive picture of supply chain performance from customs procedures, logistics costs, and infrastructure quality to the ability to track and trace shipments, timeliness in reaching their destination, and the competence of the domestic logistics industry (Arvis et al., 2007).

14. www.logisticscluster.org/tools/lca/lca-guidelines, 6 December 2009.

15. www.logisticscluster.org/tools/lca/lca-guidelines, 6 December 2009.

16. www.logisticscluster.org/tools/lca/lca-guideline, 6 December 2009.

Figure 7
Logistics Performance Index (Arvis et al., 2007)

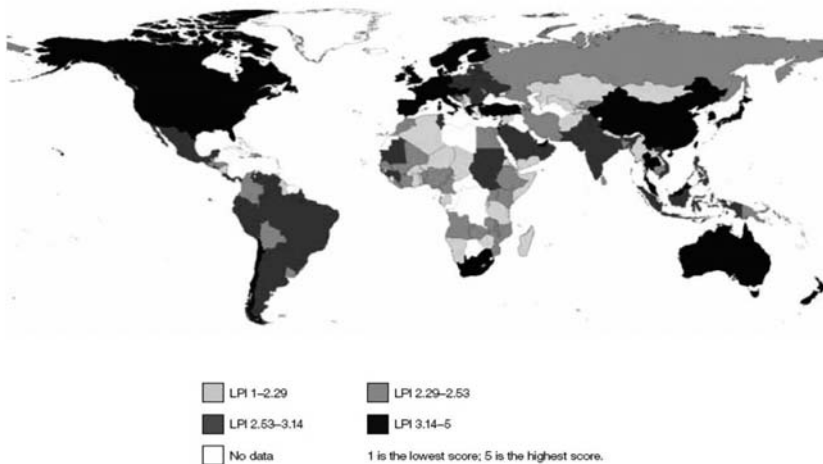


Table 6
Global humanitarian assistance by source/type (US\$)^{18,19}

Source/Type	2006	2007
Nondevelopment assistance committee (DAC) donors	435,000,000	341,000,000
Voluntary contributions to Red Cross Red Crescent and United Nations Agencies	470,000,000	3,100,000,000
Voluntary contributions to NGOs	1,840,000,000	
Humanitarian activities that are not official development assistance(ODA)-eligible	2,411,000,000	3,100,000,000
Multilateral humanitarian assistance	2,471,000,000	913,000,000
Bilateral humanitarian assistance from DAC donors	6,751,000,000	7,800,000,000
Total	14,378,000,000	15,254,000,000

Table 7
Total humanitarian assistance by donor governments in 2006/2007 and contributions if any for activities related to logistics^{20,21}

Rank	Donor	2006 (US\$)	2007 (US\$)	Contributions to IFRC logistics appeal	Contributions to UN HRDs ²²
1	United States of America	3,022,000,000	2,994,000,000	Yes	Yes
2	European Commission	1,156,000,000	1,585,000,000	Yes	Yes
3	United Kingdom	1,096,000,000	976,000,000		
4	Germany	594,000,000	618,000,000		
5	Netherlands	537,000,000	521,000,000		Yes
6	Sweden	471,000,000	512,000,000		
7	Norway	380,000,000	432,000,000	Yes	Yes
8	Spain	285,000,000	370,000,000		
9	Canada	278,000,000	330,000,000		Yes
10	France	263,000,000	360,000,000		Yes
11	Denmark	239,000,000	250,000,000	Yes	
12	Italy	237,000,000	340,000,000		Yes
13	Japan	199,000,000	116,000,000	Yes	
14	Australia	197,000,000	163,000,000	Yes	Yes
15	Switzerland	196,000,000	192,000,000		

The added value of the LPI is that it provides a global benchmark of logistics efficiency and service quality (Arvis et al., 2007). Countries with high LPI rankings are typically key players in the logistics industry and those at the bottom are often trapped in a vicious circle of overregulation, poor quality services, and underinvestment (Arvis et al., 2007). In this context, it is not entirely surprising that the countries with low LPI rankings (such as Afghanistan, Myanmar, Chad, and Tajikistan) have also been identified as some of the most vulnerable nations.

Another factor that is likely to have an effect on the global logistics capacity is the expected emergence of humanitarian organisations from the BRIC countries (Brazil, Russia, India, and China). As the world transitions from a unipolar world, dominated by United States, to a multipolar world, the significance of BRIC countries in global affairs is expected to rise appreciably. As the BRIC economies grow, the amount of overseas development assistance (ODA) they provide is also expected to grow (Borton, 2009). It is also possible that these countries will provide new players in the humanitarian sector, thereby adding to the global capacity.

Funding availability for logistics activities

The amount of funding available for humanitarian logistics is primarily a function of overall preparedness and response budgets. The results of these interviews, combined with the literature review, show that donors seldom specifically consider logistics when making funding decisions.

17. Development Initiatives. (2009).

18. Development Initiatives. (2007/2008).

19. Development Initiatives. (2009).

20. Development Initiatives. (2007/2008).

21. Development Initiatives. (2009).

22. UN Humanitarian Response Depot (UNHRD) is a WFP Network able to deliver humanitarian relief items worldwide within 24/48 hours (www.logisticscluster.org/org/about/depots, 6 June 2010).

Table 8
Present and future projections assuming no significant changes in the current approach

Dimensions	2010	Projected change between 2010 and 2020	2020
World population total	6.8 billion	Increase 12.8%	7.67 billion ²⁶
Percent of urban population	50%	Increase 10%	55%
Developing country population total	5.6 billion	Increase 13.4 %	6.35 billion ²⁷
Industry size-financial	\$US15-\$US20 billion	Decreasing rate of growth	\$18-24 billion
Industry size-field workers	250,000	Decreasing rate of growth	300,000
Number of humanitarian NGOs	6000+ ²⁸	None to little growth	6000-7000
Climate change Impact	Moderate impact and variability seen	Accelerating impact	Significant impact and variability

Table 9
Projected growth in demand for humanitarian assistance

Dimensions	2010	Projected change	2020
People affected	200 million/year	Increase 30-40%	260-280 million/year
Affected who need assistance	60 million/year	Increase 30-40%	78-84 million/year
Those who will receive assistance	40 million/year	Increase 20%	48 million/year
Those who need but do not receive assistance	20 million/year	Increase 50 % or more	30-36 million/year

Although the 80-percent estimate is an important way of identifying the overall importance of logistics, more detailed work should be done to break down logistics spending into various stages of supply chain management in order to identify the optimal amount spent on preparedness systems and infrastructure versus procurement, purchasing, and transportation of specific relief supplies.

Although overall humanitarian assistance funding has generally increased since 2000, most stakeholders felt that this trend is likely to slow down as funding levels reach a plateau, partly due to the global economic crisis. The data presented in Table 6 provide a snapshot of the total humanitarian assistance funding from the top-ranked donors in 2006 and 2007.

Further examination of the data regarding specific government donor contributions shows that two-thirds of the top fifteen government donors in terms of

humanitarian assistance have supported large humanitarian organisations that also provide logistics support to members and other partners. As indicated in section two, WFP and IFRC both play pivotal roles in today's global humanitarian logistics landscape. Table 7 indicates whether they received any assistance for some of their activities related to logistics.

Interviews and the literature review both highlighted the importance of broadening the existing pool of donors for humanitarian assistance and logistics. With aid budgets remaining flat or growing at a slower rate and with greater competition for resources, it was felt that the best option would be to tap into emerging economies and countries. The BRIC countries are expected to slowly but steadily increase their contributions to development and humanitarian assistance as a means of complementing their economic and political interests (Borton, 2009).

Analysis and Implications

This section analyses and interprets the data collected regarding the current and likely future of humanitarian logistics. It also highlights the potential opportunities and consequences of trends for humanitarian actors.

Demand for humanitarian assistance

Globally, the humanitarian system spends \$US15 to \$US20 billion each year,²³ and official development assistance (ODA) tripled between 1990 and 2006. Using coverage of the UN Consolidated Appeals Process as a proxy, only two-thirds of the required assistance is provided each year.²⁵ Over two hundred million people are affected by disasters each year²⁵, with approximately sixty million people requiring humanitarian assistance. Based on the appeals coverage, an estimated twenty-five million people who need humanitarian assistance do not receive adequate assistance in a given year.

Given the trends and predictions discussed in section three, humanitarian needs are likely to increase dramatically over the next half century. Population growth in the developing world, combined with urbanisation, a disproportionate prevalence of hazards, and climate change, will almost certainly lead to increased humanitarian needs. Table 8 notes the projected changes that will affect demand for humanitarian assistance.

Without significant changes to the capacity and/or efficiency of the humanitarian logistics sector, the analysis in Table 8 suggests a growing gap between the expected needs and the industry's capacity

23. Development Initiatives. (2009).
24. Development Initiatives. (2009).
25. <http://www.emdat.be/final-result-request>, 7 November 2010.
26. United Nations Population Division: World Population Prospects Database 2008-medium variant.
27. Haub. (2009).
28. Keane. (2003).

to meet them. When the analysis of the current situation (volumes, gaps, and growth trends) is amplified by demographic trends and the predicted effect of climate change, and assuming there are no significantly different capacities, the demand for humanitarian assistance and the number of people needing but not receiving assistance is likely to grow exponentially, as depicted in Table 9.

Because the growth in resources and capacity is not currently projected to keep pace with the growth in need, the percentage of people affected by disasters who need assistance but do not receive it is estimated to increase by 50 percent or more, which will leave a very problematic gap to close.

Actors likely to be involved and the roles they will play

The number of NGOs has increased dramatically over the past 20 years (Keane, 2003). Thousands of new NGOs have been established to fill the perceived gap in coverage as well as shortfalls in efficiency and effectiveness. This can also be seen in the growth of the number of field-based aid workers. From 1997 to 2005, the number of field-based aid workers grew by 77 percent, from 136,209 to 241,654 (Borton, 2009). The end result is counterintuitive: reduced coverage of humanitarian assistance needs due to fragmentation, duplication, costs, and time lost due to increasing coordination challenges.

The present study has found that the number of actors is not expected to continue growing because of oversaturation and complications of fragmentation of the marketplace. One medium- to long-term caveat to this prediction is the possibility that the number of NGOs in BRIC countries will increase at the same time as Western organisations contract or consolidate.

The growing number of actors is not matched by a growth in overall humanitarian logistics capacity. Many new and smaller NGOs simply

lack the resources to establish and maintain supply chain management systems. As a result, it is important to consider humanitarian actors in three distinct groups:

- Organisations that are too small or unwilling to maintain their own logistics function
- Organisations that are capable of managing and resourcing their own logistics requirements
- Organisations that are large enough and capable of managing and resourcing their logistics requirements and those of others for a fee

This study also shows significant increasing interest and motivation on the part of the commercial sector in becoming involved in humanitarian logistics. Although they are somewhat motivated by philanthropic inclinations, most commercial actors do not expect significant growth in corporate social responsibility. However, the larger commercial logistics providers all noted an expectation that they would grow their core businesses by providing supply chain management, especially transportation and warehouse management services, to the humanitarian sector, based on a profit motivation.

How will humanitarian logistics services be delivered?

Analysis of the collected data suggests a number of significant potential changes in how humanitarian logistics services will be delivered.

Limited availability of funding is slowing growth in humanitarian assistance budgets and increasing needs will place more pressure on humanitarian agencies to do more with less. The most positive outcome of these trends could be the adoption of technologies, coordination processes, and more efficient approaches by humanitarian logistics actors.

Smaller humanitarian organisations will be forced to look for cost-effective ways to manage their supply chains. Many will choose to outsource these requirements and

keep their core focus on programme design and service delivery. By focusing on front-end assessments, targeting, and last-mile delivery, organisations can best apply their strengths while collaborating with larger actors to manage specialised logistics and supply chain services.

It is likely that two primary categories of humanitarian logistics providers will control the market in this future environment: commercial actors and large humanitarian organisations that offer highly professionalized supply chain management solutions. These two categories will not operate exclusively; instead, they will form a codependent system to cover existing and future gaps. For example, the HRD system already contracts with commercial logistics companies to provide freight-forwarding services and some warehouse management.

Although commercial actors are well identified at this stage, there is room for additional, regionally specific commercial actors to fill gaps between the international movement of goods to the intraregional movement of goods. Anecdotal evidence suggests that there is a particular gap to fill in Africa in this regard.

Large humanitarian actors who might offer supply chain management solutions to the humanitarian community as a whole are less defined at this stage. Although WFP has initiated work in this area with the establishment of HRDs, this system alone does not seem adequate to meet the current and future demand for humanitarian logistics services. Many NGOs as well as the Red Cross Movement have reservations about dependency on the UN, which leaves room for one or more large humanitarian actors to set up complementary logistics service platforms.

Last-mile delivery remains one of the most problematic areas for humanitarian logistics. Although NGOs and the Red Cross/Red Crescent Movement are considered

to be most able to provide last-mile delivery, there is much room for improvement, which may be beyond the scope of these organisations' resources.

In the emerging system, all primary humanitarian logistics actors will face market pressure to increase their efficiency and effectiveness. Information technologies—especially those related to tracking and tracing goods from the time of order, procurement, shipment, and delivery—seem to offer the most immediate opportunity to reduce inefficiencies and provide transparency. This transparency will be critical as the few remaining significant humanitarian logistics providers will be increasingly expected to measure and show value for money, especially in terms of timeliness to mobilise and deliver required relief goods.

With regard to the personnel involved in humanitarian logistics, there will be an increasing shift towards professionalisation. Consolidating humanitarian logistics in a few commercial and humanitarian providers will enable those entities to demand and invest in the best trained and most qualified professionals. This should lead to increasing partnerships with academic institutions to ensure high calibre logistics professionals as well as increasing investments in training and staff development to perpetuate continual improvement.

Future funding approaches, availability, and requirements

The research conducted for this study suggests a somewhat sobering picture of resource availability to fund overall humanitarian assistance, and humanitarian logistics in particular. As funding becomes more competitive among organisations, humanitarian logistics units will face increasing pressure to measure and justify their costs and seek lower costs but higher-quality alternatives. Donors will increasingly monitor the performance of humanitarian logistics as an indicator on which

to base future funding decisions. Those humanitarian actors that do not perform or that choose to perform at high costs and low scales will find it difficult to attract funding in the future.

Findings from the interviews conducted for this study suggest an increasing preference for providing funding to pooled funds such as the UN Central Emergency Response Fund (CERF) or the IFRC Disaster Relief Emergency Fund (DREF). Donors find such funding to be simpler and more cost effective because it helps them reduce their programme design, tendering, and oversight requirements. Organisations that offer such pooled funding or framework agreement funding opportunities may be best positioned to capture the shrinking pool of funds.

Donors have also expressed significant frustration with the proliferation of actors and the resulting duplication and coordination challenges. Some donors noted that they are increasingly putting pressure on NGOs to consolidate or come up with collaborative funding proposals to lessen this problem. Networks of humanitarian actors and joint initiatives are likely to fare better given donor interest in reducing the number of actors that provide the same assistance in the same emergency operation.

Some donors are paying increasing attention to prevention, preparedness, and risk reduction after realising that poor investment in these stages leads to chronic vulnerability and excessive costs. Significant initiatives that focus on preparing communities, countries, and regions for emergencies, especially the expected effect of climate change, are likely to have a better chance of attracting resources that were previously only available during emergencies.

Conclusions and Recommendations

The main conclusion of this research is that the need for humanitarian assistance due to

disasters and other complicating factors such as climate change is growing faster than the capacity of the humanitarian industry and the resources of traditional donors. In order for organisations to remain relevant and true to their mission, they will need to continue improving their capacities, whether in-house or outsourced, and adopt innovative and forward-looking strategies. The following recommendations offer some key ideas for consideration and further research related to humanitarian logistics.

Recommendation 1:
Humanitarian actors should increase efficiency and cost effectiveness through investment in key technologies and human resources.

Developments in technology have been identified as one of the key drivers that will influence the future of humanitarian organisations. Advances in technologies such as GIS, mobile communications, ubiquitous computing, and clean water technology are expected to change the way logistics services will be delivered in the next fifteen to twenty years. However, it is not just sophisticated technologies that have the potential to help improve this sector. Humanitarian organisations must find creative and innovative ways to use technologies that are currently available and those that are more modest but highly effective. In this respect, there is an opportunity for these organisations to learn from their commercial counterparts. Track and trace, inventory management, and warehouse management are some of the many logistics functions that can be better managed by using existing technologies.

There is a shortage of well-trained logistics professionals in the humanitarian sector. The frequency and scale of disasters is expected to increase in the future due to climate change and related causes. Accordingly, humanitarian organisations will need more and better qualified personnel to

manage the increasingly complex disaster relief operations.

Recommendation 2:

Humanitarian actors should increase their capacity and reach individually or through partnerships in order to meet the growing needs caused by national and international disasters.

Those actors with adequate scale and capacity should consider offering their services to other humanitarian actors. Different combinations of in-house capacity and prenegotiated agreements with commercial sector logistics companies should be explored in order to maximise strategic advantage and effectiveness. The humanitarian industry as a whole must identify ways to expand the existing capacities of regional and subregional logistics platforms in regions that face the highest vulnerability and risks.

The lack of coordination and collaboration among various actors involved in humanitarian assistance continues to limit the efficiency and effectiveness of humanitarian logistics. This problem is exacerbated by the increasing number of actors in this field. Larger humanitarian organisations that have significant expertise and experience should take the lead in the formation of common platforms where members are able to share logistics expertise, assets, and other expensive resources. Joining forces and formulating coordinated strategies will enable both large and small organisations to optimise their capacities and performance.

The success of disaster relief operations depends on the quality of local resources, who are the first responders to immediate needs when outside assistance is still being mobilised. The quality of local response depends on the effectiveness of the plan that governs their deployment and usage.

The cost and speed of disaster relief operations is often largely

determined by the distances involved. Transport infrastructure, communication networks, the availability of fuel, and the existence of indigenous capabilities can decide the success of a humanitarian logistics operation. The problem of last-mile delivery is also largely a consequence of underdeveloped logistics capacities at the local level. All these issues indicate the importance of developing local logistics capacities. In order to succeed, humanitarian logistics players must achieve a balance between centralisation and decentralisation of their capacities and resources while also strengthening their local partners.

The commercial sector intends to increase its volume of business by boosting its involvement in humanitarian logistics. Those humanitarian organisations that prenegotiate agreements with logistics companies and prepare the system components that trigger procurement or transportation will be more efficient and cost effective as will those that receive goods at the other end. Competition with the commercial sector in some areas is not likely to succeed.

Recommendation 3:

Humanitarian actors must design performance measurement systems to monitor, manage, and account for the efficiency and effectiveness of their logistical systems. Institutional and private donors should increasingly make funding decisions based on proven effectiveness and cost efficiency and should make targeted investments in logistics platforms and systems that increase reach, coordination, efficiency, and effect.

If they expect to receive contributions, small, medium, and large actors must build robust performance measurement metrics into their logistics platforms and/or agreements with humanitarian and commercial service providers. Contracts and service provision partnerships should only be renewed with reliable and high-performing providers.

Additional research should be conducted in order to develop industry-wide performance metrics and to thoroughly measure the degree to which effective and efficient relief and humanitarian assistance depend on the efficiency and effectiveness of logistics and supply chain management systems. This research could provide evidence that would allow individual organisations, partnerships, and logistics coordination mechanisms to mount awareness-raising efforts among managers, leaders, and donors regarding the critical importance of humanitarian logistics to the overall effectiveness of humanitarian assistance.

Donors should fund independent research and evaluations in order to assess the performance of logistics and supply chain management based on standardised measures and indicators. Combined with evidence from individual organisations and coalitions, such research should form the basis for funding decisions. Following a baseline study of performance across the humanitarian sector, donors should coordinate efforts to invest in the most promising shared-service arrangements. This would help encourage capacity building, increasing reach and consolidation for effectiveness within the humanitarian logistics sector. Potential donors in the BRIC group and other emerging nontraditional donors should be encouraged to participate in such efforts.

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- About the Humanitarian Response Depot (UNHRD). www.logisticscluster.org/org/about/depots

About the authors

Brian Majewski is the principal for Global Emergency Group's (GEG) cross-functional strategy practice. He has years of experience designing policy and representing interests with executive and legislative branches of government, international, and nongovernmental organizations and leaders from the private sector. His GEG client work includes change management, preparedness/planning/risk reduction, disaster management strategies, and monitoring and evaluation. He has also supported domestic and international disaster response operations including the September 11 attacks, tropical storm Allison in Texas and Louisiana, Hurricane Katrina, Hurricane Mitch, and the south Asian tsunami. With more than fourteen years at the leadership level, Brian has led negotiations and engagements around the world, in Canada, the United States, Middle East, North Africa, Latin America, Asia, and Europe. Brian was instrumental in negotiating the Third Additional Protocol to the Geneva Conventions for the Red Cross and Red Crescent Movement.

Kaustubh Anil Navangul is currently pursuing his PhD at BI Norwegian School of Management in Oslo, Norway. The main theme of his research is regarding strategy development in humanitarian logistics. He has about five years of international work experience in supply chain management, having worked in India, the Middle East, and Europe. He has been involved at various times in business development, operations, project management, and consultancy. Kaustubh has completed his postgraduate studies in computer management as well as in supply chain management.

Ian Heigh has been involved in delivering international humanitarian assistance for over fifteen major disasters since the mid-1990s, working as a logistician and response manager mainly with the International Red Cross (IFRC) and the United Nations. This has been interspersed with a career in commercial logistics.

Outside of disaster operations, some notable achievements include managing a team to re-engineer the IFRC's global supply chain, leading to the organization winning the European Supply Chain Award for Excellence, and the award of best thesis when gaining his MSc in Logistics and Supply Chain Management at Cranfield University, United Kingdom.

Ian has recently returned from working in Haiti, where he was logistics coordinator for the IFRC, and is involved in setting up his new company, Everywhere Disaster Relief. He is also undertaking a PhD focusing on improving the way actors providing logistics services work together in disaster response.

Appendix 1

List of stakeholders interviewed for the study

Institution	Designation	Stakeholder category	Date
Norwegian Foreign Ministry	Humanitarian section	Donor	30 November 2009
European Commission's Humanitarian Aid Department (ECHO)	WatSan expert, Nairobi sector support team	Donor	26 November 2009
BI Norwegian School of Management	Associate professor, Department of Strategy and Logistics	Academia, Research and Strategy	20 November 2009
International Committee of Red Cross (ICRC) Research	Logistician	Academia, Research and Strategy	30 November 2009
International Federation of Red Cross and Red Crescent Societies (IFRC)	Under-secretary-general, Innovation and Knowledge Management	Academia, Research and Strategy	13 November 2009
International Federation of Red Cross and Red Crescent Societies (IFRC)	Head, Global Logistics Department	Academia, Research and Strategy	14 November 2009
Agility Logistics	Senior project manager	Commercial logistics firm	2 December 2009
Wilh. Wilhemsen Group	Business development	Commercial logistics firm	24 November 2009
UPS Foundation	Contributions manager	Foundation for Commercial logistics firm	4 December 2009
UPS Corporate	Global solutions unit	Commercial logistics firm	14 December 2009
DHL	Global head-aid and relief sector	Commercial logistics firm	3 December, 2009
Kuehne + Nagel	Business development	Commercial logistics firm	4 December 2009

Appendix 2

List of abbreviations

1	CRED	Centre for Research on the Epidemiology of Disasters
2	DAC	Development Assistance Committee
3	EM-DAT	Emergency Events Database
4	ECHO	European Commission's Humanitarian Aid department
5	GIS	Geographic information system
6	GPS	Global positioning system
7	HRD	Humanitarian response depots
8	ICRC	International Committee of Red Cross
9	IFRC	International Federation of the Red Cross and Red Crescent Societies
10	INGO	International nongovernmental organisation
11	LCA	Logistics capacity assessment
12	LET	Logistics emergency team
13	NGO	Nongovernmental organisation
14	ODA	Official development assistance
15	3PL	Third-party logistics service provider
16	UN	United Nations
17	WFP	World Food Programme