Humanitarian Logistics

Meeting the challenge of preparing for and responding to disasters

Edited by
Martin Christopher and
Peter Tatham

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Introduction

MARTIN CHRISTOPHER AND PETER TATHAM

The global demand for humanitarian assistance, including requests for assistance by national governments, continues to rise. This is triggered and sustained by increased severity of natural hazards, escalating conflict, and a dramatic increase in vulnerabilities caused by the global financial crisis, continuing high food prices, the scarcity of energy and water, population growth and urbanization.[1]

This gloomy prediction from the UN Secretary General underscores the massive challenge facing the world and its population as we reached the end of the first decade of the 21st century. Indeed, even if global peace were to break out tomorrow, the reality is that an increasing population (and individuals' associated rising expectations) is putting enormous pressures both on the world's resources and on the generic infrastructure supporting them. It is no wonder, therefore, that disasters frequently strike those countries that are the least prepared, both economically and socially, to deal with them. Indeed, as Kahn[2] succinctly observes, the per capita GDP is a key indicator of disaster casualty rates.

Although it would be wonderful if such challenges could be solved via the stroke of the editors' pens – this is, of course, not the case. It will take far more than the thoughts of those involved in this volume to alter the social, political and environmental trajectory of the world. So, faced with the reality of an annual occurrence of some 350 natural disasters,[3] what insights *can* those involved in the preparation for, and response to, such events bring to bear?

More specifically, and as betrayed by its title, this volume seeks to understand the nature of the challenges facing those who are involved in the management of the logistics of disaster relief, and to offer some potential solutions that can be developed in the near and longer term. Many of those contributing have spent considerable periods thinking about such issues, be

this in a commercial, a humanitarian or a military context. We aim, therefore, to try to bring these perspectives together as a means of offering ways in which particular aspects of this complex and evolving problem might be tackled.

But why focus on logisticians? The answer is simple – be it in the context of a rapid- or slow-onset disaster – the imperative is to procure and move the required materiel (water, food, shelter, clothing, medicines, etc) from point A to point B in the most efficient and effective way possible. But although simply stated, the reality is hugely complicated and, indeed, costly – not least because of the difficulty of forecasting when and where the next crisis will occur. It is unsurprising therefore, that recent estimates would suggest that as much as 80 per cent of the expenditure of aid agencies is on logistics[4] (as described above). Given that the overall annual expenditure of such agencies is of the order of US $20 billion, the resultant logistic spend of some US $15 billion provides a huge potential area for improvement, and consequential benefit to those affected by such disasters.

In the light of these almost self-evident observations, it is really quite surprising that, until relatively recently, the challenges of humanitarian logistics have not attracted serious consideration by the academic community at large. Certainly a number of important contributions have been made, with one of the earliest by Douglas Long and Donald Wood in 1995,[5] however, it is suggested that the South East Asia tsunami of 2004 really provided the catalyst for the current sustained level of interest. Not least, the publicity surrounding this catastrophic event underlined the importance of the logistics challenge as exemplified by the reported remarks of a European ambassador who observed in the immediate aftermath: 'We don't need a donors' conference, we need a logistics conference.'[6]

Arguably, however, the timing of this recognition of the importance of the logistic element of a humanitarian response has had a fortuitous aspect. By the early part of the millennium, the processes underpinning the operation of the fast-moving consumer goods (FCMG) retail business within the developed world had reached a significant degree of sophistication. This reflected the cumulative learning over the previous 20 years and, as a result, a number of key principles had been developed and understood. Thus, to many observers, the post-tsunami challenges (and, indeed, those of subsequent disasters such as the Pakistan earthquake and the series of hurricanes that devastated parts of the southern United States in 2005, Cyclone Nargis in the Bay of Bengal (2008) and most recently the 2010 earthquake in Haiti and flooding in Pakistan), have the potential to be mitigated through the application of appropriate tools and techniques that have proved beneficial in a commercial context.

But, of course, the challenges of humanitarian logistics have a number of key aspects that clearly differentiate them from those of the commercial world. First and foremost among these is the massive uncertainty surrounding, in particular, rapid-onset events. Thus, while we know that such events will unquestionably occur, their timing and location is hugely

difficult to predict with any significant degree of certainty. Second, the humanitarian field faces the challenge of a de-coupling of financial and material flows. As a result, aid agencies are placed in the difficult position of having to second guess the needs of the beneficiaries who are frequently solely focused on the business of staying alive – and yet, at the same time, the agencies must satisfy the increasingly demanding governance requirements of the donor community. Therefore, while many management gurus would argue strongly that the voice of the customer should always be paramount in an organization's thinking, the absence of clarity over the identity of the humanitarian logistician's customer remains unhelpful and can lead to perverse behaviour.

Third, almost by definition, the infrastructure surrounding the disaster will be devastated to a greater or lesser extent. Thus, generic prescriptions such as the substitution of information for inventory face a particular challenge in this environment. Finally, of course, the price of failure in terms of unnecessary loss of life or prolonged hardship is significantly greater than that of reduced profits.

Fortunately, all is not gloom and this edition represents part of the effort of the academic and practitioner community to develop novel solutions to these challenges. In doing so, it reflects the growing determination of these communities to bring together their knowledge and experience and to build on the increasing body of thought that is being exposed through a broad range of journals, conferences and international groups, such as the 'HUMLOG initiative;[7] in Australia through the Australia/New Zealand Academy of Management (ANZAM) supply chain special interest group; and, in the UK context, the collaboration between Cardiff and Cranfield Universities, which have pooled their logistic expertise in a common effort to overcome some of the issues outlined above.

However, in setting the scene for this volume, we propose to begin by exploring the challenge of how to manage supply networks when future requirements are manifestly uncertain – which is, of course, one of the most challenging aspects of humanitarian relief programmes.

Managing supply networks under conditions of uncertainty

One of the distinguishing features of modern supply networks – both in the world of business as well as in the humanitarian arena – is that they are characterized by uncertainty and, hence, unpredictability. For some time now commercial supply-network managers have become accustomed to the idea that they can no longer rely on the traditional rules and techniques that have allowed them to plan ahead with a degree of confidence.

Thus, although conventional supply-network management typically assumes a degree of stability with planning horizons that extend some

months into the future, the last few decades have seen a considerable increase in turbulence in the wider business environment. Demand can no longer be easily forecast and supply conditions have become more volatile in almost every industry. As a result of this uncertainty new business models have emerged to enable organizations to make the transition from the classic 'forecast-driven' approach to a much more 'event-' or 'demand-driven' capability.

Organizations doing business in turbulent markets have learned that one of the key elements to ensure survival is 'agility'. This can be defined as the ability to respond rapidly to unexpected changes in demand or supply conditions – and, indeed, to changes in the wider business environment.

It can thus be argued that the logistical capabilities required by aid agencies and others to deal successfully with large-scale, sudden-onset disasters are not dissimilar to those required in commercial organiszations faced with rapidly changing conditions. There is, therefore, an excellent opportunity to learn from the experiences of companies who have become adept in responding rapidly to unpredictable events.

Because all organizations are part of a wider network of suppliers, intermediaries and customers, it is important to recognize that agility is not just about achieving internal responsiveness, but rather about how the end-to-end supply network can become more agile. Thus, the concept of agility has significant implications for how organizations within the supply/demand network relate to each other, and how they can best work together to maximize the efficiency and effectiveness of the network as a whole. It has been suggested that there are a number of key prerequisites to the design and management of such agile supply networks.[8] Specifically, agile organizations tend to exhibit certain characteristics; agility implies that they are demand- or event-driven, they are network-based, they are process oriented and they are virtually integrated through shared information.

Demand- and event-driven

Traditional management practice has been based upon the principle of planning ahead, usually based upon a forecast. In conditions of turbulence and unpredictability, however, the challenge is to create a capability to facilitate a rapid response to events as they happen. A fundamental enabler of demand/event-driven responsiveness is time compression. Much of the time that is consumed in supply networks could be termed 'non-value adding time'. In other words this is time when nothing is happening to achieve the goal of the 'right product in the right place at the right time'. Sometimes this non-value adding time is incurred because of cumbersome planning and decision-making processes. At other times it may arise because of queues at bottlenecks, or because of inadequate coordination across the different stages in the supply network. As a result, many commercial organizations have transformed their responsiveness by a strong focus on

what has been called 'business process re-engineering'[9] whereby every underpinning process in the supply network is put under the spotlight with the intention of squeezing out as much non-value adding time as possible.

Demand- and event-driven supply networks are also often characterized by their strategic use of inventory and capacity. Conventional wisdom is often driven by the desire to follow 'lean' principles of reducing inventory and eliminating idle capacity. Agile supply networks on the other hand recognize that in conditions of uncertainty – both on the demand side and the supply side – a certain level of 'slack' is essential. Ideally, such strategic inventory is held as far upstream as possible and in a generic form to enable 'risk pooling' – in other words, rather than disperse the inventory in its final form and run the risk of having the wrong product in the wrong place, it is held centrally, shipped and configured on a just-in-time (JIT) basis. Clearly this approach will incur a cost penalty compared to the 'leaner' alternative, but that is the price of responsiveness.

Network-based

One way that organizations can enhance their agility is by making use of the capacity, capabilities and resources of other entities within the network. It could be financially crippling for one organization to have to carry enough capacity and inventory to, for example, cope with any demand eventuality. However, if close working relationships can be established with other organizations that can provide access to their own resources, then a real opportunity exists for creating high levels of flexibility in the supply network.

A good example of how network partners can enable a more agile capability in the commercial world is provided by the Spanish clothing manufacturer and retailer, Zara. Because Zara competes in a market characterized by unpredictability and short product life cycles, the need for agility is high. One way that Zara achieves this agility is by making use of a network of small, independent workshops that do the final sewing of many of their products. Zara has established strong working relationships with these suppliers and regards them as part of their 'extended enterprise'. These external workshops reserve capacity for Zara even though they will not know the precise requirements until a few days before the garment is to be manufactured.

In other cases organizations can benefit by sharing resources across a network even with competitors. Thus, for example, petrol companies such as Shell, BP and Total will often share refinery capacity, while in the airline industry different airlines will pool their inventory of service parts and position these strategically around the world. In a similar way, the Armed Forces of the NATO countries use a common parts identification system that facilitates an equivalent approach.

Indeed, in the world of humanitarian logistics, such a resource-sharing model has recently been created to enable access to a common inventory, with the United Nations Humanitarian Response Depot (UNHRD) network, which is coordinated by the World Food Programme (WFP) in Italy, being a case in point.

Process-oriented

One feature of organizations that can respond rapidly to unpredictable events is that they have achieved a high level of cross-functional working. Most conventional businesses tend to be organized around functions, eg the production function, the distribution function, etc. This type of organizational structure may be administratively convenient, but it often leads to an inwardly focused 'silo' mentality. It also means that there are usually multiple 'hands-offs' from one department to another. The end result is that the decision-making process is lengthy, and that lead-times are extended.

The alternative is to break down the silos by adopting a cross-functional team-based approach that reflects the key business processes – particularly the supply-network processes. Processes are the horizontal, market-facing sequences of activities that create value for customers. In the context of supply networks they include such key underpinning processes as order-to-delivery, capacity and demand management, and supplier management. For each of these processes a 'process owner' should be appointed whose task is to bring together a cross-functional team and to seek to create a seamless and more rapid achievement of the process goals. Thus, for example, the order-to-delivery process will consider how a customer's requirement can be met in shorter timeframes with more reliability by 'project managing' the order from the moment it is captured until it is delivered. Usually when processes are managed in this way, opportunities for process simplification and improvement quickly become apparent.

Furthermore, if the supply network is to work effectively across multiple independent entities, it is critical that processes are aligned across organizational boundaries. A good example of such process alignment is provided by the concept of vendor-managed inventory (VMI). Under a VMI arrangement, the sales outlet (say a supermarket) does not formally place an order on the supplier; rather they provide the supplier with regularly updated information (usually extracted from the point of sale systems) on the rate at which the customer's inventory of the product in question is being depleted. The supplier then automatically replenishes the inventory. It is akin to a closed-loop supply network process.

Virtually integrated

By definition, for global supply networks to achieve high levels of agility there must be a corresponding level of *connectivity*. Historically, such connectivity may have been achieved through ownership and control – a state often described as 'vertical' integration. Today, the likelihood is that the supply network will be fragmented and dispersed with each entity independent from the others. However, the need for integration is still as vital as ever, but now the essential integration is not achieved through ownership and control but rather through shared information and collaborative working. This type of connectivity is often called 'virtual integration'.

The underpinning idea of virtual integration is that an agile capability can be enabled through enhanced visibility. Ideally all parties in the network should share information in as close to real time as possible. This information will include the actual requirement from the field (demand), current inventory dispositions, the supply schedule and event management alerts.

Many traditional supply networks have poor upstream and downstream visibility with little shared information. Hence they are prone to mismatches of supply and demand at every interface – a situation made worse by the so-called 'bullwhip' effect that amplifies disturbances in the demand signal as orders are passed up the supply network. Bullwhips can be dramatically reduced or even eliminated if the different echelons in the supply network can be linked through shared information.

The barrier to improved visibility is, however, no longer technological. The tools exist to enable the highest levels of connectivity in even the most fragmented global network. The real challenge is the reluctance that still exists within some organizations to share information across boundaries – be these internal or external. The most agile supply networks are typified by a mindset of collaborative working with other partners in the network based upon a spirit of trust and shared goals.

Lessons from best practice

It may sometimes seem banal or inappropriate to ask the question 'what can humanitarian logistics learn from best practice in the commercial sector?' Although there can be no question that the challenge of saving lives is significantly more important than improving on-the-shelf availability of consumer products in a retail outlet, we would argue that there *are* lessons that can be learned and through which humanitarian logistics practice can be improved.

We have suggested that the key connection between the worlds of commerce and humanitarian logistics is that of uncertainty, and we have highlighted how, to a certain extent, such uncertainty can be conquered

through agility. But one of the biggest remaining barriers to supply network agility is complexity. In a global supply network this complexity comes in many forms, but one of its most potent manifestations is in the multitude of nodes and links that constitute the network.

As Figure 0.1 suggests, what are often referred to as 'supply chains' are not really chains; rather they are networks or webs of inter-connected and inter-dependent entities. The resulting complexity can be considerable and, unless a means is found of managing across these nodes and links, the system will be prone to disturbance and disruption. The challenge is to synchronize activities across the network so that a more agile response to changes in demand can be achieved. One idea that is attracting attention is the concept of supply network 'orchestration', and a good example of such orchestration is provided by the Hong Kong-based company, Li & Fung.

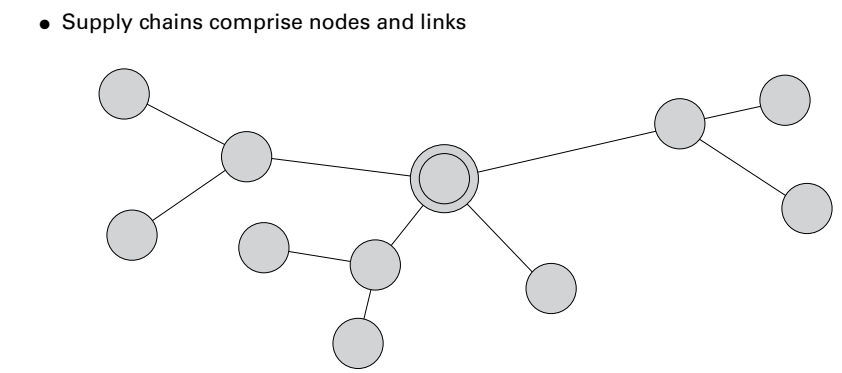
Li & Fung work on behalf of clients, mainly retailers, who are seeking to source products made to their own specification. Thus, for example, the global retailer Wal-Mart might decide that for the next winter season in the USA they want to introduce a range of low-priced ski wear. Acting on their behalf, Li & Fung will identify the appropriate designers, they will source the different fabrics, fasteners and zips, they will contract with appropriate manufacturers, and manage the whole supply network from raw materials through to Wal-Mart's stores. Li & Fung's capability as an orchestrator comes from their specialist knowledge of the industry, their long-standing relationships with suppliers, and their information systems that enable them to coordinate and synchronize the flows of material and product across a complex network.

Sometimes the supply network orchestrator is termed a Lead Logistics Provider or a 4PL (Fourth Party Logistics) provider, and companies such as DHL, UPS and FedEx are increasingly taking on this role on behalf of global corporations. For example, Cisco, one of the world's leading suppliers of communication network equipment, use UPS to coordinate a large part of their global network of contract manufacturers, distribution service providers and component suppliers to enable a high level of synchronization in what has become a very volatile marketplace. Again, this synchronization is greatly enabled by real-time information that is shared across the partners in Cisco's global network.

The way forward

It seems that the common thread running through agile supply networks is a focus on synchronization enabled by shared information. Clearly there are other enablers of agility such as process alignment and collaboration across inter- and intra-organizational boundaries, but 360° visibility appears to be the critical element. Given that meeting the challenges facing the humanitarian logistic community would seem to demand the ultimate in

FIGURE 0.1 The two generic categories of risk



agile response, it is heartening to recognize that, as reflected in the contributions contained within this book, this message is now gaining traction and that there is a growing commitment to breaking down the barriers to much closer collaboration across organizational boundaries.

In approaching the challenge of developing a volume on humanitarian logistics, as editors we were especially keen to present as diverse a set of perspectives as was practicable. In particular, we believed that an improved understanding of the challenges and solutions could be gained by garnering contributions from both a geographically diverse community as well as from practitioners (as distinct from academics). It is, however, a sad reality that the real world events of 2010 conspired against us as a succession of major events, including the Haiti earthquake, the Pakistan flooding and the Indonesian volcanic eruption made for an even more frenetic year that usual for the disaster-response community. As a result, and to their considerable regret, a key contribution from George Fenton of World Vision International and Mike Goodhand of British Red Cross was never able to make it onto the written page – although they have promised to do better for the 2nd edition!!

In line with our theme that there are potential lessons that humanitarian logisticians can develop from emerging business best practice, *Professor Paul Larson* from the University of Manitoba, Canada, explores these issues more fully in Chapter 1. In particular, Paul reflects on the potential for an approach that considers the application of commercial and academic models of risk management to the humanitarian logistics network. In doing so, he powerfully reminds us that, ultimately, the supply network is operated by individuals who must endure considerable hardship and discomfort in

carrying out their tasks for which much of the reward is in terms of self-satisfaction rather than in a tangible financial sense. Sadly, and all too frequently, such unsung heroes pay the ultimate price and, in that sense, this book can be seen as a small contribution to the global efforts to achieve a fairer and more just society.

In Chapter 2, *Dr Tina Wakolbinger* from the University of Memphis, USA, and *Dr Fuminori Toyasaki* of York University, Canada, reflect on a second of the key challenges facing the humanitarian logistic system as a whole. This emanates from the basic structure of the system for funding the preparation and response mechanisms, and these authors underline the importance of investing in logistic systems in the round. In doing so, they underline one of the key premises of this anthology, which is that significant improvements in the humanitarian response to disasters are, to a significant degree, conditional on achieving advantages in logistic practice and, preferably, transformation to supply network management with concomitant embodiment of the practices that have led to such massive improvements in the business environment.

As has been discussed earlier, a robust and comprehensive end-to-end communications system is one of the key ingredients underpinning the advances in commercial supply network management. Unsurprisingly, this is equally true of humanitarian logistics systems; however, persuading NGO management to invest in such a 'back office' (as distinct from 'front line') function has proved extremely difficult – notwithstanding the weight of evidence from other fields. Perhaps this reflects the very nature of non-profit organizations where the absence of the profit motive removes a key indicator that will inform strategic decision making. Nevertheless, a number of major NGOs such as Oxfam are making a concerted effort to improve the information systems supporting their supply networks. The challenge that this presents is explored by Oxfam GB's head of supply chain management *Martijn Blansjaar* and his colleague *Charl van der Merwe* in Chapter 3. Through a historical discussion of the various intertwined change programmes within Oxfam GB, this chapter powerfully demonstrates the importance of focusing on the organizational and interpersonal dimensions of the problem as well as those relating to the computer technology. The chapter also offers a tantalizing glimpse of the humanitarian supply network of the future that is underpinned by a common software package that significantly eases the cooperation and coordination challenges that have bedevilled the field.

Not least as a result of the absence of data relating to profit/loss in the humanitarian arena, the challenge of developing appropriate management metrics is particularly difficult in a non-profit environment. *Dr Peter Tatham* from the Graduate Business School of Griffith University, Australia, and *Kate Hughes*, a Res Associate at Macquarie University, Australia, explore this issue in Chapter 4. These authors note that, although there is a welcome improvement in the use of metrics to understand the efficiency of the supply network, achieving a better

understanding of the outcome (or effectiveness) of the operation as a whole and specifically focusing on the aid beneficiaries, remains remarkably elusive.

The final chapter relating to the major issues facing those who wish to improve the humanitarian logistic response has been written by *Dr Nezih Altay* of De Paul University in the USA and his colleague *Dr Melissa Labonte* of Fordham University, also in the USA. Given that the response to many disasters sees a large number of UN agencies and NGOs operating in close geographic proximity, achieving coordinated action to meet the needs of those affected has long been recognized as one of the most significant challenges facing the humanitarian community as a whole. The most recent initiative to achieve a resolution to the resulting inefficiency has been developed through the United Nations Cluster system, and this is analysed in depth through the work of these two authors in Chapter 5.

In line with the approach to this book that has been outlined earlier, Chapter 6 is the first of three that take regional perspectives on a broad range of humanitarian logistic issues. Authored by *Dr Stephen Pettit* and *Dr Anthony Beresford* of Cardiff University, UK, *Mike Whiting* who both lectures at Cranfield University, UK, and is regularly deployed in the aftermath of disasters to assist in the management of helicopter and fixed-wing assets, and *Dr Ruth Banomyong* from Thammasat University, Thailand, this chapter takes a retrospective view of the 2004 SE Asia tsunami as it affected Thailand, and through this reflects on the logistic lessons identified and the associated progress towards their resolution. In doing so, it underlines many of the themes that have been touched on in this opening chapter, including the necessity for good communications and for appropriate coordination mechanisms.

Professor Paul Buatsi who, until recently, was the Dean of the Kwame Nkrumah University of Science and Technology in Ghana has kindly contributed Chapter 7, which draws on his extensive expertise in the management field. This essay emphasizes the extent to which the development of efficient and effective logistics processes is equally applicable in the environment of a developing country. Indeed, the absolute level of improvement generated by even limited advances in the practice of supply network management underscores the importance of working with local agencies and individuals to deliver transformational change in a way that is appropriate to the specific geographic and cultural context.

In stark contrast to the previous contribution, Chapter 8 contains a case study of the State of Florida that is used by *Dr Jarrod Goentzel* (from MIT) *and Professor Karen Spens* (of Hanken School of Economics, Finland) to describe the current arrangements for responding to disasters that affect that part of the USA. Indeed, given that the frequency and severity of the wind storms that strike Florida each year, it will be readily appreciated that these can only be loosely described as *uncertain* future events. As a result, the enormous scale and scope of the dormant preparation and response mechanism reflects the reality of the threats the population faces. In