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Blackett Memorial Lecture† Humanitarian aid logistics: supply chain management in high gear

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This paper builds on the idea that private sector logistics can and should be applied to improve the performance of disaster logistics but that before embarking on this the private sector needs to understand the core capabilities of *humanitarian logistics*. With this in mind, the paper walks us through the complexities of *managing supply chains* in humanitarian settings. It pinpoints the cross learning potential for both the humanitarian and private sectors in *emergency relief operations* as well as possibilities of getting involved through corporate social responsibility. It also outlines strategies for better preparedness and the need for supply chains to be agile, adaptable and aligned—a core competency of many humanitarian organizations involved in disaster relief and an area which the private sector could draw on to improve their own competitive edge. Finally, the article states the case for closer collaboration between humanitarians, businesses and academics to achieve better and more effective supply chains to respond to the complexities of today's logistics be it the private sector or relieving the lives of those blighted by disaster.
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Introduction

Tsunami, *Darfur*, *Bam*, *the Gujarat earthquake*, *Hurricane Mitch*… Every year there are about 500 disasters killing around 75 000 people and affecting some 200 million people. We just have to look at the recent events in the Indian Ocean Tsunami to realize the scale of the relief effort for one isolated case, let alone additional natural or 'man-made' disasters. Consider the conflict in Sudan, for example, where 2.5 million people in Darfur are in extreme need of assistance plus another half-a-million returnees from southern Sudan. So the humanitarian impact is huge but this is also a large 'business' sector albeit a peculiar one.

The recent World Conference on Disaster Reduction in Japan in January 2005, called for better preparedness for disaster relief in natural disasters, but being better prepared can also mitigate the affects of man-made disasters. In addition to this, humanitarians have also come under increasing pressure to prove to donors, pledging millions in aid and goods, that they are reaching those in need. Since donors are becoming more aware when it comes to expenses humanitarian organizations are under greater scrutiny to monitor the impact of aid, not just the input and output but the whole operation. This means they must be more results-oriented as they become ever more accountable and therefore their operations *must* be more transparent. Since disaster relief is about 80% logistics it would follow then that the only way to achieve this is through slick, efficient and *effective logistics operations* and more precisely, *supply chain management*.

Therefore, just as the science of logistics and supply chain management has become critically important for private sector logisticians, so too it is becoming more important for humanitarians. Until fairly recently humanitarian logistics was a back-office function that was not given proper attention and logistics skills remained underdeveloped. That is changing, albeit fairly slowly, as logistics has started to be recognized as integral to any relief operation. This was the case even before recent events but what the Indian Ocean Tsunami has done is to move logistics to centre stage.

The following sections highlight the differences and similarities of humanitarian supply chains and those of the private sector, as well as outline the cross learning potential for both sectors. We also state the case for closer collaboration between the sectors and highlight the significant role that operational research academics can have in improving logistics.

Defining logistics

Before we get underway into highlighting the case for greater emphasis on logistics in humanitarian organizations and

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greater collaboration with the private sector we first need to understand a few terms at the outset. For example, what do we mean by 'logistics'?

The word 'logistics' comes literally from the medieval Latin 'logisticus' *of calculation*, from Greek 'logistikos', *skilled in calculating*, from 'logizesthai', *to calculate*, from 'logos', *reckoning, reason*.

It means many things to many people. *To the military*, it is 'the science of planning and carrying out the movement and maintenance of forces […] those aspects of military operations that deal with the design and development, acquisition, storage, movement, distribution, maintenance, evacuation and disposition of material' (DoD, 2002). Logistics in this domain dates back to the Napoleonic era when the *maréchal de logis*, the military officer, was responsible for organizing the camp facilities for troops at war. (Kleindorfer and Van Wassenhove, 2004). *To business* it is defined as a planning framework for the management of material, service, information, and capital flows and includes the increasingly complex information, material, communication and control systems required in today's business environment. To many *humanitarians*, the definition of logistics is open to loose interpretation. Senior logistics representatives working together in an advisory committee for humanitarian logistics set up by the Fritz Institute recently tried to address the need for a common definition of logistics in the humanitarian sector. They define it as 'the process of planning, implementing and controlling the efficient, cost-effective flow of and storage of goods and materials as well as related information, from point of origin to point of consumption for the purpose of meeting the end beneficiary's requirements' (Thomas and Mizushima, 2005). Essentially for humanitarians, logistics is the processes and systems involved in mobilizing people, resources, skills and knowledge to help vulnerable people affected by disaster.

By 'disaster' we mean 'a disruption that physically affects a system as a whole and threatens its priorities and goals.' A disaster can be natural or man-made. *'Natural disasters'* comprise both 'slow onset' disasters such as famine and drought and 'sudden onset' such as the recent tsunami or earthquakes. Some are cyclical in nature such as hurricanes. Collectively they account for only 3% of disaster relief operations.

According to Rony Brauman (Rony Brauman speaking at the lecture entitled *Le Dilemme Humanitaire* at INSEAD on 14th March 2005) former Director of Médecins Sans Frontières (MSF) France, from 1982–1994, an astounding 97% of operations were devoted to the relief of *'man-made disasters'* such as sudden onset disasters, for example a terrorist attack or a *coup d'état* or slow onset disasters such as political or refugee crises. Man-made disasters do not include wars which are in a category of their own since most humanitarian organizations do not get involved while the fighting continues (see Figure 1: Explaining disasters).

	Natural	**Man-made**
Sudden-onset	Earthquake Hurricane Tornadoes	Terrorist Attack Coup d'Etat Chemical leak
Slow-onset	Famine Drought Poverty	Political Crisis Refugee Crisis

Figure 1 Explaining disasters.

Similarities with the private sector

Humanitarian organizations are about 15 years behind their private sector counterparts who realized way back the importance of using efficient supply chains, particularly given the increasing opportunities to 'go global'. For years, humanitarian logistics has been struggling for recognition. It has been locked into a vicious circle where lack of understanding for the function and its importance have meant lack of inclusion in planning and budgetary processes, resulting in logistics requirements not being met (see Figure 2). This in turn has led to a 'fire-fighting' mentality. Managers saw logistics struggling and concluded that a review of logistics was not advantageous further fuelling a lack of understanding and so the cycle begins again.

It is only recently that humanitarian organizations such as the International Federation of Red Cross and Red Crescent Societies (IFRC) and the World Food Programme (WFP) have tried to break free of the vicious circle by pin-pointing logistics and supply chain management as key to a relief operation. Other organizations in the sector are beginning to follow suit and raise the profile and professionalism of logisticians.

Just as the private sector, over a decade ago, humanitarian organizations are beginning to wake up to the fact that logistics:

- is crucial to the performance (effectiveness and speed) of current and future operations and programmes;
- serves as a bridge between disaster preparedness and response, between procurement and distribution and between headquarters and the field. (Thomas and Mizushima, 2005);
- provides a rich source of data, since it is this department that handles the tracking of goods, which could be used to analyse post-event effectiveness (Thomas and Mizushima, 2005); and
- is the most expensive part of any relief operation and the part that can mean the difference between a successful or failed operation.

Whatever the definition, one thing that logistics has in common is the fact that it includes the *planning* and

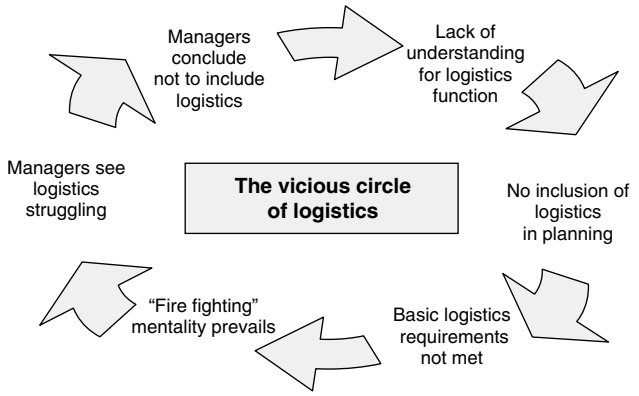


Figure 2 The vicious circle of logistics.

preparedness, *design*, *procurement*, *transportation*, *inventory*, *warehousing*, *distribution* and *recipient satisfaction*. In short, all logistics operations have to be designed in such a way that they get the right goods to the right place and distribute to the right people at the right time.

Logistics in context

A complex environment

Although humanitarian logisticians can learn from and work with private sector logisticians their work in the context of a natural or man-made disaster is very different from logistics in the business context. As the recent relief effort in the Indian Ocean shows, the biggest hurdle facing humanitarian logistics teams has been the sheer complexity of the *operating conditions* within which they had to work in order to supply aid to those affected. In this particular case, thousands of kilometres of coastline were hit. Such areas are already difficult to reach under normal circumstances because roads are often inadequate but following the disaster the original infrastructure had been completely destroyed.

Humanitarians need *robust equipment* that can be set up and dismantled quickly enabling them to be extremely adaptable and prepared for the unexpected as circumstances can change very quickly from one moment to the next. Unfortunately, logisticians in this sector often have to work with fragmented technology and poorly defined manual processes.

There are greater issues of safety as they may be operating in a *politically volatile climate*. They often work under high levels of *uncertainty* in terms of demand, supplies and assessment. Then there is the added *pressure of time* which, in this context, is not just a question of money but a difference between life and death. *High staff turnover*, often through burn-out in response to the emotional and physical demands on them, means that skilled staff are always in short supply.

Unlike private sector logisticians, humanitarians often have to contend with *many stakeholders*, including large numbers of uncoordinated and disparate donors, the media, governments, the military not to mention the final beneficiaries. At any one time, there can be as many as several hundred humanitarian organizations at the scene of a disaster, not always acting in a coordinated fashion. All with different political agendas, ideologies and religious beliefs and all fighting for media and donor attention. The greatest challenge here lies in aligning them without compromising their mandates or beliefs.

As mentioned above, donors have become particularly influential in prompting humanitarian organizations to think in terms of *greater donor accountability and transparency* of the whole supply chain.

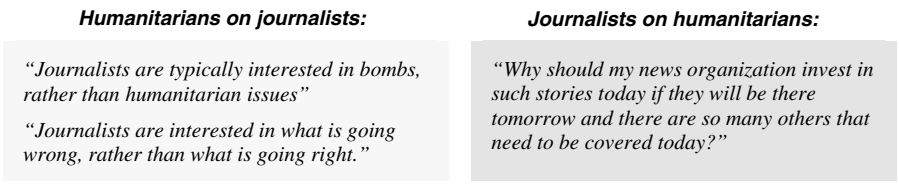
The role of the media in humanitarian logistics is also something with which private sector logisticians rarely have to contend. It can best be described as a love–hate relationship born out of a need to highlight the plight of those affected by disaster. In spite of the increasing role of the media, humanitarian organizations and journalists do not seem to have understood their mutual interdependence very well as Figure 3 suggests.

Following appeals in the media, humanitarian organizations are often inundated with *unsolicited donations* which can cause bottlenecks in the supply chain as much-needed resources, including personnel and transportation, are sacrificed to sort through and transport the supplies. According to Iain Logan, former Operations Manager at IFRC, the Balkan crisis unleashed an overwhelming response from the donor community to the point that IFRC decided not to unload planes carrying unsolicited goods.

Unlike the private sector where the bottom line motivates the constant need to measure performance and invest in improving it, the humanitarian sector operates without the market forces of demand and supply regulated through price. In the private sector, performance is rewarded by the market (eg stock market, higher revenues and profits) and internal incentive schemes such as bonuses, stock options and so on, which feeds a culture of continuous improvement. This is in stark contrast to the humanitarian sector where, until now, there has been *little incentive to use the lessons learned* from disasters to improve performance next time around.

The above already paints a pretty complex picture of the difficulties that await humanitarians in the aftermath of a disaster but it is not just the operating conditions that make humanitarian logistics so complex. Add to this a number of other factors within the *physical or geographic environments* where disasters strike and you get a much fuller picture of the complexities. As highlighted by Richardson (1994), complexity can include one or more of the following:

- *Diversity of factors* can make it difficult to understand which factors predominate and can obscure the precise



Source: Quotes taken from Ross, 2004

Figure 3 Humanitarians *versus* journalists.

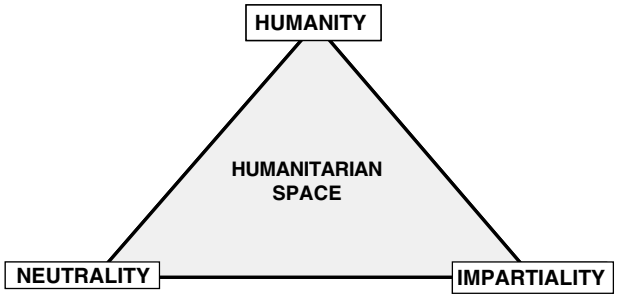
nature of the problem. Such was the case in Africa where the famine, the HIV situation, the economic conditions and limited access to at-risk populations were all combined to make the crisis complex.

- *Interactivity* among the factors accelerates the rate at which the disaster might escalate. For example, after long periods of rain, water-saturated terrain is more likely to generate mudslides, especially during an earthquake.
- *Invisibility* comes from the inability to anticipate factors, typically because they are unknown in different dimensions to the managers. The classic example of invisibility is when foreign aid workers underestimate the importance of local customs and habits in the relief area. Despite the best efforts to estimate them, without the perspective of a local partner, many important factors will remain invisible leaving the manager unaware of potential damages.
- *Ambiguity* makes it difficult to know the direction in which the crisis might escalate since the cause-effect relationships are not clear. Thus, it is hard for managers to forecast the implications of their decisions. This is the classic case heard in debates about what exacerbated a disaster: the lack of resources, trained personnel, accurate information, or all together.
- *Incremental* change happens when the impact of the crisis is so strong early on that everything else is disregarded. The problem is that, while ignored, the other factors become invisible, grow and interact, leading to further consequences.
- *New phenomena* always present a great challenge since the effects and impact are most likely unknown, with insufficient time for appropriate analysis of the situation. To some extent, that is what happened in Africa, as the 2002 food crisis was the first time HIV played such an important role.

In the midst of an environment beset with high levels of uncertainty, ever changing needs, increased complexity and numerous stakeholders all vying for attention perhaps the most important concept setting apart humanitarian logisticians from their private sector counterparts is their strict adherence to the *humanitarian principles*.

A question of principles

Humanitarian organizations live by their principles of *humanity*, *neutrality* and *impartiality*. In other words, they will help everyone in need wherever found; will not influence the outcome of a conflict with their intervention; and will not favour one group of beneficiaries over another. These principles define the 'space', both physically and virtually, in which they need to be able to operate to do their job effectively. We like to think of it in terms of a triangular structure that is flexible and dynamic as in Figure 4.



Source: Tomasini and Van Wassenhove, 2004c

Figure 4 Humanitarian space.

In the physical sense, humanitarian space represents a *zone of tranquillity* where civilians, non-combatants and aid workers are protected from gun fire and can move and operate freely. Safety is still the number one issue of concern these days. Of course, political and military actors are prohibited, under international conventions, from encroaching on this space and impeding the humanitarian work in a conflict but, in the harsh reality of a disaster, as we have seen in the poorly handled situations in Afghanistan and Iraq, the lines between the military and humanitarians have sometimes been blurred. One of the main challenges for humanitarian efforts in Afghanistan was to disassociate or 'deconflict' the activities of the humanitarian community and the military. Therefore, it was vital that the humanitarian community had no visible contact and could therefore not be confused with the combatant military force, in this case the US-led coalition. During the fuel shortage in Iraq concerns for security arose when a UN vehicle was shot at on a petrol station forecourt presumably by a disgruntled member of the public who assumed that it was queue-jumping. In the 'virtual' sense, humanitarian space is used to guide humanitarians and help shape their decisions to ensure they remain firmly within an ethical context.

Humanitarian space is built for humanitarians but in the field it is concretely defined by non-humanitarian parties.

Sticking to humanitarian principles in complex environments is often very difficult, particularly in an armed conflict for example. Any compromise on the humanitarian principles, such as using aid to secure the victory of one side over another, would nullify the intent of the operation and take it out of the ethical context and mandate of the participating organizations. Humanitarian work cannot judge the conflict; it can only judge the extent to which the conflict is affecting civilians (Tomasini and Van Wassenhove, 2004c).

Challenging the space

The case study of the South African Food Crisis is just one example of how challenging it can be for organizations to uphold their principles and maintain the required 'space' (see Case 1).

In this case, the negative impact of bringing in genetically modified food into the local economy could have been much worse than the positive impact of quickly feeding hungry populations. So again, this shows that humanitarian logistics is very different from business logistics. From a supply chain management perspective, the example illustrates the adaptability and agility of humanitarian logistics. It is unlikely that many companies could create a completely new supply chain in mid-course while simultaneously improving 'product quality' which is, in effect, what humanitarians have to do. So this example also illustrates that while humanitarians can learn a lot from the private sector in terms of designing standard tools and techniques (eg inventory control or warehousing), the private sector can surely learn from the humanitarians in terms of agility and adaptability in response to a quickly changing situation.

Despite the contextual differences of the private sector and humanitarians, it is *supply chain management* that is at the centre of any given logistical operation.

Case 1 The South African food crisis in 2002

In February 2002, the African nation of Malawi declared a state of emergency having experienced the worst crop failure in nearly 50 years. By April, Lesotho and Zimbabwe had done the same putting the international community on red alert. This became the worst food crisis in southern Africa for nearly a decade.

There were a whole host of factors involved that made this a highly complex crisis.

Political—Government-controlled reserves were mismanaged; slow NGO approval; position on GMO.

Economic—economic downturn; low purchasing power; currency devaluation and inflation.

Demographic—high HIV infection rates; malnutrition; reduced labour force; scattered population.

Environmental—erratic weather patterns.

As Jon Bennett, team leader for the WFP operations explained, 'Everyone went in thinking they were responding to a drought. Then we realized we were dealing with the results of an economic crisis and demographic changes due to the high HIV infection rates. The drought was simply what exacerbated it all.'

The WFP quickly set about assessing needs and drawing up a plan to respond. It had gone to great lengths to ensure that food reached the stricken areas when news broke that the food, mostly donated by the US Government, was genetically modified. The US had been a prominent donor to the WFP providing not only food but also meeting overhead costs for the handling and management of its donations. However, as with many other donors, the US made no distinction between conventional and genetically modified (GM) food in its shipments. Many African countries refused the food, primarily because their own economies are very dependent on non-genetically modified produce and they were afraid of contamination. Therefore, bringing in genetically-modified food to the local economy could have had more serious, long-term consequences than the immediate impact of feeding a hungry population.

True to its humanitarian principles, the WFP respected this decision but was then faced with a huge dilemma. They had stockpiles of food in transit, waiting in harbours and stored in warehouses that they could no longer distribute. Suddenly they had to change their plans even though doing so would mean a delay in getting food supplies to those in need by possibly up to a month. They had to deal with the stranded shipments; find some place to store the cargo; while minimizing the wastage caused by humidity. And all this in addition to the cost of replacing the genetically modified food with non-genetically modified alternatives.

The WFP's adaptability and agility in responding to the situation while keeping their humanitarian principles intact were tested to the full. Despite all its efforts to be as prepared as possible the WFP could not anticipate the issues it would face with GM food donations. A whole new strategy had to be devised.

In the end, the organization moved quickly and decided to mill the genetically modified food. However, large-scale milling had not been foreseen and had new implications for the operation. WFP had to incorporate the milling process with new distribution routes, a bagging process and storage. In Mozambique, for example, where the whole grain was rejected, deliveries could only travel through the territory if they were sealed to avoid spillage *en route*. This limited the type of transportation that could be used and therefore also increased costs.

However, WFP were able to turn, what at first assessment, seemed a negative situation into a positive one. For example, milling the genetically modified maize meant that they could add much-needed vitamins and minerals to boost the immune systems of those weakened by HIV. It also had wider implications, as local mills that had stood empty for many years were reopened, creating employment and encouraging regional purchases which, in turn, stimulated the economies of African countries. Most important to highlight is the fact that this change in plans, although costly, helped to maintain WFP's position as an impartial humanitarian organization.

Source: Tomasini and Van Wassenhove (2004c), INSEAD case no. 03/2004-5169.

Managing the supply chain

The emergence of SCM

A supply chain is essentially a network consisting of suppliers, manufacturers, distributors, retailers and customers. The network supports three types of 'flows' that require careful design and close coordination:

- *Material flows*, which represent physical product flows from suppliers to customers as well as reverse flows for product returns, servicing and recycling.
- *Information flows*, which represent order transmission and order tracking and which coordinate the physical flows.
- *Financial flows*, which represent credit terms, payment schedules and consignment arrangements (Kleindorfer and Van Wassenhove, 2004).

The ultimate effective humanitarian supply chain management has to be able to respond to multiple interventions, often on a global scale, as quickly as possible and within a short time frame. Therefore supply chains need to be *'multiple, global, dynamic and temporary'*. In this era of globalization, this applies to the private sector as much as it does to humanitarians.

Working with uncertainty and risk

The common elements present in any supply chain of getting the right goods, at the right time, to the right place and distributed to the right people are still applicable in the humanitarian context. Setting up an efficient supply chain is always a complex operation but in the aftermath of a disaster humanitarian organizations have to deal with multiple interventions on a global scale and, often, concurrently. At the start, it is speed at any cost and the first 72 h are crucial. At this stage goods may be flown in from abroad as quickly as possible despite being an expensive option. Later on (the first 90 to 100 days), it becomes a mixture between being effective in helping people and doing this at a reasonable cost. So humanitarians would start looking to buy the same goods locally.

Unlike logisticians in the private sector, humanitarians are *always* faced with the unknown. They do not know when, where, what, how much, where from and how many times. In short, the basics for setting up an efficient supply chain. Added to this is the fact that even with accurate data both demand and supply can vary dramatically during the length of the relief operation. Dealing with unexpected events also means humanitarians often have to pull out of one disaster and head off to another overnight. Considering the difficult circumstances and the typical lack of resources, this puts extra pressure on people (high stress and turnover levels) and capability to invest in learning and improvement (fire-fighting culture).

In addition to the risks of mismatch in supply and demand, disruption is an increasing risk in global supply chains even for the private sector. With longer paths and shorter clockspeeds, there are more opportunities for disruption and a smaller margin for error if a disruption takes place (Kleindorfer and Van Wassenhove, 2004). Therefore, one could argue that humanitarian supply chains show the extremes of a trend towards more uncertainty and risk prevalent in today's global business supply chains. Here, the private sector could learn a thing or two from their humanitarian counterparts adept at dealing with the unknown and having to change their plans and suppliers at the last minute.

What makes a successful response?

> 'A successful humanitarian operation mitigates the urgent needs of a population with a sustainable reduction of their vulnerability in the shortest amount of time and with the least amount of resources' (Tomasini and Van Wassenhove, 2004c).

Of course, there is always room for improvement but before things can be improved organizations need to know what ideal scenario they are aiming for, in other words what makes a successful response. A successful response to a disaster is not improvised. The better one is prepared the more effective the response. This leads to us to consider the different aspects of *disaster management* and *preparedness strategies*. A successful response depends heavily on local capabilities as well as collaboration with the host government such as welcoming foreign help or even military resources on their territories. Added to this is a general willingness of other governments and the general public to donate or offer assistance. Of course, this is also highly influenced by the media and subsequent appeals. However, donations are often earmarked for a particular disaster and it is a known fact that spectacular sudden onset, normally natural disasters such as the tsunami, attract more media attention and are often over-financed, whereas slow-onset disasters such as Darfur, tend to be forgotten and under-financed.

Perhaps a bit of a morbid example would be to calculate the number of children in the world who died of hunger since 26 December 2004, the date of the terrible tsunami. A child dies of starvation every 5 s which would mean that while the television cameras were still showing the killer waves in the Indian Ocean more children than the 300 000 victims of the tsunami had already died of starvation. This cruelly highlights the point that the media plays an increasing and important role in disaster relief.

Looking at disasters in time as opposed to their scale, there are four clear phases within *disaster management*. First the *mitigation* phase where, for example, building on the shoreline in regions prone to tsunamis can be avoided. Japan, for example, uses protective walls to restrict the impact of the big 'harbour waves', the translation of the Japanese word 'tsunami'. Of course, this is not always

feasible particularly if tourism or fishing is your main trade. Second is the *preparedness* phase which could involve, for example, educating village heads and school children on what to do when the ocean retracts in a very unusual way. Doing this could have saved many lives in the recent tsunami and in fact did for some ancient tribes who knew from old tales that they had a couple of minutes to run as fast as they could when the sea retracts before the wave hits the shores. Nowadays, being better prepared could also mean ensuring that early warning systems based on sophisticated information and communication technologies are in place but the question remains how forgotten villages without roads or electricity would receive the warning signals. In fact, following the earthquake that struck on 28 March 2005, just 3 months after the terrible tsunami, residents including police, soldiers, monks and fishermen used all modes of communication from megaphones to temple bells to warn people of the possibility of another tsunami. Preparedness could also entail ensuring that food and medical supplies are pre-positioned in warehouses close to the disaster-prone areas. Doing so would enable people to respond much faster enabling them to reach the beneficiaries earlier which brings us to the third phase—the *response*. Finally, in spite of all the above, a large-scale disaster will substantially destroy infrastructure such as roads, bridges and homes which means that reconstruction during the fourth and final phase of *rehabilitation* could take years.

We won't deal with mitigation and rehabilitation in this article since our focus is on disaster logistics. As the IFRC discovered following Hurricane Mitch, to be more effective their logistics team needed to focus on disaster management as being *disaster preparedness (DP) + disaster response (DR)* and that is also the approach we will adopt here drawing on our two case studies *IFRC—Choreographer of Disaster Management: The Gujarat Earthquake* and *Preparing for Tomorrow's Disasters*, as examples.

Being better prepared

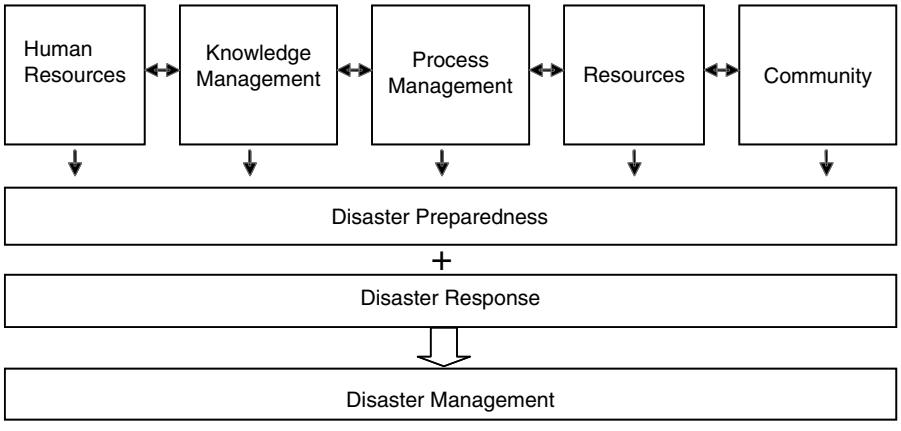
Humanitarians have begun to heed to the lessons learnt from previous disasters and realize that they have to work hard not only during disasters but also *between* disasters. They are beginning to think more in terms of optimizing their performance by being *better prepared*.

Of course, there is no question that being *better prepared* leads to a *better response* and the key to being better prepared, and perhaps the greatest stumbling block in humanitarian sector, is that logistics has to be recognized and understood as an intrinsic element of any relief operation. This has to happen before the functions can be designed and preparedness improved through *effective disaster management*. However, how can organizations be better prepared if they do not have prior or accurate information regarding the timing (when?), location (where?) and type of disaster (what?) or the number of people requiring assistance (how many, where from?). In short, the basics for setting up an efficient supply chain. Considering this and the fact that the quality of a response depends also on the capabilities and training of the staff involved, is it really possible to have a strategy to be better prepared? If so, how?

Five key elements

Preparedness consists of five key elements that have to be in place to produce effective results. These in turn lead to effective disaster management (refer to Figure 5). They are as follows:

- *Human resources:* Selecting and training people who are capable of planning, coordinating, acting and intervening where necessary. The basic principle of humanitarian aid is that people and countries can help themselves to the maximum level possible. Therefore, upgrading local skills



Source: Samii R. et al 2002[a] INSEAD Case No. 06/2002-5039

Figure 5 Creating effective disaster management.

is a primary task both between and during humanitarian interventions. It is always better to use a local instead of a foreigner who only speaks basic English, let alone the local language. With better training local teams would be better prepared and able to respond to local disasters.

- *Knowledge management:* Learning from previous disasters by capturing, codifying and transferring knowledge about logistics operations.
- *Operations and process management:* Recognizing logistics as a central role in preparedness. Then setting up goods, agreements and means needed to move the resources quickly. In supply chain management this also means having alternative suppliers, modes of transport and trade lanes in place.
- *Financial resources:* Preparing sufficient money and financial resources to prepare and initiate operations and ensure that they run as smoothly as possible.
- *The community:* Finding effective ways of collaborating with other key players such as governments, military, business and other humanitarian organizations. This could be achieved through mutual framework agreements.

To be better prepared and therefore respond more effectively all five elements need to interconnect as Figure 5 illustrates. The systems and departments need to be set up so that they enable the flow of goods (material flow), information to ensure collaboration and coordination (information flow) and funds from donor support and assets or goods in kind (financial flows) between each element or 'link' in the chain. This is essential for the supply chains to work effectively be they in the private or humanitarian sectors. However, the main issue holding back many humanitarian organizations is finding the funds to finance the training and procedures that will lead to better preparedness and therefore more effective logistical operations. Donations for a disaster are earmarked for relief and not for training and investment on preparedness strategies in between disasters. According to Bernard Chomilier, former head of logistics at the IFRC: '*It is easy to find resources to respond, it is hard to find resources to be more ready to respond.*'

Despite the lack of funding, some organizations have made significant improvements. A good example of an effective and flexible supply chain based on preparedness can be seen in the case study entitled *Choreographer of Disaster Management: The Gujarat Earthquake* which highlights the IFRC's response to the Gujarat earthquake (see Case 2). The IFRC, founded in 1919 in the aftermath of World War I, is one of the constituent bodies of the International Red Cross and Red Crescent Movement. Its mandate is to assist refugees, victims of health emergencies and natural and technological disasters. As the world's largest humanitarian organization, its four areas of activity are promotion of humanitarian values, disaster response, disaster preparedness and health and community care. In 2001, 178 National Red Cross and Red Crescent Societies (NSs) were members of the IFRC.

This response was in stark contrast to operations that unfolded in the aftermath of Hurricane Mitch 3 years back where the IFRC failed to play a coordinating role in managing the disaster because they arrived too late on the scene. (For more information refer to the INSEAD case No. 06/2002-5039 on *IFRC-Choreographer of Disaster Management: Preparing for Tomorrow's Disasters*.) When they did finally arrive they were not sufficiently prepared to respond to the crisis in terms of technical support because not enough technical expertise was readily deployable. Neither did they have the supplies to respond because they had not thought of pre-positioning relief items beforehand.

Their success in Gujarat lay in the fact that following the criticism received after the relief operation of Hurricane

Case 2 The IFRC in Gujarat

On 26 January 2001, an earthquake measuring 7.9 on the Richter scale struck at 8.50 in the morning in Gujarat, on the west coast of India. It ravaged the country destroying five districts in its wake and killing over 20 000 people. Added to this devastation were the difficulties of working in a politically sensitive area rife with local conflict and under heavy army presence. Its close proximity to the Pakistani border was also not to be taken lightly.

When humanitarian organizations arrived at the scene they were faced with a high degree of uncertainty and lack of reliable information. For example, the actual death toll was probably closer to 50 000 than the official cited figure but nobody will ever know the exact numbers because of insufficient data. Lack of accurate data coupled with the mass destruction meant that it was very difficult to assess how many people had been affected and what their immediate needs were—crucial information for the supply chain to be set up and managed effectively.

Despite such forbidding circumstances, the rate at which the relief teams worked and what they were able to achieve in just a few days, with very modest means, was impressive. For example, the IFRC managed to mobilize a global supply chain in a very agile and flexible way despite having scant reliable information. Within 30 days the organization had chartered 45 planes, amassed 255 000 blankets, 34 000 tents and 120 000 plastic sheets. Within 100 days they had secured the assistance of 300 000 people and €23 million. Impressive given that they started from scratch with virtually no money. Also while they were mobilizing resources for Gujarat, they were still involved in other disasters such as the earthquake in El Salvador, drought in Tajikistan, volcanic activity at Mt. Merapi, Indonesia and the Orissa cyclone in India to name a few. Not to mention that all of this was coordinated by a logistics team of half-a-dozen people in Geneva.

Source: Samii R *et al* (2002b), INSEAD case no. 602/046/1.

Mitch in 1998, the IFRC realized they needed to improve their disaster management and, more specifically, be better prepared. Perhaps the key difference and contributory factor in their success was that they were able to pin-point logistics and supply chain management at the heart of operations. In doing so, they were able to raise the profile of logistics from largely a back-office function mainly geared at procurement to a division in its own right—the Disaster Management and Coordination division. This division consisted of two distinct departments, namely Emergency Response Preparedness and Logistics and Resource Mobilization, as well as three Operations Managers responsible for coordinating emergencies on global scale that were able to play significant roles 3 years later.

By the time of the Gujarat earthquake they had implemented preparedness initiatives, based on the five key elements that could be put to use for the first time in a real-life situation. They were also the first organization at the scene of the disaster and since they were well prepared they were accepted by other organizations arriving after them as the natural leader. They had developed a number of *readily deployable mechanisms and tools* involving people and equipment such as *Field Assessment Coordination Team (FACT)* that they had lacked during Mitch. The FACT team which was on standby and deployable within 12–24 h for up to 6 weeks anywhere in the world, was able to carry out rapid field assessment immediately after a disaster, ensure coordination with dozens of actors and make quick decisions. There were also highly skilled, first-line relief operators who were part of the new *Regional Intervention Teams (RITs)*. Reports were generated and debriefing sessions held. Considerable efforts had gone into improving logistics systems and *frame agreements with international and local suppliers* had been set up enabling supplies to be distributed swiftly. Finally, they had devised a *code of conduct* which enabled them to reduce the arrival of useless (eg expired medicines) and unsolicited goods.

However, even if an organization is highly prepared and has all the right elements in place, if that organization insists on working in isolation during a large-scale disaster it could still be less effective than the organization that decides to cooperate with others.

Effective coordination

If current trends in disasters are anything to go by, we can expect more complex disasters in the future as a population, perhaps already weakened by conflict or disease, is hit by a natural disaster. Intervention then becomes multifaceted and complex.

Therefore, the response will increasingly require collaboration and specialization of tasks between humanitarian organizations, as well as *increased collaboration with the military, governments* and *private business*. This is quite a challenge given the very different origins, history, geographical, cultural and political nature of many organizations and could pose potential problems for humanitarian principles and space. Furthermore, humanitarian organizations already compete between themselves for media attention since this is related to donations where they are also competing for a shrinking base of common donors. However, in crisis situations people accept that collaboration is necessary and democracy is not always the best system.

In order to understand when and how the key players should collaborate and how they should be coordinated we need to understand what we mean by 'coordination'. There has recently been some empirical and conceptual research on the types of coordination involved in humanitarian logistics and the fact that different types take place at certain points within the 'lifecycle' of a disaster, man-made or natural. A typical lifecycle consists of ramp-up, maturity and ramp-down phases (see Figure 6). Donini (1996) points to three forms which can be described as follows:

- *Coordination by command* where there is central coordination; agreement on responsibilities and objectives; and common territorial areas of responsibility.
- *Coordination by consensus* where organizations have access to compatible or shared communications equipment, liaison and interagency meetings and pre-mission assessments.
- *Coordination by default* includes routine contact between desk officers and civil military operations centres.

Coordination by command. In the 'ramp-up phase' time is critical and there is a pressing need to clear the bottlenecks in the processes so that the humanitarian community can get to the scene of the disaster quickly and start their work. This is where *coordination by command* can be very effective. Simple issues such as obtaining visas, getting customs clearance, signing agreements with the military on accessible corridors and times, can all hinder the initial stages. There is no point in every NGO negotiating with the Uzbek Government, for example, to obtain visa and customs clearance to be able to bring people and goods into Afghanistan. In this case, one organization should take the lead and clear things for all

	Ramp Up	Maturity	Ramp Down
Command			
Consensus			
Default			

Figure 6 Coordination types and disaster lifecycle phase.

Case 3 UNJLC's role in the Mozambique floods

During the Mozambique floods in 2000, the coordination skills of the UNJLC were tested to the full. Cyclone Connie hit the southeast coast of Mozambique on 4 February 2000, severely affecting three of the country's provinces. The rapid rise in the water level resulted in widespread flooding of the major river basins. In a matter of hours, road and rail links to the bordering countries of South Africa and Swaziland were cut, railway services between Maputo and Zimbabwe were impeded, airfields were under water, property and thousands of acres of land was destroyed, water purification plants, boreholes, wells were damaged. By the end of February, the worst and most extensive floods the country had known for 150 years had affected over 900 000 people, forcing 300 000 people to abandon their homes, washing away 1600 km of roads and destroying cultivated land and numerous bridges connecting the provinces. Added to this was the threat of water-borne diseases, such as cholera and malaria increased daily from the pools of stagnant water and unsanitary conditions. Around 100 000 people were left homeless or stranded on 'islands' of rooftops and trees.

It became clear that the only way to reach them was by helicopter. Since helicopters are a scarce and expensive resource, it was readily accepted that UNJLC would coordinate operations for the different humanitarian organizations and that it would not only prioritize but also operate the assets. In an unprecedented move even the military accepted to be coordinated by the UNJLC who provided daily briefings to ensure that pilots were kept up to date.

As a result of the coordinated efforts, 10 000 h or the equivalent of about 20 000 flights were organized without incident. Translated into lives, this meant 16 551 people were rescued.

Source: Samii and Van Wassenhove (2003a, b, c), INSEAD case no. 04/2003-5093.

involved. (For more information see INSEAD case entitled *The United Nations Joint Logistics Centre: The Afghanistan Crisis* No. 052003-5092.)

Case 3 shows the United Nations Joint Logistics Centre's (UNJLC) role in the Mozambique floods and is a prime example of when coordination by command is beneficial. (see INSEAD Case No. 04/2003-5093). The UNJLC was set up to coordinate the logistics capabilities of cooperating humanitarian agencies during large-scale emergencies. The concept of a UNJLC was born out of the humanitarian response to the 1996 Eastern Zaire crisis. In 2002, the UNJLC was institutionalized as a UN humanitarian response mechanism, under the aegis of WFP, by the Inter-Agency Standing Committee Working Group (IASC-WG). This is no easy undertaking especially as the UNHCR is not necessarily convinced it should coordinate with the WFP or UNICEF, even though all three of them are UN Agencies. The UNJLC has since taken on training, coordination, providing central information, as well as 'orphan issues' for which no one organization has a mandate.

Coordination by consensus. As the bottlenecks are cleared and all humanitarian organizations are installed and operational, their focus will shift to fulfilling their own specific mandate (eg food stuffs, health, water). They no longer accept coordination by command. However, take for instance fuel which is outside the mandate of any one organization. If a central body such as the UNJLC anticipates fuel shortages in a certain region because of cartel formations which are raising prices, humanitarian organizations would probably appreciate this information being posted on a website and be ready to discuss how they can collectively solve the issue. This is *coordination by consensus*. Case 4 on the Winterization Campaign in Afghanistan highlights how effective operations can be when coordinated by consensus. (For more information see INSEAD case entitled *Moving the Seeds of a Brighter Future* (*UNJLC's Second Year in Afghanistan* No. 09/2003-5135.)

In this case, the UNJLC became the obvious contender to take on the coordination of the campaign largely because they had anticipated the onset of winter, were able to propose a solution and there was no one organization that had a mandate to carry out the tasks needed. However, all organizations could continue their work within their own mandates.

Despite the shear magnitude of this logistics operation, the Winterization Campaign in Afghanistan was an immense success, unique in its kind in the history of *humanitarian collaboration*.

Coordination by default. Finally, when organizations start pulling out, coordination will still happen but only occasionally, *by default*. This tends to happen naturally in the field as humanitarians from one organization swap ideas, help, advice with those from another organization.

When coordination is missing

We have seen effective coordination in both the Mozambique floods and the Winterization Campaign in Afghanistan now let's consider the coordination in Sumatra following the events of 26 December in the Indian Ocean tsunami.

Figure 7 below highlights the fact that due to the lack of adequate regulation and the presence of too many players chaos ensued in Sumatra after the tsunami. In short, there was *no effective coordination*. How did this come about? The answer lies in the fact that this disaster was particularly unusual due to its sheer magnitude (thousands of miles of shoreline); its unusual nature (a huge killer wave); the presence of many western tourists; and the fact that it happened during the Christmas vacation. All of this generated massive media attention which in turn prompted

Case 4 The winterization campaign in Afghanistan

After the first year in Afghanistan it became clear that the conflict would persist for a while longer. The UNJLC understood that the onset of winter would be very difficult for the weakened population and could be a source of a major crisis. So it decided to coordinate a huge winterization campaign consisting of pre-positioning food in the central mountains so that villages would be adequately catered for throughout the winter months.

Had this not happened villagers would have travelled to the cities aggravating an already difficult situation and they may not have been able to make it back to their villages in time to cultivate their land so that the next crop would also fail (like the previous one due to the war).

The winterization campaign was a huge logistical operation requiring close collaboration with different agencies as well as good planning and execution. For instance, roads needed to be cleared all winter to ensure that food could be transported from the pre-positioned storage places to the many mountain villages. Of course, this is a classic operational research (OR) optimization problem.

To give you an idea of just how immense an operation this was, during the process the UNJLC coordinated the distribution of the following goods:

	Distributed
Food (mt)	209 125
Tents (units)	35 047
Blankets (units)	1 518 694
Plastic sheets (units)	168 148
Stoves (units)	291 655
Coal (mt)	31 259
Kerosene (ml)	2 132 062
Total beneficiary population	3 432 711

Source: Samii and Van Wassenhove (2003c), INSEAD case No. 09/2003-5135, INSEAD, Fontainebleau, France.

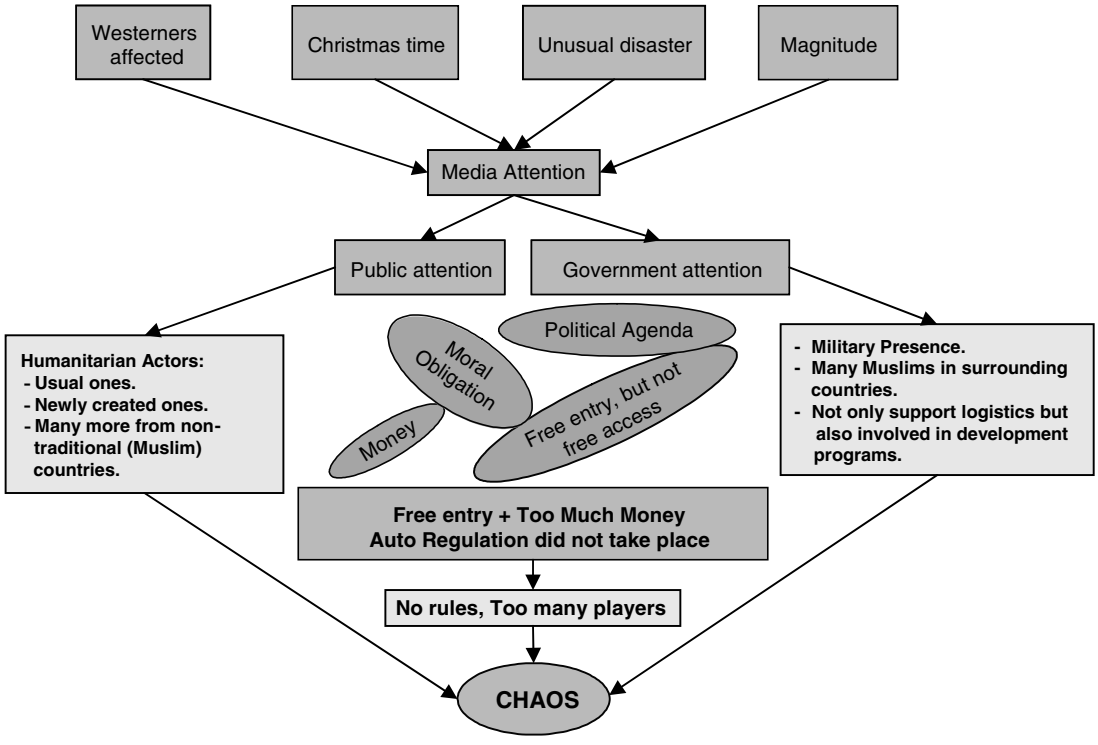


Figure 7 Coordination in the aftermath of the tsunami.

an inordinate public response to donate money as people felt a moral obligation to help. There was also an unprecedented wave of governments' attention which was not necessarily free of a political agenda. The Indonesian Government felt compelled to allow free entry in a region that had been very restricted for a long time which meant that many more humanitarian organizations, *ad hoc* organizations and volunteers arrived on the scene than would normally be the case. However, free entry was not translated to free access since the Indonesian army was very much present and

carefully controlled operations and movement into sensitive areas. It is interesting to note that 5 months after the disaster about a third of the containers with relief items (mostly from small volunteer donors) are still blocked at customs.

In summary, the following factors created a difficult set of circumstances leading to a chaotic relief operation:

- *too much money* with organizations competing for ways to spend it;
- *too many actors* with new and inexperienced organizations as well as other volunteers allowed in by the free entry policy;
- *an overwhelmed Indonesian Government* that was unable to play a coordinating role.
- *the UN arriving late* on the scene and with insufficient resources which meant that they were also unable to play a coordinating role.

Usually, scarcity of money is a regulator forcing a division of labour and more collaboration among organizations. Usually, the government acts as another regulator by controlling the entry and managing or coordinating the intervention. And, usually the UN coordinates the effort with the local government. None of these three natural regulatory mechanisms functioned in Sumatra and this led to an unprecedented level of chaos. More importantly perhaps, this excess of money may also be an open invitation for unwise spending or worse.

Cross learning possibilities

Despite the fundamental differences between logistics in the private sector and humanitarian sector logistics, there is a lot of overlap. Therefore, it follows that there is an awful lot that businesses can learn from studying humanitarian logistics and *vice versa*.

Learning from business

Business logistics has become a mature discipline in the last decade. Many useful new concepts and tools have been developed and successfully implemented in global organizations. Obviously, quite a few of these tools would also make sense in humanitarian supply chains, provided they are carefully translated and one takes into account the complexity of humanitarian logistics.

For instance, a standard water container could make all the difference. It could mean water could be bought from a few carefully selected suppliers who could pre-position the containers in their warehouses within accessible reach of disaster-prone areas. Upon the outbreak of a disaster, the containers could be supplied as needed and paid for as they are used. Stickers corresponding to the humanitarian organization using the containers could be stuck to the outside of each container. This would ensure that the organization's brand name would be visible to the CNN cameras, something that is important for them to satisfy and activate their donors. This example (and there are plenty of others) shows the potential of applying sound business logistics principles. However, we are still a long way from this happening routinely because of a general lack of trust and collaboration between humanitarian organizations and their reluctance to work with private sector organizations.

Learning from humanitarians

Humanitarian logisticians have many strengths that businesses could use to improve their performance and competitive advantage. For example, as we have seen they are very *agile*, *adaptable* and capable of setting up and changing supply chains quickly and in difficult conditions. They are able to *align* the differing needs and dynamic roles of many players. Companies increasingly need the same sort of skills (Lee, 2004) given the dynamic demands and risks of operating global supply chains and the increased central role of logistics in making profits under these conditions (see Figure 8).

Businesses could learn more as well about vulnerability assessment, preparation and response to disasters (be they natural or man-made, accidental or deliberate such as terrorist attacks). Case 5 highlights vulnerability to risk and the impact of preparedness to respond well. In March 2000, a 10-minute lightning-induced fire at a Philips chip factory in Albuquerque wreaked havoc on the profits of one mobile phone manufacturer, while another was able to handle the situation. In this example, Nokia was well

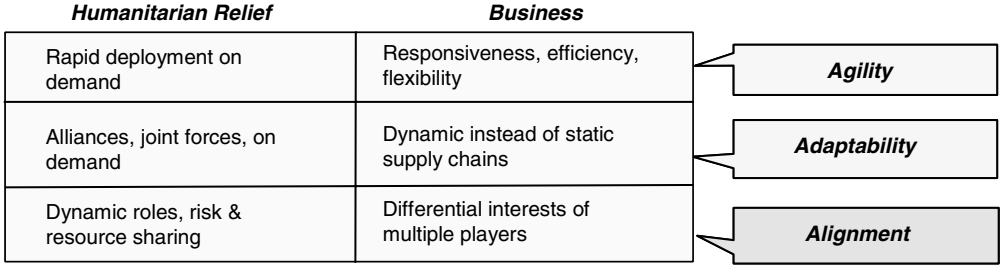


Figure 8 Strategy to win (*source*: Lee, 2004).

Case 5 Nokia *versus* Ericsson

Nokia	***Ericsson***
• 'Executive Hit Squads' set up and trained years ago by CEO with on-the-ground authority to respond to crisis. • Component team on-site to monitor condition and daily report to Nokia's mobile phone division president. • Nokia and Philips CEO met. Nokia offered engineering help to Philips in Albuquerque. • Within 2-weeks, chips redesigned so that backup suppliers from US and Japan can be used. Philips agreed to utilize additional capacity from Eindhoven and Singapore. • Production target met, with subsequently strong business growth.	• No crisis management process in place. • Relied on Philips to report damage conditions. • Trusted Philips' original assessment (damage of only 1-week shutdown of factory). • Head of Ericsson Consumer Goods Division only learnt of the problem a month later. • No backup suppliers in place. No Plan B. • Severe shortage, estimated revenue loss of 4.5 billion Swedish Kronor.

Source: 'Crisis Bared One's Weakness, Other's Strength' Wall Street Journal, 29 January 2001.

prepared to deploy adequate procedures using well-trained people, Ericsson was not. The consequences were a revenue drop of 4.5 billion Swedish Kronor for Ericsson, a real setback at a time when they were fighting the battle for market dominance with Nokia. Companies are notoriously poor at dealing with these types of small probability, big-impact events. This is exactly humanitarian organizations' core business and competence.

Public–private partnerships

As disasters become increasingly complex better collaboration not only with governments, the military, other humanitarian organizations, but also through partnerships with *private business* becomes ever more important.

However, such partnerships are not easy as organizations in the two sectors are extremely different: one typically a slow, bureaucratic organization, the other a fast-moving action-oriented business; both have very different agendas. Typically, humanitarians are very sceptical of the business world and, just as typical, companies see humanitarians as idealistic and inefficient dreamers. Working together is not obvious though not impossible.

Corporate social responsibility

Corporate social responsibility (CSR), an issue at the forefront of most CEOs' minds these days, is one way of fostering closer collaboration with business. There are obvious benefits and drawbacks of this type of cooperation. For instance, how can businesses align their needs and the needs of their shareholders with those of humanitarians? Should companies be getting involved in CSR at all and is it even ethical for a CEO to give away shareholders' money? The questions and debates on this subject are many.

According to Porter and Kramer (1999), *'The more social improvements relate to a company's business the more it leads to economic benefit as well.'* In other words, Porter is a firm advocate of the principle that CSR activities should be in line with a company's strategy and play to its core competences if the relationship is to work effectively.

Of course, shareholders will ask questions and the company's management will be forced to show that the way they run the partnership with the humanitarian organization is beneficial not only to them but is also adding value for the company. Case 6 taken from the full INSEAD case entitled *The TPG-WFP Partnership: Learning How to Dance* highlights one successful partnership between business and humanitarians.

In answering shareholders, TNT were able to show that they had

- *Anchored the WFP programme to their core business* letting TNT managers take ownership and include it within their daily activities per business unit.
- *Measuring the impact* of their investment by tracking improvements at WFP.
- *Maintaining the momentum* to ensure that stakeholders including the press are well aware of the programme.
- *Enlarging the programme* by expanding the number of partners and initiatives.

By doing so they could also point to the benefits for the company.

The benefits

In return for its time and exchange of skills, TNT gets free publicity raising its profile as an organization that is also working to improve the world in which we live which in turn creates more customer loyalty. This in turn raises the organization's reputation and with it the employee morale and motivation. The organization also gains from the experience of working with humanitarians in that staff are able to develop the necessary skills to deal with the most challenging of circumstances which serve to strengthen their own supply chains and therefore competitive edge. Finally, the association could also be translated into business

Case 6 TNT with the WFP

TNT (formerly TPG) is a huge logistics company with 150 000 employees in over 60 countries. A few years ago its CEO Peter Bakker decided the company should engage in a partnership with a humanitarian organization in order to contribute to the eradication of hunger in the world. The partner they eventually selected was the WFP. With an annual budget of €1.6 billion, the WFP is arguably the world's biggest humanitarian organization. It is certainly the largest humanitarian logistics operator by far. On any day it has 40 ships on the seas, 20 planes in the air, 1000 trucks on the ground, that is, it is almost the same size operator as TNT. So it makes sense for TNT to partner with WFP and *vice versa*.
TNT decided to transfer know-how instead of money so that the WFP could become more effective in disaster response (quick deployment) and coordinate better with other humanitarian organizations (joint logistics). The partnership involves €5 million per year over 5 years and includes projects in emergency response and joint logistics supply chains. Examples of initiatives include WFP pilots being trained in TNT's training center in Liege in Belgium or TNT experts helping WFP to reorganize their warehouse in Brindisi (Italy).

Source: Samii and Van Wassenhove (2004), INSEAD case no. 04/2004-5194, INSEAD.

opportunities in areas that would otherwise be hard to access.

The role of academics

OR academics in logistics

To round off this article we should consider what role Operational Research (OR) academics can play in improving the lot of logisticians, be they in the humanitarian or private sectors.

If we go back to the definition of what makes a successful response the words *complex systems*, *speed*, *sustainable solution*, *scarce resources* resonate perfectly with the definition of OR and many of its fields of specialization (risk management, process management, logistics, etc). OR is about using analytical skills to develop and apply tools and techniques to problems in order to structure complex messes and is 'concerned with real-life problems and the people dealing with these problems' (Fortuin *et al*, 1996). It would therefore seem a perfect fit in the field of humanitarian logistics: there is a disaster (real-life problem) where logisticians are tasked with getting aid out to those suffering (people dealing with the problem) and as quickly as possible (systems requiring analytical input). Furthermore, academics have the time and mandate to articulate, codify and transfer knowledge so that it can be widely applied and contribute to a better and more sustainable world.

There are many areas where OR academics can offer their expertise and transfer their knowledge to have a positive impact.

- *Supply chain design and management (processes)* (donor issues, last mile problems, cross learning possibilities with the private sector, the military and humanitarians).
- *Systems and technology* (Disaster Management Information Systems, Knowledge Management, Communities of Practice).
- *Project management* (lifecycle issues).
- *Risk management* (risk analysis, vulnerability assessment mapping, and supply chain robustness issues).
- *Coordination and strategic alliances (partnering)* (between humanitarian organizations, with industry, with the media).
- *Performance measurement and scorecards* (reporting, accountability and continual improvement).
- *Process standardization and control (tools and behaviour)* (eg TQM, Six Sigma, training).

Conclusion

Together, we humanitarians, businesses and academics, can achieve better and more effective supply chains enabling us to respond to the complexities of today's logistics be it the private sector or relieving the lives of those blighted by disaster. As OR academics our challenge is to develop a science of disaster logistics that builds upon, among others, private sector logistics and to transfer to private business the specific core capabilities of humanitarian logistics.

The full INSEAD case studies used in this article can be found at the following website: http://knowledge.insead.edu/home.cfm

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