Raising money is the easy part. With pictures of devastation on Asian coasts hitting television screens, donations to survivors have been pouring in at record rates. But as one of the world's biggest relief efforts gets under way, the Indian Ocean tsunami disaster will provide one of the toughest tests of recent advances in humanitarian supply-chain management.

The logistical obstacles to delivering food, medicine and shelter to people in times of famine, war or natural disaster make managing a commercial supply chain look easy. For a start, local infrastructure has often been destroyed, making it hard to land cargo planes or drive trucks into affected areas. In conflict zones, rebel forces may try to obstruct the passage of supplies. Instead of the relatively stable demand enjoyed by the private sector, relief agencies face surges in demand whose timing, location and scale are unpredictable. Many aid organisations have goods stockpiled in warehouses around the world, but with the site of the next event impossible to determine, those supplies may still have to be transported great distances.

While commercial supply chains operate through a fixed number of distribution points in known locations, aid agencies must create distribution centres virtually overnight, often in difficult conditions. And with no lead times, organisations race against the clock to satisfy "customers" for whom delays can mean the difference between life and death.

Furthermore, relief agencies often find themselves dealing with unwanted supplies, particularly drugs that are inappropriate or past their expiry date. Donations received during Eritrea's 1989 independence war, for example, included seven truckloads of expired aspirin tablets that took six months to burn. Inappropriate donations are so common that relief missions now routinely bring incinerators with them to the scene of a disaster to destroy items that may be dangerous or are clogging up the system.

All this is far removed from the lean, just-in-time supply chain practices pioneered by companies such as Dell, the computer manufacturer. Nevertheless, in spite of the very different nature of relief operations, the humanitarian sector is finding that valuable lessons can be learned from commercial practices.

Outsourcing, for example, has made its way into the humanitarian world, with many agencies establishing pre-purchasing agreements with suppliers of drugs, tents, sheeting or blankets. "The old idea that disaster preparedness meant filling up your warehouse is disappearing," says Peter Walker, former director of disaster and refugee policy at the International Federation of Red Cross and Red Crescent Societies. "The issue isn't keeping things in stock. It's having your supply chain sufficiently worked out."

Partnerships between private and non-profit sectors are emerging and - as corporate responsibility gains momentum - logistics companies have been offering their expertise. Through a partnership with the World Food Programme, TNT Logistics, part of TPG, the Dutch post and logistics group, is sharing its knowledge and experience with the WFP to help upgrade its logistics infrastructure.

TNT has, for example, developed a system for the World Food Programme for the transport and storage of the humanitarian supplies needed to support the more than 1m refugees who will return to Sudan over the next six years.

"The first estimates of the humanitarian sector are that [using the system] they can save around €300,000 (£211,000) a month - amounting to €6m in total for the whole process," says TPG's Ludo Oelrich, director of the programme.

Because of the vast differences between commercial and relief supply chains, however, the learning process is two-way. "They can come in, look at the way we work from their perspective and make some recommendations for efficiency improvements," says Martin Bentley, logistics officer for the surface transport unit at the World Food Programme. "But often we meet them halfway, because there's certain reasons we do what we do, due to local conditions."
But such partnerships are starting to catch on. In July, DHL and the International Federation signed a similar agreement through which the company will conduct research and develop supply-chain management tools.

Technology is a crucial tool. One system holding great promise for relief missions is the Humanitarian Logistics Software developed with the federation by the San Francisco-based Fritz Institute - founded and run by Lynn Fritz, a logistics industry expert. The system tracks supplies from donation to delivery, giving organisations an online overview of the relief pipeline. Web-based supplier lists, details of pre-purchasing agreements and catalogues of items allow orders to be made online, rather than by phone or fax.

The federation has estimated that the technology could speed up delivery of relief supplies by between 20 per cent and 30 per cent. "And all this information is kept in a repository and provides a memory of what happened," says Anisya Thomas, managing director of the Fritz Institute. "So following the disaster, you can look back and say what did and didn’t work."

Another software system, Suma, developed by the Pan American Health Organisation, also tracks donated items. Suma allows relief workers to categorise donations rapidly on arrival, manage warehouses and set up distribution priorities.

However, perhaps the greatest potential for enhanced efficiency lies in extremely low-tech systems. Colour-coding items - red for food-stuffs, for example, and blue for clothing - helps smooth the passage of supplies. And sending goods in packages of a size and weight that one person can handle is crucial, since unloading equipment may not be available at the receiving end.

For it is the receiving end - "the last mile" - that poses the greatest challenge for relief logisticians. Here, Peter Walker, now director of the Feinstein International Famine Center at Tufts University in the US, stresses the need to capitalise on local resources.

"Like any system of supply and demand, you have to figure out whether it’s best to purchase locally or to bring stuff in. Some things, like blue plastic sheeting that you need in massive amounts in these disasters, are best to bring in internationally because it's prepacked," says Mr Walker. "But when it comes to buckets and basins for people to store water in, those sort of things can be bought, if not locally, then in the country."

Buying locally, says Mr Walker, "helps support the market, makes sure you've got the most appropriate goods and means you can get them quicker".

In spite of the vast progress made in the past decade, experts say more could be done to enhance the efficiency of disaster supply chains. "There’s a long way to go, and a lot of it has to do with the politics, insufficient resources and insufficient understanding that you need to prepare if you want to react," says Luk Van Wassenhove, a professor at Insead business school who has studied disaster management.

Many organisations underestimate the strategic role of logistics and still focus efforts on fundraising and relief activities. "There's a need to recognise that the response, in the sort of situation we’re in now, could be so much more effective if, between Bam [Iran’s 2003 earthquake] and the tsunamis, we spent a year seeing how to improve for the next disaster," says Ms Thomas.

Sadly, however, funding does not always allow for this, since many donors insist their money is spent directly on victims' needs rather than on developing back-room operations. As a result, says Prof Wassenhove, preparation and training between disasters is often neglected. "What you need is money to organise, not the money to deploy - and that’s what you don’t get," he says.

HOW TO COMBAT THE DIFFICULTIES OF DISTRIBUTING AID

• Demand for supplies is unstable, from unknown locations at unpredictable times. Humanitarian logistics is becoming more flexible, with organisations supplementing supplies stockpiled in warehouses with outsourcing arrangements whereby they can call upon manufacturers for goods at the time they need them. Local suppliers are also crucial in the procurement process.

• Unsolicited donations clog up ports, airports and warehouses and add to the burden on relief workers. Aid agencies encourage donors to give money, not goods. IT systems help to manage donated goods, allowing relief workers
to prioritise distribution of appropriate supplies.

- Supplies arrive from different agencies in different countries with non-standard labelling. Use of colour-coding systems helps sort goods on arrival. Progress has also been made on the uniform labelling of supplies.

- Lack of co-ordination between agencies leads to duplication and confusion at the "last mile". Initiatives have emerged, such as the United Nations Joint Logistics Centre, which promotes co-operation between agencies by, for example, collating and disseminating information and facilitating the pooling of expensive assets such as aircraft.

- Agencies often lack the time and resources to develop systems and train staff between disasters. Logistics software provides an electronic trail, helping organisations capitalise on past experience. However, experts stress the need for more agencies to treat logistics as a strategic function at the heart of their operations.