International Journal of Logistics: Research and Applications

ISSN: 1367-5567 (Print) 1469-848X (Online) Journal homepage: https://www.tandfonline.com/loi/cjol20

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**To cite this article:** S. J. Pettit & A. K. C. Beresford (2005) Emergency relief logistics: an evaluation of military, non-military and composite response models, International Journal of Logistics: Research and Applications, 8:4, 313-331, DOI: 10.1080/13675560500407325

**To link to this article:** https://doi.org/10.1080/13675560500407325

Published online: 23 Jan 2007.

*International Journal of Logistics: Research and Applications*
Vol. 8, No. 4, December 2005, 313–331

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# Emergency relief logistics: an evaluation of military, non-military and composite response models

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The nature of a particular disaster or emergency determines the form of response and the mix of military or non-military commitment. Whatever the balance between military and non-military involvement, logistical support and replenishment of supplies form crucial aspects of the stabilisation process. This paper examines the processes involved in emergency relief and highlights the relationships between the participating bodies. A generic portrayal of emergency response was initially proposed by Jennings *et al.* (Emergency relief logistics: a disaster response model, Occasional Paper No. 64, Cardiff University, 2000) and discussed further by Beresford *et al.* (Emergency relief logistics: a disaster response model, in *Proceedings of the Logistics Research Network Conference*, 2002, pp. 121–128). This paper presents recent research that proposes a refined model for logistics requirements in emergency conditions, taking account of existing response models, both military and non-military, and of results from field research conducted partially under sponsorship by the Chartered Institute of Logistics and Transport. The composite model proposed here, which incorporates Jennings *et al.* 's model as well as the military/non-military dimension, appears to be robust and workable in a range of geopolitical and operational circumstances.

*Keywords*: Humanitarian aid; Emergency relief; Military; Non-military; Models

## 1. Introduction

One of the most serious problems affecting the modern world is the vulnerability of nations or regions to natural disasters (earthquakes, flood, drought) or man-made crises (civil unrest, war, political/tribal disturbance). Most manifest themselves in terms of: instability of population; large-scale displacement of people water and food shortage; inaccessibility; and breakdown of services and infrastructure damage/destruction (see, e.g. Hampton 2000, Global IDP Project 2003). Examples from the last 10 years include Rwanda (1994/95), Kosovo (1998/99), Mozambique (2000/01), Afghanistan (2002/03), Zimbabwe (2002–present) and Iraq (2003–present). There have been several recent major events that have highlighted the need for a co-ordinated response from the international community. These have included the Iran (Bam) earthquake (December 2003), the North Korean train explosion (April 2004), the ongoing civil conflict in Sudan (2004–2005), the Kashmir earthquake (October 2005) and the Indian Ocean

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*International Journal of Logistics: Research and Applications*
ISSN 1367-5567 print/ISSN 1469-848X online © 2005 Taylor & Francis
http://www.tandf.co.uk/journals
DOI: 10.1080/13675560500407325

tsunami of December 2004. In the latter case, it was notable that the main needs in Sri Lanka, India, Thailand, the Maldives and Malaysia were for clean water, food and medical supplies. The initial surge of donations, however, was largely of clothing.

At the heart of any international relief operation is the establishment and management of an emergency supply chain. Long and Wood (1995) suggested four reasons why famine relief logistics is abnormal: it usually takes place in less developed regions with inadequate infrastructure; the consumer is not the customer of the carrier; logistics modelling for such events must combine both military and civilian aspects; and distribution networks must be established quickly in politically difficult situations. The provision of humanitarian aid and the complex logistics systems that enable the aid to be delivered are often more complex than simply providing disaster relief. Tasks might include refugee protection and restoring civil order, as well as securing humanitarian aid (Byman *et al.* 2000).

The nature of a particular disaster or emergency largely determines the form of the response and the mix of military and non-military resource allocation. Non-military resources can be government, inter-government or non-governmental organisations (NGOs) or a combination of these. Broadly, war or civil disturbance normally involves the greatest military mobilisation, whereas natural disasters precipitate a response that often involves few or no military resources. Military involvement is likely to incorporate both indigenous and external forces, as the scale of a crisis may overwhelm those of the nation state. Although all large-scale disasters are unique, the greater the military involvement, the closer the response becomes to a traditional military model. Where the military becomes significantly involved, such operations are known, in the UK, as peace support operations (PSOs) (MoD 2003). Such terminology is not, however, universal. The US military, for example, defines such work as complex contingency operations (Byman *et al.* 2000). Where the level of military involvement is principally concerned with emergency relief, such involvement is known as either humanitarian/disaster response operations, or humanitarian assistance (MoD 2002).

Practical provision of humanitarian aid generally has to take place in locations where sophisticated logistics techniques are difficult to implement and in situations that are often subject to military conflict and which, therefore, require some form of co-ordination between the military and NGOs (Oloruntoba and Gray 2002a, b). There is often little agreement on the status of the relationships both between NGOs and between NGOs and the military (Stock 1990, Long and Wood 1995, Dadzie 1998). The provision of humanitarian aid in such circumstances has led to many organisations developing inadequate logistics systems and concentrating on funding relief rather than on the processes that support the delivery of that relief. The problem has been exacerbated by environmental factors, funding issues, employee turnover, weak use of technology and poor manual processes (Thomas 2003). This approach therefore leads to the focus being on response rather than preparedness, so the system becomes reactive rather than proactive. The combination of these factors has restricted the development of the understanding of supply chains and, as a consequence, performance improvement has been neglected. There are clear parallels between business logistics and relief logistics, but the transfer of knowledge between the two has been limited and the latter remains relatively unsophisticated, although, more recently, greater effort has been put into understanding and developing systems that can improve the relief supply chain (Fritz Institute 2004).

Several recent events have highlighted the need for flexibility in emergency relief response. These include the train explosion at Ryongchon in North Korea in April 2004, which affected structures up to 4 km from the site. The second is the ongoing humanitarian crisis and relief effort in the Darfur region of western Sudan, where up to 1 million people have been displaced by factional fighting. The most recent has been the Indian Ocean tsunami, which affected all

of the countries in, or fronting, the Indian Ocean, including all East African nations, the West Indonesian Archipelago, the Malaysian Peninsula and the Kashmir earthquake.

In the case of the train explosion, the relief effort was severely hindered by political dogma. The direct routeing of relief by land from South Korea was forbidden by the North Korean government, which refused land access from the south, forcing the diversion of aid materials to take a longer, multi-modal (road–sea–rail) route to the affected site. Other aid was flown in; both options are sub-optimal, the first being time inefficient and the second high cost (BBC 2004a, b). External military involvement in this crisis would have been inconceivable given the political and military sensitivities of the country concerned. Internally, however, it is likely that there was significant military involvement, in terms of both control of the situation and provision of assistance.

In the case of Darfur, relief measures have been persistently hindered by the military conflict in the region. Around 1 million people have been displaced and several thousand are believed to have died in the conflict between rebels and government forces that has now lasted more than a year. Humanitarian operations had begun before the end of October 2003, where around 100,000 people were in receipt of aid and assistance. The Sudanese government, however, stopped aid from reaching victims of the fighting from November 2003, and it is only recently that aid delivery has restarted. The International Committee of the Red Cross, for instance, has been prevented from helping the strife-torn region. Aid workers were unable to get to the villages and refugee camps because they had been denied travel permits by Sudanese government officials (BBC 2004c, d). Again, the use of external military resources to assist in relief efforts has not occurred due to the political and military sensitivities of the incumbent government.

The Indian Ocean earthquake of December 2004 placed humanitarian aid provision under greater stresses than ever before. The earthquake-induced tsunamis caused loss of life in India, Bangladesh, Burma, Indonesia, Thailand, Malaysia, Sri Lanka, the Nicobar and Andaman Islands, the Maldives, Somalia, Kenya and Tanzania. The tsunamis left more than 220,000 dead (BBC 2005d), many thousands unaccounted for and hundreds of thousands injured and/or at risk from disease. The aid operation had to provide aid over a vast geographical area where much of the infrastructure was either severely damaged or totally destroyed. Aid provision had to be co-ordinated on an unprecedented scale amongst a number of governments and a wide range of NGOs, United Nations (UN) bodies, ICRC and military players. In this case, the scale of the disaster was so large that in the early stages of the crisis it was only possible to get aid to the worst affected areas with the use of military resources. As the crisis progressed, the Indonesian military started to impose restrictions on aid workers and foreign military personnel by requiring them to have travel permits for work within the Aceh region (BBC 2005b, c).

This paper examines the processes involved in emergency relief and highlights the relationships between the participating bodies. The Disaster Response Model proposed by Jennings *et al.* (2000) is reassessed against other military and non-military models with a view to developing a composite model able to incorporate the main elements of the Jennings *et al.* model as well as the military/non-military dimension. Information and data were obtained primarily from a stratified Delphi study covering 45 interviewees. Early field research was carried out largely under UN sponsorship (1995–99), subsequently independently (2000–02), and most recently (2004–05) with the financial support of the CILT Seedcorn Fund. Emergency relief operations in Afghanistan, East and Central Africa, Mozambique, Kosovo and Iraq were assessed in detail, supported by additional research into other regions as appropriate. The experts were selected from governments, NGOs, UN bodies, private corporations and the UK military.

## 2. Emergency relief and humanitarian aid response

### 2.1 *The disaster management cycle*

Disaster management is "an applied science which seeks, by the systematic observation and analysis of disasters, to improve measures relating to prevention, mitigation, preparedness, emergency response and recovery" (Carter 1999). Disaster and its management is a continuum of inter-linked activities, it is not a series of discrete events that run sequentially, nor do activities necessarily run routinely in parallel. There are three key elements: preparedness, response and recovery, which cannot be designated to specific time periods, but all are consistently part of the preparation–reaction process (Brown 1979).

Each of these stages differs in terms of its intensity; however, categorising disaster management into the stages referred to above may be too rigid, allowing insufficient flexibility for external influences and unforeseen problems in the crisis management plan. Relief situations include: disaster/emergency situations; long-term relief; famine and resettlement activities; and rehabilitation and development programmes. Against this background, the provision of logistics and transportation services becomes a long-term need.

### 2.2 *Emergency relief supply: key issues*

The preparation phase of disaster management is summarised in table 1, which shows that preparedness is reliant largely on pre-tested systems and communication. Response activities (table 2) usually have to be carried out in crisis conditions and require flexible planning, organisation and disciplined training. As physical infrastructure, such as roads, bridges and airports, is commonly damaged by war or natural disaster, transport capacity is often severely limited (Thomas 2003). Emergency relief is therefore heavily reliant on adapting conventional logistics capability to constrained circumstances. Recovery is a process "by which communities and the nation are assisted in returning to their proper level of functioning following a disaster" and can take many years (Carter 1999). The progression from response to recovery is gradual and the boundaries are usually blurred. Recovery programmes, like response activities, follow an evolutionary path and also have a major logistics component, summarised in table 3.

The response method and the time required to set up the relief supply chain will differ between man-made and natural crises (Ramsbottom and Woodhouse 1996). Man-made events generally have a lead-up period, which can be monitored and used for a certain amount of preparation. Natural disasters, however, may occur with little or no warning and they often necessitate very large-scale response at very short notice (Wijkman and Timberlake 1988).

Table 1. Disaster management: preparation.

| | |
|---|---|
| Disaster policy | Involves governments and NGOs |
| Organisational structure | Clear and workable structures required for effective response |
| Assessment of need | Accurate assessments of need required, covering casualties, damage to infrastructure, crops, services, the national infrastructure and disease |
| Planning | Preparedness measures should be set out in plans, devolving responsibilities and resources to appropriate groups or organisations |
| Co-ordination | A system for is required for achieving co-ordinated effort |
| Facilities and systems | Facilities for response operations include communications, information technology and emergency relief arrangements as required |
| Equipment and supplies | Designated and stockpiled where appropriate. Inventory management |
| Training | Important for effective and adaptable response |

*Source*: Adapted from Carter (1999) and Thomas (2003).

Table 2. Disaster management: response.

| | |
|---|---|
| Assessment | Assessment of overall requirements in the disaster/crisis area. Determination of initial logistics requirements |
| Appeals management | Preliminary appeals launch for donations to underpin the relief effort |
| Operations planning | Co-ordination of relief supplies with other activities and accounting for factors such as politics, safety and weather |
| Mobilisation | Mobilisation of international and local transport and the establishment of an effective supply chain |
| In-country operations | Management of inbound supplies and fine-tuning of distribution involving multi-party co-operation |
| Co-ordination of agencies' activities | Organisation of competitive tendering for, for example, transport capacity, local commodities and services |
| Reporting | Monitoring of the effectiveness of the response and establishment of feedback mechanisms to improve pipeline reliability and performance |

*Source*: Adapted from Carter (1999) and Thomas (2003).

This was exemplified during the 2004 Asian tsunami crisis. A number of other factors relating to physical hindrances, such as poor infrastructure, mountain barriers, remoteness or severe climatic conditions, often further hamper the distribution of food aid by reducing the range of transport options available and by slowing down the movement (Moore and Anthill 2000).

Jennings *et al.* (2000) and Beresford *et al.* (2002) highlighted the main considerations that affect the ease with which food can be transported to the host country, including availability and quality of infrastructure, political conditions and topography/physical conditions. The logistics operation involved in transporting food aid to a host country is often very complex, involving a number of organisations and transport modes (Beresford and Rugamba 1995, Beresford 1998). Even before a crisis situation has arisen, the quality of the infrastructure of a potential host country, its topography and its political situation are all factors that often conspire against efficient logistical operations. In the case of landlocked countries, these problems make the logistics even more complex. Not only do the difficulties associated with the host country have to be addressed, but the conditions in the neighbouring countries through which the aid must travel must also be considered. The process of distributing food in such circumstances is especially difficult, and it is often necessary to engage military personnel and equipment to secure a route and establish a reliable supply chain, at least for an initial period (Weiss and Campbell 1991, Whitman 2001).

### 2.3 *Aid transport and distribution*

The aim of emergency logistics is to establish the food transport pipeline tailored to fit a particular crisis. The principal leg of the pipeline is generally sea transport. It is appropriate,

Table 3. Disaster management: recovery.

| | |
|---|---|
| Logistics | Integrated into recovery programmes with increasing reliability |
| Recovery programmes and projects | Reduction in emergency projects and movement towards long-term development of diverse, integrated programmes |
| Decision-making and project implementation | Less emphasis on urgency. Move towards medium- and long-term planning and project implementation |
| Management of commodities and suppliers | Changing profile of commodities required and review of supplier and capacity requirements |
| Maintenance of transport and transport systems | Ongoing improvement and development of transport infrastructure and systems oriented towards commercial criteria |
| Personnel resources | Reduction in emergency personnel and movement towards development of skills required in the long term |

*Source*: Adapted from Carter (1999) and Thomas (2003).

therefore, to consider ocean freight as the "driver" of the supply chain in most cases. The main choice within ocean freight is between vessel chartering or sending the freight via an existing scheduled liner service. The World Food Programme (WFP), for example, adopts many different methods when transporting aid in order to reach a crisis area very quickly. It charters approximately 200–250 ships annually (Myatt 1995), implying that it has 40–50 ships, or about half a million tons of food, either loading, discharging or sailing at any given time. This flexible strategy enables it to divert ships to areas where the need is greatest. WFP also "borrows" food from neighbouring countries or from their own development food stocks, which are situated in strife-prone or disaster-prone areas (Long and Wood 1995, Beresford *et al.* 2002, BBC 2005a).

Road transport is flexible, versatile, relatively inexpensive over short distances and the required infrastructure is usually available in most countries, so roads can normally provide a door-to-door service; roads can also transport almost anything anywhere and at any time (Fawcett *et al.* 1992). The versatility of roads stems from their ability to transport commodities that have special requirements, for example refrigerated or chemical products. Road transport has the advantage that there are often local operators, and it is relatively simple for an aid agency to mobilise and organise a fleet of trucks and to deploy them where the need arises (McClintock 1997). Road transport, however, does have disadvantages as trucks are susceptible to poor weather conditions and the available infrastructure may not be of a suitable quality (Long and Wood 1995, Beresford *et al.* 2002, BBC 2005a).

Rail transport can carry large amounts of cargo cheaply over long distances. In most developing countries and within Eastern Europe, rail is cheaper because it is either subsidised or it has not seen large investment for many years. Rail is also often faster than road transport, especially over long distances, but over short distances any time gain is generally consumed by the transfer of the cargo from road to rail. Unfortunately, rail very rarely offers a door-to-door service; this means that road transport is needed first and last whenever rail is utilised (Jennings *et al.* 2000). The major disadvantages of rail transport are its fundamental inflexibility, its lack of gearing to commercial needs and, in the case of many countries, the basic lack of railway infrastructure (Banomyong and Beresford 2001). It can also be susceptible to flooding and landslides.

In the early stages of an emergency, the best method in terms of speed and security for distributing food aid is air transport. However, the cost of air freight is far too high for most aid agencies to contemplate using over a long period of time. Air freight is generally used in the early stages of an emergency or when the refugees are in an area inaccessible by any other mode of transport (McClintock 1997). The most economical use of air transport for food emergencies is the air drop technique. This technique avoids the need for landing strips, which are often not available or are poorly maintained; or if they are available, they are short, thus restricting the size of aircraft that can carry the aid. The food aid is packed in specially designed parcels that can withstand the shock of being dropped out of the back of a low-flying aircraft (Long and Wood 1995, Beresford *et al.* 2002, BBC 2005a).

## 3. Emergency relief logistics and the military

### 3.1 *Conflicting objectives*

The use of military forces in emergency relief can offer benefits to the international relief system, although such involvement is controversial due to a number of practical, political and ethical issues. Use of the military is therefore often a difficult decision to make. The armed forces have a range of operational capabilities (Leaning *et al.* 1999), and these are outlined in

Table 4. Operational capabilities of the military.

| | |
|---|---|
| Security | Establishment of "safe havens". Protection of relief supplies. Maintenance of a credible armed presence to reduce threat of violence |
| Transport and logistics | Ability to transport personnel and supplies rapidly. Provide an ongoing supply of equipment and materials |
| Construction and repair | Building or repairing essential infrastructure – roads, ports, airports, railways and storage facilities |
| Command, control and communications | Sophisticated communications systems. Rapid and complex contingency planning. Central planning and direction capabilities. Basic organisational and communications framework for relief organisations |
| Medical care | Rapidly deployable medical teams and evacuation systems. Disease prevention and control. Use of field water purification units |
| Specialised units | Personnel trained to interface between the military and civilian populations. Experts in transportation, business, law, communications, health, policing |
| Preparedness | Joint training of military and civilian personnel in preparation for, for example, mass casualty situations |

*Source*: Adapted from Leaning *et al.* (1999).

table 4. Despite the technical and organisational strength of the military, there are significant limitations stemming from the fact that their primary role is to fight wars not to provide disaster assistance. Leaning *et al.* (1999) suggested that this leads to conflicts in their ability to be fully effective as a humanitarian tool in the disaster management operation. Examples of such conflicts are outlined in table 5.

Whatever the political advantages or disadvantages of military participation, the military can be a useful asset, particularly in complex emergencies in assisting civilian agencies, such as in, for example, Afghanistan, Bosnia and Rwanda. Military forces in such situations, while not necessarily undertaking the humanitarian role, are important for separating and containing warring factions, ensuring that international law is complied with and providing civil and humanitarian assistance in co-operation with NGOs.

Military bodies often have to implement both the political and humanitarian objectives that their government decides are appropriate. In addition, they face complex operational challenges that involve a wide range of actors with divergent goals and objectives. Ultimately, this will mean that there may be many groups who perceive that they have a leadership role, which will add to the complexity of relief provision and the responsibilities for providing it

Table 5. Conflicts between the military and their role in humanitarian crises.

| | |
|---|---|
| Medical care | Military medicine is not necessarily appropriate for humanitarian crises. Supplies readily available to military forces may be inappropriate for refugees and disaster victims, although at the outset of a crisis they may be all that is available |
| Conflict resolution | Military forces are not well suited to aid long-term redevelopment efforts. The imposition of security by outside military forces may also impede negotiation and conflict resolution |
| Interaction with other organisations | Military commanders may be unfamiliar with the roles of major international organisations and, conversely, civilians will have little experience of military organisations. There will be differences in strategy, objectives and tactics |
| Conflict with humanitarian agenda | Using military resources to achieve humanitarian goals creates tension and can undermine the appearance of neutrality of relief organisations |
| Adequacy of training | Few military officers receive training in disaster relief or humanitarian assistance. There is also likely to be ambiguity over the role of military physicians in complex emergencies in international humanitarian law |
| Limited commitment to disaster response | The principal mission of the military is to resolve military conflicts and, generally, less effort and fewer resources are devoted to humanitarian aid unless a HA-specific mission is being conducted |

*Source*: Adapted from Leaning *et al.* (1999).

(Byman *et al.* 2000). Further, the involvement of the military in the provision of humanitarian aid (HA) is seen by many NGOs as being likely to compromise their neutrality. The most vivid manifestation of this problem occurred in Afghanistan in July 2004, when Medecins Sans Frontières (MSF) announced their complete withdrawal from the country, citing the involvement of the US military in the provision of aid and the use of that aid to advance their strategic interests as having compromised their ability to work (BBC 2004e–g).

### 3.2 *Providing and protecting humanitarian assistance*

Byman *et al.* (2000) detailed the tasks that the military will become involved in and which include: providing humanitarian assistance; protecting humanitarian assistance; assisting refugees and displaced persons; enforcing a peace agreement; and restoring order.

There are certain activities that the military are often better placed to provide during natural or man-made crises. Such activities include the transport of relief aid by either air or sea and may also include the provision of air traffic control, airstrip or airport improvements and navigation aids. In addition to the direct transport of HA, there may other vital functions that the military are capable of undertaking, such as communications, medical care, sanitation, civil engineering and water purification. The distribution of HA, especially food rations, water and building materials, is often in direct support of NGOs.

Relief supplies may be vulnerable to attack and the need to protect such supplies can be a vital task. Examples of the UK military securing an area post front-line action include that of Umm-Qasr in Iraq in March/April 2003. Several weeks of military activity followed the initial invasion of Iraq in order to provide a protected gateway for vessels delivering humanitarian assistance (BBC 2003c–e). In general, non-indigenous military cannot countenance local armed support, while NGOs may accept that this is a necessary part of the overall relief effort. There may also be a need to protect NGO personnel from local militia activity, but some NGOs may see this as compromising their neutrality and a balance will therefore have to be reached that meets the aims of all parties concerned. Creating safe areas may assist in this process, but this may require significant military involvement and ultimately may not be that safe (Byman *et al.* 2000).

Refugee assistance is an important aspect of modern international relief efforts and there have been many examples of this, most recently in Darfur, Sudan (BBC 2004a, b). Where the military become involved, they are likely to be assisting the United Nations High Commissioner for Refugees in establishing and securing refugee camps. When displaced persons are able to return to their home state, they may again require military assistance in order to provide some stability (Byman *et al.* 2000).

Enforcing a peace agreement is likely to require a much greater level of military action in order to apply sanctions, intervene between belligerents and disarm factions. Where such action is taken, it is likely to be under the terms of UN Security Council resolutions and conducted under chapter VII of the UN charter. Such operations may extend to disarming militias or demilitarising an area.

The UN and its agencies are bound by the UN charter to work with the host government. This will clearly affect their ability to provide aid to those who may be most affected by the actions of the same government. UN agencies are also highly bureaucratic and, as a consequence, slow to respond. However, they may remain committed to a region for a much longer period than would be the case with purely military intervention. NGOs are generally less bureaucratic than UN agencies and are therefore able to respond much more quickly. Very often they are decentralised, in complete contrast to military bodies. Perhaps the most crucial difference that affects military/non-military co-operation is the question of neutrality. Many NGOs see no

benefit in military involvement, are reluctant to accept their protection and see neutrality as their best form of defence. This is exacerbated by the limited understanding, in both directions, of their respective remits (Byman *et al.* 2000).

### 3.3 *The UK military approach*

The UK military prefers to play a supporting role in crises, recognising that relief agencies are more suited to carrying out such tasks. Additionally, HA is not a core task of the military and is not provided for in its budget (Byman *et al.* 2000). Thus, military involvement in HA is a sensitive issue from the perspective of both the Services and the NGOs. HA is therefore the role of NGOs and the military will supply HA only when NGOs cannot do so. If they do become involved in the provision of HA, the military will "extract" themselves as soon as they can and remain only for the "hearts and minds" aspect. However, aid is increasingly part of the overall operation and is linked to a range of other issues, such as force protection (Wieloch 2003).

The structure of the HA system is visually represented in figure 1 and includes military involvement. In this context, HA is referred to as relief aid to distinguish it as aid provided by military bodies rather than by humanitarian organisations. The military is careful not to use HA terminology, recognising that either "side" could prejudice the operations of the other, and there is a presumption to de-conflict the interface between the two. Military terminology in respect of its involvement has therefore been carefully designed to separate the various approaches taken (United Nations 2004) and is outlined in table 6.

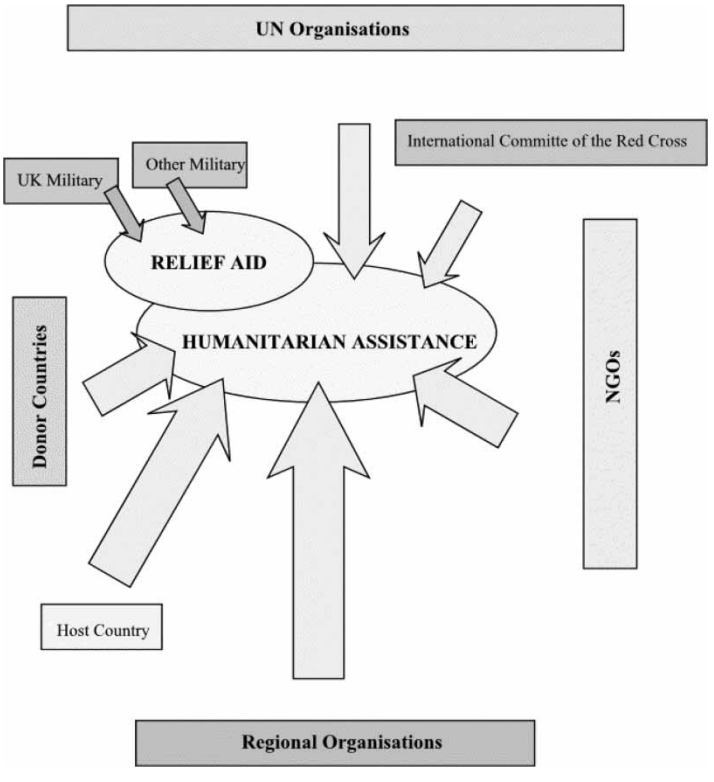


Figure 1. Humanitarian aid provision including military involvement. *Source*: authors.

Table 6. UK military terminology for peace and humanitarian operations.

| | |
|---|---|
| Peace support operations | The highest level of military involvement embracing multifunctional operations at military and diplomatic levels and humanitarian agencies |
| Peace-keeping | Benign involvement, consent by the population and personnel will use force only in self-defence. Conducted under chapter VI of the UN charter |
| Peace enforcement | The enforcement of a peace settlement with coercion. Conducted under chapter VII of the UN charter |
| Conflict prevention | Trying to prevent a conflict starting and the deployment of forces |
| Peace-making | Involvement in a conflict situation and includes the imposition of a peace settlement. This is a consequence of diplomacy and aimed at establishing a ceasefire or peaceful settlement |
| Peace-building | Actions to support political, economic, social and other measures that aim to strengthen and solidify political settlements |
| Humanitarian operations | Conducted to relieve human suffering. UK military humanitarian activities may accompany or be in support of humanitarian operations conducted by civilian organisations (MoD 2003). Humanitarian operations are further divided into either: |
| Humanitarian/disaster relief operations | "Conducted in a benign posture, to assist humanitarian emergency and/or disaster relief efforts in a militarily permissive foreign country." In effect, the military are subcontracted by DfiD and support wider relief efforts (MoD 2002) |
| Humanitarian assistance | "The provision of humanitarian relief by UK military forces deployed for the conduct of combat or security related operations." In circumstances where aid agencies cannot provide aid due to combat operations, the military may take advice about, and provision of, aid until the responsibility for such work can be passed to humanitarian agencies (MoD 2002) |

*Sources*: MoD (2002, 2003).

The range of operations outlined in table 6 can be observed in the following recent examples of military involvement in emergency response: Montserrat (1997), where the requirement was essentially humanitarian operations; Cyprus (ongoing), where some long-term peace enforcement has been necessary; Rwanda (1994–95), which required comprehensive PSO; and Iraq (2003 and ongoing), where several parts are still live as a PSO theatre. In the case of Cyprus, the military role in peace-keeping (under chapter VI UN mandate) is limited to use of force only in self-defence. Overall, the balance between these various approaches is one of obtaining consent in preference to coercion.

### 3.4 *Peace support, peace-keeping and peace enforcement*

Byman *et al.* (2000) depicted the various branches of military contingency operations, and these are depicted in figure 2. Such operations can be represented by a decision tree that has decision points leading to a branching of the relief effort in a specific direction. The initial assessment of the type of operation will be between whether it will be a military (complex) or humanitarian (simple) operation. Complex operations cover PSOs, peace-keeping and peace enforcement, while simple operations cover humanitarian activities. These activities will often be blurred in practice.

If military engagement of some form is required, then relief work will form part of the wider military brief and will almost certainly be a sub-activity to the principal military involvement. Peace support operations, peace-keeping and peace enforcement are conducted in response to man-made crises such as civil war or military intervention. They are complex in nature and require the balancing of international and national political goals and military objectives as well as the possibility of having to provide humanitarian relief and the logistics necessary to support it. They require the co-ordination of many actors. If UK military force is involved,

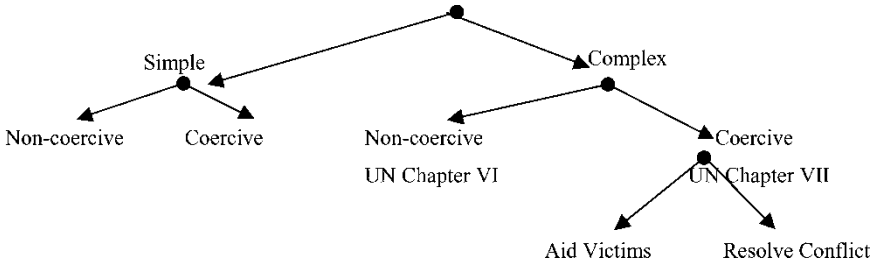


Figure 2. Operational decision tree. *Source*: Byman *et al.* (2000).

decisions will also have to be made in respect of the type of operation to be carried out. If the operation is to be carried out under chapter VI or chapter VII of the UN charter, there may be some level of conflict, which may hinder any relief effort. Additionally, the provision of relief is only likely to be funded out of direct military spending. Simple coercive operations are intended to persuade the enemy without direct contact, and relief would not form a part of such operations.

The simple branch of the decision tree will usually be concerned with relief operations following some form of natural disaster (Byman *et al.* 2000). UK military forces may become involved in relief efforts, providing assistance directly from the UK, from overseas garrisons or from units operating in the region concerned. If the relief effort is humanitarian rather than being related to direct military involvement in a conflict, then it is likely to be at the request of the Department for International Development (DfID). Military involvement is specifically required for the support of international humanitarian emergencies and disaster relief through Defence Mission E and Military Task 20 (see table 7) (MoD 2002). The complex operations concept developed during the 1980s relates classically to civil war situations. Where the military become involved, engagement is distinguished from wider peace-keeping roles. In such complex emergencies, the role of the military in assisting aid workers is contentious as it may compromise the neutrality of aid; aid distribution does, however, often form part of the peace-keeping role from a military perspective (Munslow 1999).

The conceptualisation of how the UK military is involved in relief work is developed through the Joint Doctrine Concepts Centre (JDCC), a tri-service unit (air/land/sea) operating at the strategic level within the Ministry of Defence (MoD). The purpose of the unit is to develop approaches that will operate over a 10–15-year time frame. This means that any relief effort is based on a "doctrine" that has been developed for all three services. Thus, the "doctrine" is

Table 7. Requirement for military involvement in humanitarian aid and disaster relief.

| Defence Mission E<br>Peace support and humanitarian assistance operations |
|---|
| To contribute forces to operations designed to prevent, contain and resolve conflict, in support of international order and humanitarian principles, and to contribute to efforts to deal with humanitarian disasters and crises |
| Military Task 20<br>Humanitarian operations and disaster relief outside the UK and overseas territories |
| Humanitarian crises and disasters, if not addressed rapidly and effectively at an early stage, can often lead to potentially serious conflicts. When appropriate, and at the request of the Foreign and Commonwealth Office or the Department for International Development, the armed forces contribute to humanitarian and disaster relief operations, either on a national basis or as part of a co-ordinated international effort |

*Source*: MoD, 2002.

intended to provide guidance for commanders in the field who can then decide what to do in a particular "theatre". The UK forces maintain military missions as their primary brief, but all acknowledge the need to provide non-military logistics support when called upon, notably in emergencies that require large-scale movement of relief supplies, which may be beyond the capabilities of local non-military organisations.

British defence doctrine differentiates between disaster relief and HA provision and is closely linked to the security situation found on the ground (MoD 2002). A different set of circumstances will exist for each arena that the UK military becomes involved in and will pose a different set of problems. Each, however, will require an underlying concept to define the doctrine that military planners will implement and that determines the actions to be executed. There is significant sensitivity of NGOs towards military involvement in aid provision; however, in many circumstances the main pool of manpower is military, which can step in and fill the human resource void; the potential value of the military units cannot therefore be ignored (BBC 2003b). Clearly, this means that the military has to have different plans applicable to situations where it is involved only in providing aid, compared with conflict scenarios, where aid is provided as a follow-up to the initial military activity. A good example of the latter was the initial provision of relief supplies to southern Iraq following the main military intervention. The aid was supplied by the military and was funded out of military budgets rather than relief funds (Chapell 2004).

To be successfully involved in aid operations, the military must have a developed operational plan for its input. While, in many cases, there may well be *ad hoc* arrangements on the ground, the doctrine has to govern both general strategy and tactical issues, particularly the interface with NGOs where it is "political" to maintain their involvement.

## 4. Modelling disaster relief

### 4.1 *Existing models*

A number of models have been identified that incorporate many of the key stages of the emergency relief cycle. The *disaster management cycle* outlined by Carter (1999) shows the continuum of inter-linked activities that comprise disaster and its management. Haas *et al.* (1977) also illustrated the cycle of activity in a *recovery model*. This identifies the overlaps that occur between each of the phases of the full emergency relief cycle (figure 3). Given this sequence of events, the key stages that the supply chain for humanitarian relief must respond to have been suggested by the Fritz Institute. The sequence begins with preparedness, moves through a number of stages to the operational (transport and distribution) phase, and then through further stages to a conclusion where performance is evaluated (Thomas 2004). This sequence of events provides a clear starting point for integrating further ideas on humanitarian supply chains.

Whittow (1980) devised a flow-chart *General Systems Model* to illustrate the effect of environmental hazards and the possible behavioural adjustments and human responses to extreme events that can occur. Waugh (2002) considered the adjustments and responses to hazard events, devising models that consider the *responses to hazard events* in a disaster response model similar to that of Haas *et al.* 's (1977). In this model, human responses are divided into two general levels of response: biomedical and psycho-social. The biomedical responses tend to be predominantly (although not exclusively) short term, while the psycho-social responses are longer term in their nature. Park (1991) also modelled the *funding and distribution of aid*, detailing the flow of aid from official and voluntary sources.

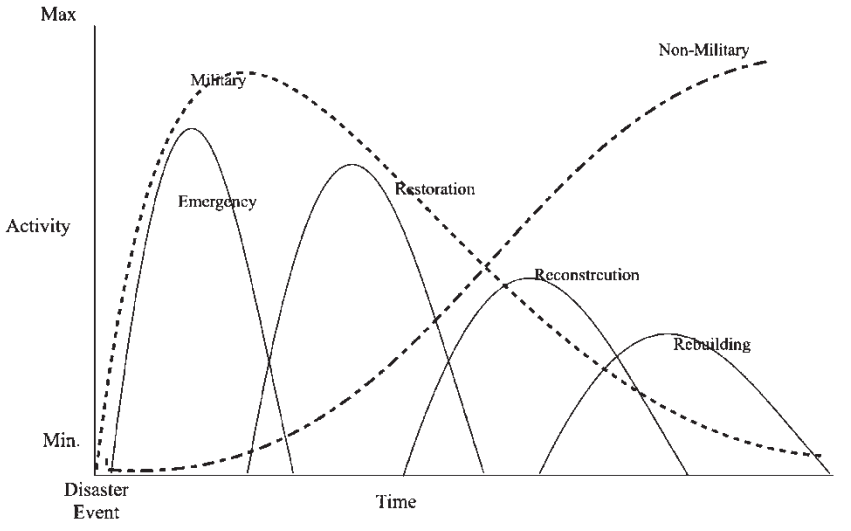


Figure 3. A suggested model of emergency recovery. *Source*: after Haas *et al.* (1977).

The starting point for this project was the *Disaster Response Model*, devised and developed by Jennings *et al.* (2000), and developed further by Beresford *et al.* (2002). Its aim was: "to establish the common criteria which can be applied to all refugee crises with regard to the logistical processes by which food aid is transported and distributed". Although each crisis is unique in its detail, most exhibit at least some similarities in the logistical response.

In terms of modelling the military response to emergencies, the UK military view appears to be that there are no specific models that govern its actions. This appears to be a function of its role, as concepts are developed by considering lessons from actual operations, which then leads to revised doctrine for the medium-term future. Within developing UK military doctrine, there are models that represent the situations that the military is likely to face and its response to them. Included within these doctrines are models of the military's involvement in aid situations. Further, the UK military considers that models are useful in both planning and post-operational contexts. The military has to maintain adaptive structures that allow interfacing with non-military organisations, and often has operational difficulties in the transition phase, "transitional challenges" regarding who to handover to and, indeed, whether there is anybody of sufficient authority to handover to (BBC 2003a).

Two models developed by the JDCC for UK military involvement in conflict/security contexts are the *Interstate Conflict Model* and the *Alternative Conflict Model*. The Interstate Conflict Model deals with military force being used for the desired outcome of destruction of will and means, thus enabling the subduing of the opposing forces. In such situations there is unlikely to be any aid provided by any organisation other than the military. Security conditions would dictate that only the military would be able to access such areas while conflict was still occurring. The Alternative Conflict Model involves a much greater complex of state and non-state actors, several points of conflict, and often several factions. The model factors-in the idea of a failed or failing state, with military force being used as part of the conflict, leading to altered will and conciliation. In such circumstances there may be opportunities for HA to be provided by the range of aid organisations, although again the security conditions on the ground are likely to be dangerous (JDCC 2004).

As a background to these models, full consent from the local population cannot be assumed, highly volatile situations and terms of engagement are likely, and the situation will be complex. The realities are that poor mandates, inadequate capacity and weak diplomacy can all lead to failure. The provision of emergency relief in such situations is therefore extremely dangerous and may fail. Examples of such complex emergency situations are Sudan/Chad at the time of writing, and the Sierra Leone/Cote D'Ivoire crises, which were both linked to instability in Liberia. In such cases cross-border issues arise and the scope of the mandate may not allow the most appropriate response. An extra dimension in relief supply involving military resources is the question of "impartiality" versus "neutrality". Non-governmental humanitarian agencies are "neutral", but armed forces are invariably wearing the colours of a third-party country, implying bias; their activities can be conducted in an "impartial" manner in order to restore normality.

A further model developed by the JDCC is known as the *RECHIMED Model* (JDCC 2004).[†] In this model, a nation or society is seen as a series of strands whereby the interrelationships between the actors are drawn together. In the case of failure of relief operations, it is usually because of the failure of one or more of the key constituents. At the start of a PSO the UK military are likely to be involved in many if not all of the strands; their activities are not limited solely to the military strand. This has an impact on logistics and the supply chain structures because although the military would like to control all of the logistics chain, they recognise that a proportion has to be outside their control. Thus, while the strategic, operational and tactical levels are separate, a "control-at-arms-length" approach may be taken. Decisions taken at the tactical level may have an impact on strategy, an example of strategy affecting the supply of HA on the ground being the movement of supplies to Um Qasr (Spring/Summer 2003).

Finally, it should be recognised that military organisations must be able to operate in both conflict and disaster situations and have to adapt to conditions prevailing at any given moment. Thus their stance will vary depending on the situation on the ground. This in turn will have an impact on the logistics response. One of the identifiable trends is the increasing need for agility (adaptability) of military logistical support, with less emphasis on buffer stock and more on manœuvrability (Chapell 2004). Effectively, this means that agility and scale need to be separated. Within this structured approach to rebuilding society, there is an important role for the provision of HA. In the context of the three stages of disaster management – preparedness, response and recovery – logistics has an important role to play. A wide range of humanitarian and military actors will therefore be involved in providing effective logistics to ensure that aid is delivered to the right people at the right time (Beresford and Rugamba 1995).

As any situation develops through the three phases of preparedness, response and recovery, there will be a shift in the balance of effort being provided by the various organisations. In the early stages, if the military are involved, there will be a much greater level of effort provided by them. As time progresses, so this level of input will reduce as other humanitarian and development organisations gear up and increase their level of input (figure 4). Equally, the level of involvement of the military and civilian organisations is likely to be affected by the general level of development in the country, the level of resources that they are able to commit to a particular situation and the level of infrastructure deterioration. More developed countries are likely to be able to rely more heavily on non-military organisations, whereas less developed countries tend to depend proportionately more on military assistance during a humanitarian crisis (figure 5).

[†]RECHIMED is derived from the first letter of each key strand of military involvement: rule of law; education; commercial; humanitarian and health; information; military; economic; and diplomacy and governance. These form the core components of a developed society.

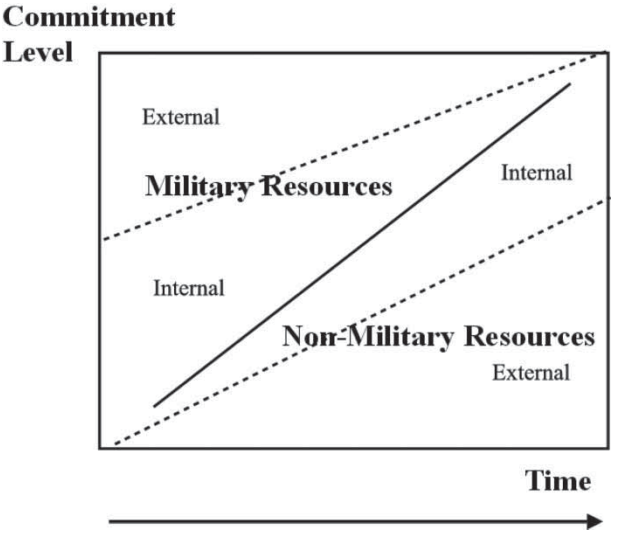


Figure 4. The changing balance of aid provision over time. *Source:* authors.

### 4.2 *A revised emergency relief response model*

Developing a model incorporating military involvement in relief provision, and which accounts for the range of government and NGO relief supply activities, raises some interesting issues. For example, should the starting point be a military approach, drawing in NGO resources where necessary, or should the reverse occur, initially taking an NGO approach with links to the military where necessary? In view of the fact that emergency relief logistics is primarily driven by non-military organisations, the latter approach is more common, with links to military resources highlighted at the relevant stages. Furthermore, to develop a model that accurately reflects what happens in relief situations requires several dimensions to be addressed in parallel. The first of these is the balance between the military and NGO input into a given situation, e.g. at

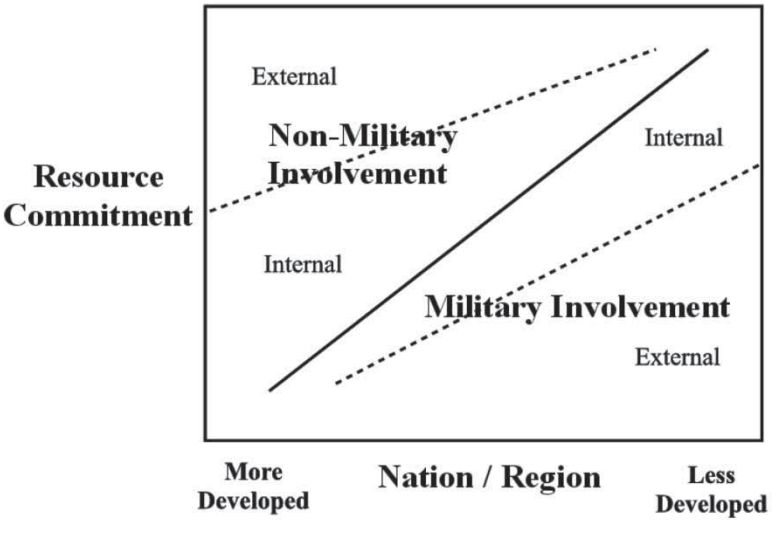


Figure 5. The balance of humanitarian aid provision. *Source*: authors.

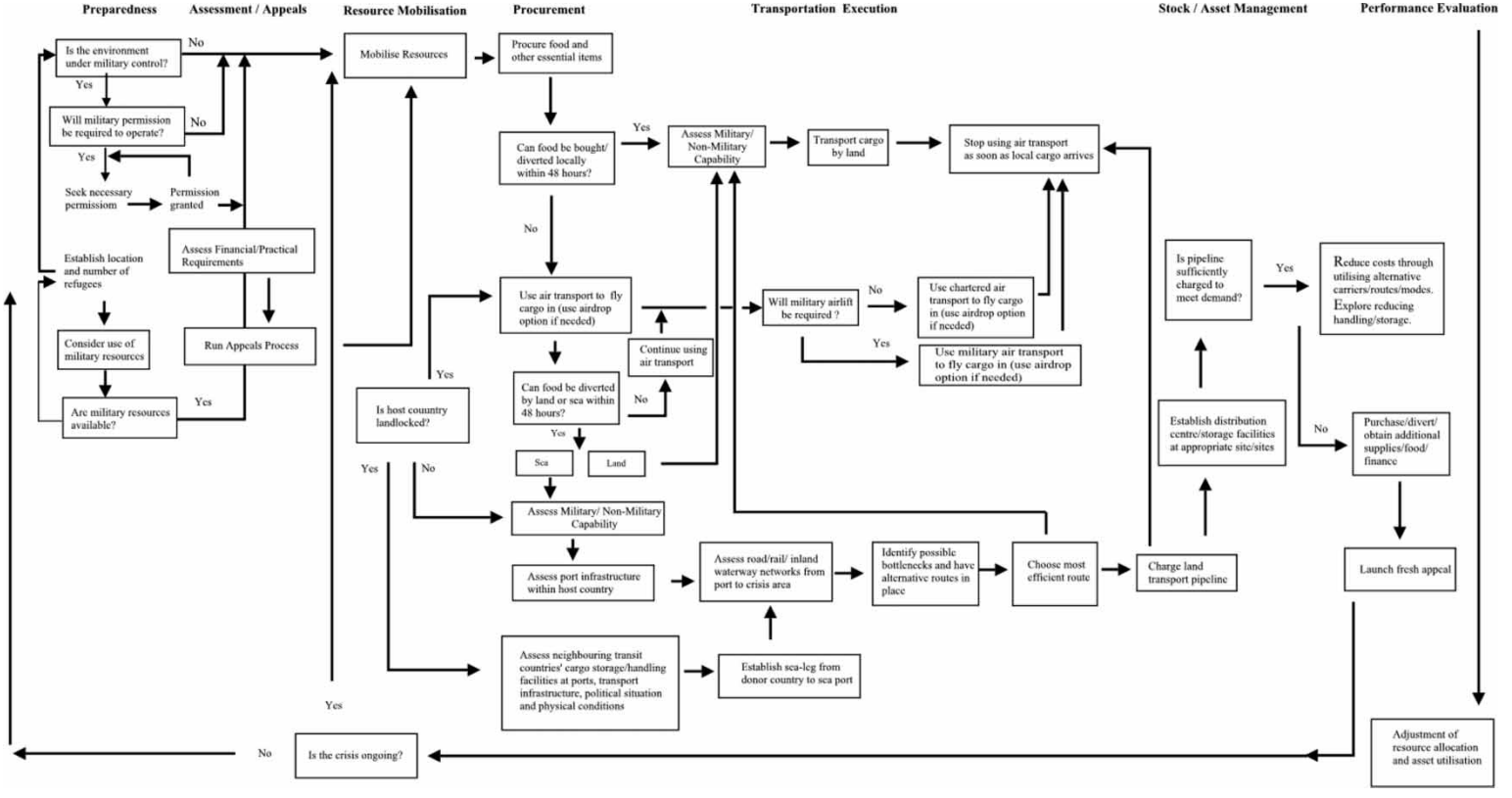


Figure 6. A model of humanitarian logistics.

what point does the balance change regarding the level of effort provided by each? The second is the dynamics of how a particular supply chain operates and how it might, of necessity, be streamlined. Clearly no simple model can represent all elements that might combine, and the composite model presented here (figure 6) represents a drawing together of the key themes from approaches developed in both military and NGO practice.

There is clearly significant scope for improvement in military/NGO co-ordination in the logistics provision for HA. Specifically regarding the modelling of emergency response, this paper demonstrates that existing models can be fused and adapted to take better account of the full range of military and non-military involvement and the range of circumstances prevailing during a specific crisis. The composite emergency relief response model represents a first attempt to draw together all the main components of emergency logistics response. Further research is required to test the model against a range of emergency relief cases.

## 5. Conclusions

It is clear that there is no single model that can accommodate all the variables in the supply of emergency relief materials. However, there are certain key dimensions that may be critical in any HA effort where military forces are likely to be involved. The first of these is whether the situation has been created through a conflict or whether it has arisen solely as the result of natural disaster. Clearly, any situation involving military conflict will be intrinsically shaped by the security situation and the ability of NGOs to work, if not with, at least within the confines of military control. Stemming from this will be the balance between the allocation of any military-based logistics effort and that of NGO relief activities. The balance in such cases may well be primarily military in the early stages, but as time progresses and security conditions change, so the balance will swing to NGO-based aid provision. The third aspect will be the balance between a country's indigenous HA capability and that of external countries' ability (and will) to participate. The scale of many disasters may well overwhelm internal resources and this will inevitably lead to requests for external intervention, which in turn may well be provided from military capacity. Military involvement tends to be more likely in the case of large-scale sudden events by virtue of the speed and scale requirements. External military forces are generally able to react at much greater speed than NGOs simply because of their operational capabilities. The revised Emergency Relief Response Model, developed from the original version proposed in Jennings *et al.* (2000), takes account of the main military and non-military forms of response and of the full range of dimensions and operational constraints.

The December 2004 tsunami disaster, unprecedented in its scale and reach, offered a sad but timely opportunity to examine the workings of aid logistics in extreme conditions. As the disaster unfolded, it was clear that several different approaches were taken depending on country and circumstance. Especially interesting was the mix of military and non-military, government and NGO bodies involved in the relief effort, depending on the country and scale of local need. There appear to be clear benefits in terms of improved responses to HA situations by addressing the links between military organisations and the NGOs. For many NGOs this may be a "step too far", but for others the benefits may well outweigh the disbenefits.

## Acknowledgements

This paper has been developed from the final report submitted to the Chartered Institute of Logistics and Transport, whose financial assistance through the seed-corn fund is gratefully acknowledged. We are also indebted to: Cmdr Andrew Chapell of the Logistics Analysis

and Research Organisation; Lieutenant Colonel A. Marriott and other members of the Joint Doctrine and Concepts Centre, Shrivenham; and to the other interviewees for their co-operation in the Delphi study.

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