

Humanitarian Relief Supply Chain in India - Framework and Challenges

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ABSTRACT

There has been a substantial increase in the number of natural and man-made disasters, both in scope and intensity, in the last few decades. The resultant damage – social, economic, and human, has highlighted the necessity of immediate response, in aid of maximum number of affected people, utilising all available resources in an optimal manner. The logistical challenges in the face of such disasters, call for proper management of relief resources in the form of Human Relief Supply Chain (HRSC). This study examines current issues regarding HRSCs including major stakeholders and agencies involved, including role of the private sector, and their respective contributions. A framework of HRSC in the Indian context is proposed, highlighting major issues and challenges.

Keywords: Humanitarian, Disaster, Supply Chain, NDMA, India

INTRODUCTION

Natural disasters have sharply increased in the last four decades causing significant economic, social and human damage. The major reasons for this increase in natural disasters all over the world are: (1) rapid growth of world population, (2) larger concentration of infrastructure and people in high risk areas, and (3) increasing social and economic interdependency (Whybark *et al.*, 2010). It has been suggested that, keeping increasing trends of the last 100 years in view, natural disasters are set to increase five-fold in the next 50 years (Thomas & Kopczak, 2005). As per data available, Asia accounts for 41% of total global disaster occurrences from 1961-2010 with the American Continent at second place with 26%. There has been a steady increase in disaster events in low and medium income countries over the last 50 years (Guha-Sapir & Hoyois, 2012). India ranked fourth, after Philippines, USA and China in numbers of reported disaster events in 2011 (Guha-Sapir *et al.*, 2012).

The Indian subcontinent has been severely affected by natural disasters: earthquakes, landslides, tsunami and cyclones and if we go by trends, then they are set to rise in future. Cyclone Bhola in 1970 is said to have killed

over 400,000 people as per United Nations Office for Coordination of Humanitarian affairs (OCHA) estimates. Cyclone Sidrin 2007, Bhuj earthquake in 2001, earthquake in Pakistan in 2005, the Asian tsunami in 2004 and Kosi river floods in India in 2008 are some of the severe natural disasters which have caused largescale loss in terms of lives, infrastructure, adversely affecting economies of the affected areas. These disasters have more than ever highlighted the need for a well-planned, robust and effective disaster management strategy to be in place.

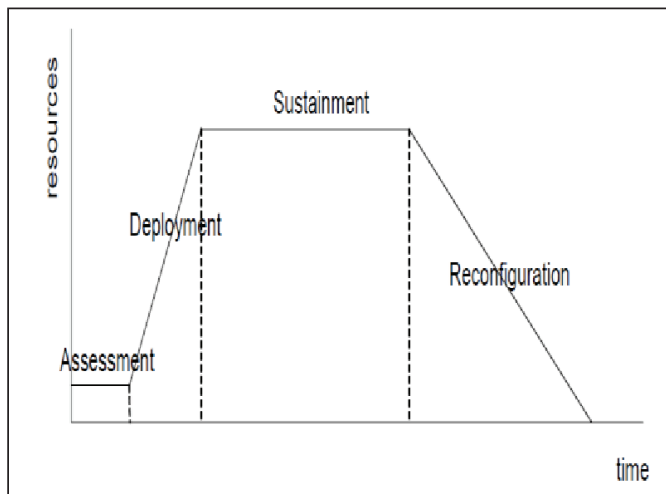
LOGISTICS IN HUMANITARIAN RELIEF

Disasters are disruptions, physically affecting a system as a whole and threatening its priorities and goal that may give rise to an emergency or crisis situation, in turn calling for pragmatic mitigation strategies (Tomasini & Van Wassenhove, 2004). It was the Asian tsunami in 2004 which actually triggered the need for a much more involved study into the aspect and importance of logistics in the humanitarian context. Humanitarian logistics may be defined as “the process and systems involved in mobilizing people, resources, skills and knowledge to help people affected by disaster” (Van Wassenhove, 2006). Providing relief in an aftermath of any disaster

is a complex process and humanitarian relief agencies are bound by principles of humanity, neutrality and impartiality which are enshrined by the 'Humanitarian Principles Framework' (Tomasini & Van Wassenhove, 2004). Five strategies have been identified to meet the unique challenges in ensuring efficient humanitarian relief – creating a professional logistics community, standardized training and ratification, metrics and performance measurement, communicating the strategic importance of logistics to all stakeholders and developing flexible technology solutions (Thomas & Kopczak, 2005).

A Relief Mission Cycle (Beamon, 2004) is depicted in Fig. 1. The stages of the cycle are - Assessment (requirement for immediate response in specific situations), Deployment (requirement of resources at all stages), Sustainment (planning for a longer time frame) and Reconfiguration (closure of operations).

Fig. 1: Relief Mission Cycle



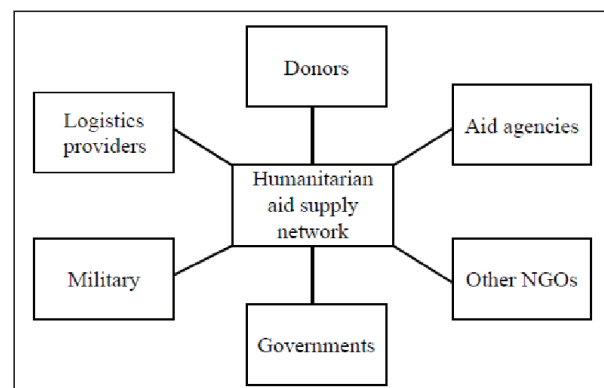
Source: Beamon, 2004

Planning and preparing for the 'next disaster' is an ongoing process and calls for a tailor-made organisation which takes on a leadership role during a crisis. The preparedness of any organisation to respond effectively in providing humanitarian relief depends on qualified experts, knowledge management, well defined processes, financial resources and the attitude and collaboration among stakeholders (local community etc). These act in a continuum of Disaster preparedness – Disaster response - Disaster Management.

From the state of unpreparedness during Hurricane Mitch in 1998 to a focused, efficient disaster management effort, as seen during the Gujarat earthquake in 2005 and Hurricane Katrina in 2005, humanitarian relief efforts have come a long way. The importance and need for logistics

in humanitarian relief efforts has been well established and advocated, especially after the Asian Tsunami of 2004 (Whiting & Ayala-Ostrom, 2009). Varied types of organisations are assembled for a particular disaster and depend on "severity, loc, nature of disaster, availability of potential participants, anticipated needs and prescribed procedures" (Whybark *et al.*, 2010). Fig. 2 depicts some of these agencies which may be grouped into two categories- regional (country-specific) and international aid agencies. Both these groups converge and collaborate during disaster relief stages (Kovacs & Spens, 2007).

Fig. 2: Stakeholders in Humanitarian Relief Efforts



Source: Kovacs & Spens, 2007

Some of the issues in effective disaster relief management can be covered under the broad factors of degraded infrastructure, poor communications, lack of trained personnel, availability and conditional funding by donors, cultural and religious issues and even problems related to non-standard relief materials (Rodman, 2004; Kovacs & Spens, 2007).

The inadequate international response provided during Hurricane Mitch in 1998 (Samii, 2002a) provided the impetus to formalize humanitarian relief organisations under aegis of the International Federation of Red Cross and Red Crescent Society (IFRC) which is now the world's largest humanitarian organisation. They operate through country specific National Societies (NSs), Emergency Response Units (ERUs), each tailor-made to cover specific areas and Field Assessment and Coordination Teams (FACTs) (Tomasini & Van Wassenhove, 2004). During the Bhuj earthquake (Gujarat, India) in 2005, the IFRC through the NSs was able to deploy rapidly with adequate resources available at its disposal (Samii, 2002b). The United Nations Joint Logistics Centre (UNJLC) concept institutionalised in 2003, came into being initially in the mid 90's, tasked with controlling and coordinating efforts by all UN agencies in a disaster relief scenario (Samii & Van Wassenhove, 2008).

On 23 December 2005, the Government of India enacted the Disaster Management Act, which mandated the creation of the National Disaster Management Authority (NDMA) headed by the Prime Minister and the State Disaster Management Authorities (SDMAs) headed by respective Chief Ministers to spearhead and implement a holistic and integrated approach to Disaster Management in India. A National Disaster Response Force (NDRF) has been created for immediate response and a National Disaster Communication Network (NDCN) set up for ensuring reliable communication backbone. The NDMA has also taken active steps in facilitating coordination between NGOs and conduct training on disaster management response.

HUMANITARIAN RELIEF SUPPLY CHAIN

The advent and need of supply chain management in humanitarian relief dealing with complexities of managing supply chain and the importance of the inclusion of private sector in relief operations has been highlighted by Van Wassenhove, (2006). He notes that logistics is the most expensive part of any relief operation and is the part that can mean the difference between a successful or failed operation. Specific application of supply chain principles covers three main focus areas: Preparedness, Response, and Collaboration (Tomasini & Van Wassenhove, 2009a).

An analysis of four major natural disasters (Argollo da Costa *et al.*, 2012) —Asian tsunami (2004), earthquake in Pakistan (2005), the tsunami and earthquake in Japan (2011) and the massive landslides in Brazil (2011), all reveal the importance and extent of planning efforts needed to ensure that relief operations are launched speedily with assured, adequate funding and ensuring that logistics balance is maintained throughout the operations.

The complexities and challenges of the HRSC and the need for different response levels during the various stages, calls for well-planned application for ensuring efficiency, effectiveness, cost and time savings. Thus, the principles of Leanness and Agility (Aitken *et al.*, 2002; Christopher & Towill, 2001) are finding increased mention in literature on humanitarian supply chain streams. This aspect has been studied by Cozzolino *et al.* (2012), in the application of leanness and agility in the World Food Program's HRSC. The paradigms of Agile, Adaptable, and Aligned supply chains (Lee, 2004) can be used as a comparison in humanitarian and business contexts (Van Wassenhove, 2006). However logistics in such circumstances has unique challenges such as break down of road and rail networks in the disaster area, lack

of communications, inadequate transportation and trained personnel and even problems related to unsolicited and non-standard relief material (Kovacs & Spens, 2007, 2009; Maon *et al.*, 2009). Application of proven supply chain practices would address some of these challenges.

The various stakeholders in any humanitarian relief operations are heterogeneous based on their culture, purpose, interest, mandates, capacity and logistics expertise (Tomasini & Van Wassenhove, 2009a). HRSCs, besides standard functions, also include aspects of donor-relationship management, resource assessment, supplier management, and monitoring and evaluating the effect of aid that has been delivered (Howden, 2009). The specific characteristics of humanitarian supply chain have been summarized by Beamon (2004), who further analyses the aspects to be kept in mind for performance, measurement of HRSCs using various parameters of resource, output and flexibility performance measures. The Disaster, Pressure and Release (PAR) model (Tomasini & Van Wassenhove, 2004) is a comprehensive framework which enables humanitarian relief agencies to analyse and plan for disaster mitigation, basically preventing a given adverse situation to worsen. The PAR framework helps to identify factors of vulnerability i.e., Root Causes, Dynamic Pressures and Unsafe Conditions which compound the Risk attributes of a disaster situation. The PAR model has been widely used to analyse various natural disasters such as the Pakistan earthquake in 2005 (Agha, 2009) but has its own limitations (Wisner, 2004) and is more of a post-disaster analysis framework. A dual-cycle model taking into account Prevention and Planning Cycle and Reaction and Recovery Cycle (Maon, 2009) details issues and factors in each cycle which can be used effectively by corporate entities to contribute significantly to disaster relief preparedness and implementation. In India as in other countries, it is usually the military which is the first respondent in the aftermath of a disaster. Therefore it may be useful for lead humanitarian relief organisations to study the 'military model' in such situations and a useful comparison has been made by Kovacs (Kovacs & Spens, 2009) with the 'Humanitarian model'.

There are significant differences between conventional business and humanitarian relief logistics. Some of these differences (Whybark *et al.*, 2010) are -predictability of demand, surge of demand and short lead times, critical requirement of adequate and timely delivery, overall lack of resources, immense scrutiny by media. Of special interest is the active participation of the private sector and local community involvement, the latter to develop capacity in terms of training citizens in logistics issues such as distribution of aid (Tomasini & Van Wassenhove,

2009a). The motivation for companies to participate in humanitarian relief (Ross, 2004) calls for leveraging private expertise for HRSCs and factors for their participation have been enunciated by Tomasini & Van Wassenhove (2006) and (Ross, 2004).

Collaboration in any supply chain is the cornerstone for its success and the major ingredient of collaboration is trust among participating entities. This latter aspect is even more relevant and challenging to achieve in a HRSC which is an example of a hastily formed network (HFN). The aspect of development of “swift trust” in this context (Tatham & Kovacs, 2010) highlights the challenges of developing trust among entities, in the initial stage of formation of such HFNs, who have perhaps never before worked together. Contemporary literature covers issues of confidence building among agencies, categorization of relationships (McLachlin & Larson, 2011) and steps to ensure effective collaboration (Tomasini & Van Wassenhove, 2006).

Information systems play a crucial role in all stages of the disaster management cycle specially keeping in view the dynamics of the environment, multiple aid providers, relief management organisations, unpredictability of demand and also help in prevention of corruption (Howden, 2009) and a Knowledge Management framework, building up ‘institutional memory’, is useful as an aid for decision-making in crisis situations (Dongsong *et al.*, 2010). The ultimate impact of a well-planned HRSC lies in the actual delivery of aid to the needy in an acceptable time frame. This may be turned as a ‘last mile relief distribution’, the efficiency of which depends on decisions regarding facility location, inventory management, transportation and distribution with speed being of essence (Roy *et al.*, 2012).

The cluster approach developed by the UN was first implemented in the aftermath of the earthquake in Pakistan (2006) which claimed over 73,000 lives (Action Aid). Essentially the cluster approach calls for setting up of domain specific disaster response team which act as ‘organisational leaders’ and are tasked with their specific areas or clusters. In the above mentioned earthquake, mini clusters – Food and Nutrition, Water and Sanitation, Health, Emergency Shelter, Early Recovery and Reconstruction, Logistics, IT, Telecommunications, Camp Management and Protection, and Education were set up within 24 hours of the response. The performance of the clusters in this particular operation was varied depending on a variety of factors (Action Aid).

The issue of providing urgent medical care to affected people suffering from post-disaster trauma needs due deliberation and planning from a logistics perspective.

Stocking, provisioning and proper storage of medicines, move of medical personnel, casualty evacuation and establishment of medical camps in the near vicinity necessitates a separate supply chain mechanism. However, this aspect is beyond the scope of the present study.

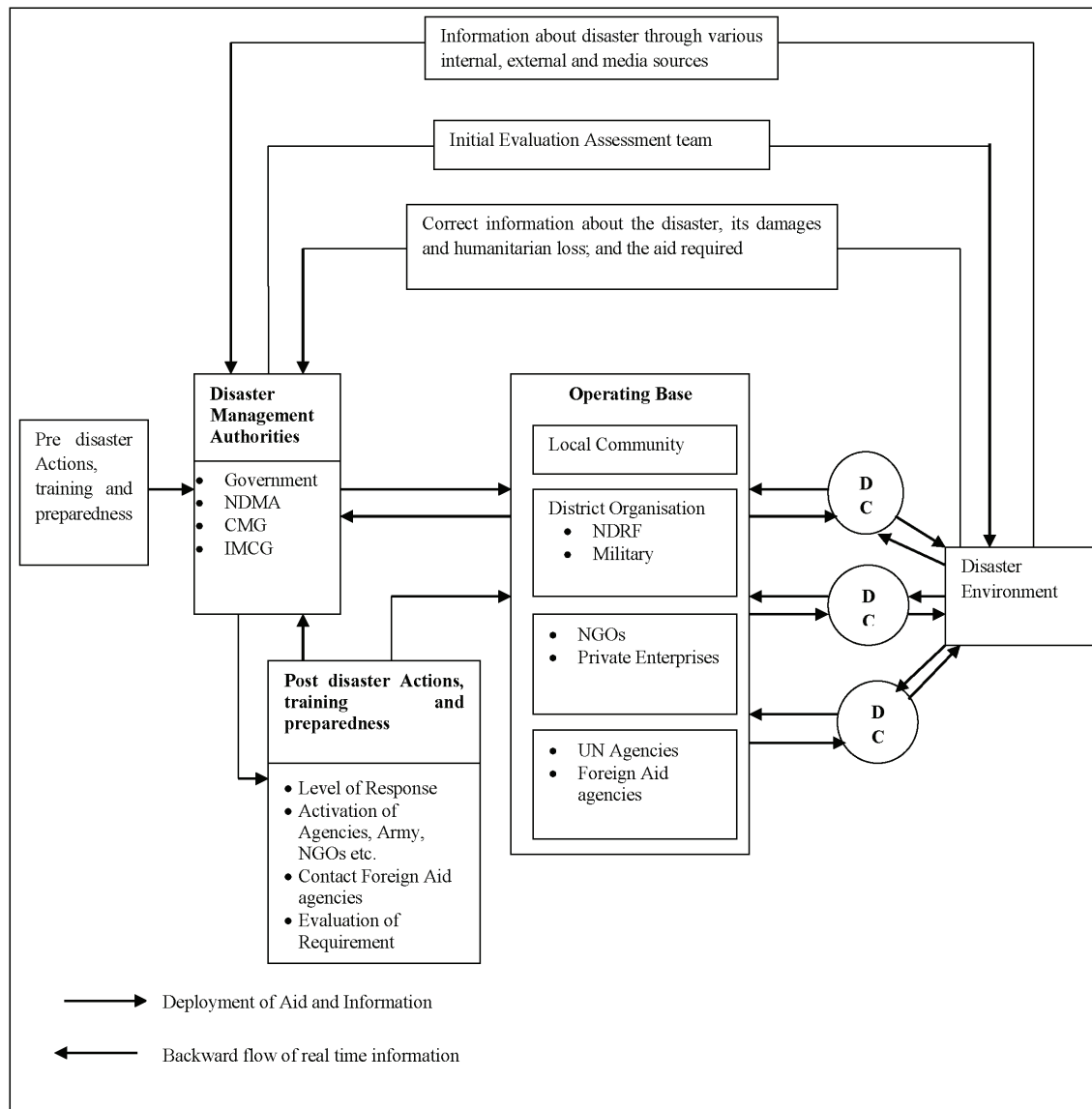
HRSC: AN INDIAN PERSPECTIVE

A framework for disaster relief operation in the Indian context has been proposed (Fig. 3). The framework assumes a case where a large disaster has occurred which is beyond the capability of being handled at the local level and which calls for multi-agency involvement, both national and international. The signal for the initiation of the disaster relief sequence is the receipt of information at the Governmental level by the NDMA and in turn the Crisis Management Group (CMG) and the Inter-Ministerial Crisis Group (IMCG). The preliminary decisions which may be taken relate to the level of response based on the magnitude of the disaster and early assessment of damage, loss of lives etc. It is expected that the NDMA would, as an immediate response, dispatch the nearest located NDRF to carry out evaluation and on-the-spot damage assessment, with the Army, in all likelihood being called in to provide the first level of disaster relief.

Entities in the Humanitarian Relief Supply Chain

At this juncture there would be a need to set up an Operating Base perhaps in the closest air field from where all future relief efforts could be coordinated and this may act as a central point and reception centre for receipt of all relief supplies, humanitarian logisticians and other personnel. All the agencies as highlighted in Fig. 2 would converge in the Operating Base. International relief aid agencies may not be a participant at this stage. It is pertinent to mention that during the Gujarat earthquake in 2005, international agencies were initially not called in and even then, the UNJLC, on deployment was not very effective. Local NGOs were however activated. The basic reasons for this were as follows (Samii & Van Wassenhove, 2008):

- ◆ It was presumed that the Indian Army’s efforts would suffice.
- ◆ UNJLC was activated without sufficient interagency and Governmental consultation.
- ◆ Lack of awareness of the UNJLC concept.
- ◆ Lack of formal office, secretarial support etc.

Fig. 3: Humanitarian Relief Supply Chain Framework

In any case there would be a need for setting up of an Overall Coordination Centre (OCC) at the Operating Base on lines of the UNJLC. The core of the OCC would comprise elements of NDRF and the Army (Ozdmr, 2011). In conjunction with delivery of aid (food, water, shelter, medicines etc.) the relief effort would also involve other issues such as clearance of rubble (in case of earthquake), disposal of the dead, reconstruction etc. These tasks would be carried out by the Emergency Response Teams and may follow the Cluster method of UNJLC (Action Aid) as has been described earlier in the paper. In the Indian context, setting up of 'clusters' would have to be weighed carefully, based on limitations of this system and local imperatives.

The delivery of aid and passage of information would be most efficient if HRSC practices are followed under the lead of NDMA. Representation of local state/district administration, NGOs and local community would be part of the OCC. The media is increasingly playing a significant role during the entire cycle of disaster relief operations and their reportage does have a major impact on donor (NGOs, foreign aid agencies, private sector etc.) response which often plays major role in ensuring that maximum affected people adequate are covered. The physical delivery of relief material would be based on actual requirement and type of disaster. Adequate and accurate information flow about the location and number of people would enable appropriate relief material

distribution based on local distribution centres. Varied modes of transportation such as: truck, minivans, boats (in case of floods) helicopter, air dropping would ensure efficient last mile delivery highlighted earlier, are put into effect at the earliest. This would of course entail a large degree of planning, coordination and preparedness by the NDMA as part of its functional responsibilities.

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Role of the Private Sector

The private sector in India, specially the FMCG majors, has deep and wide distribution networks covering rural areas. It is this aspect of the private sector companies which can be gainfully leveraged in providing immediate, urgent relief to those affected by a disaster situation. Therefore, it is imperative that any humanitarian relief strategy should incorporate the existing supply chain of the private sector companies. In the Indian context, the NDMA would be the nodal agency to include private sector supply chains during the planning process. The humanitarian relief supply chain strategy, therefore should take into account the following significant advantages that accrue by involving the private sector in disaster relief:

- ◆ **Material Availability:** It is pragmatic to understand that any segregated, large storage of relief material would not be practical due to these stores reaching their expiry dates, being obsolete or not being available in the right quantity in the hour of need. Inventory costs of such storage have also to be considered. Herein, concept of Vendor Managed Inventory (VMI) may be applied with a continuous replacement and replenishment policy by the companies.
- ◆ **Collaboration Among Companies:** Efforts should be directed to form a collaborative network of major private sector companies for the distribution/movement of relief materials. The collaboration framework could be formulated by NDMA, in its central role, with selected companies whose supply

chain network would be utilised in a contingency. This also necessitates amalgamation of inventory handling techniques of the NDRF and other relief agencies with modern techniques being practiced by the corporate sector.

As has been brought out earlier, the role of private agencies in any disaster scenario has been of a limited nature. This is especially true during past disaster relief efforts in India where such involvement has been, at best, of an ad hoc nature. One example of such partnership was during the Asian tsunami where Coca-Cola converted its soft drink production lines to bottle huge quantities of drinking water and even used its marketing distribution network to deliver it to relief sites. However it may be noted that the company had established a relationship with relief aid agencies prior to the tsunami (Thomas & Fritz, 2006).

CHALLENGES IN HRSC

Some of the challenges and barriers in effective humanitarian relief operations have been covered earlier (Rodman, 2004; Kovacs & Spens, 2007; Tomasini & Van Wassenhove, 2009b; Whiting and Ayala-Ostrom, 2009). In the Indian environment, significant challenges in any disaster relief effort in implementing a robust HRSC are as follows:

- ◆ While local NGOs played a significant role during the Gujarat earthquake and other disasters in the recent past, other agencies such as private companies and Public Sector Undertakings (PSUs), Public Works Department (PWD), have yet to be included in the overall relief operations in a formalised manner.
- ◆ Local youth and communities in general, especially in disaster-prone areas should be trained and educated in aspects of immediate post-disaster relief including use of multi-mode transport, inventory management etc.
- ◆ Collaboration is the basis for establishing an effective HRSC which is yet to find its meaningful place in disaster preparedness in India.
- ◆ The National Institute of Disaster Management (NIDM) has been set up under aegis of the NDMA to impart formalised education in disaster relief and mitigation (NDMA). However supply chain best practices for implementing HRSCs need to be included in the training paradigm.

- ◆ Infrastructure constraints and inadequate number and type of vehicles may preclude an effective distribution system and impose delays in the overall HRSC.
- ◆ While mobile connectivity has a large 'footprint' even in rural areas, the disaster environment could seriously damage the communication infrastructure. In such cases the National Disaster Communication Network (NDCN) may be able to provide an effective information and communication backbone.
- ◆ A plethora of regional and national media agencies, if not suitably facilitated may result in a biased, inadequate reportage leading to confusion among different agencies which may, in turn, adversely impact the decision making process in an already challenging atmosphere.
- ◆ Cultural, religious and social sensitivities relating to a host of issues such as food preferences, attitude of community leaders in accepting and distribution of relief material.
- ◆ Response time at various stages may increase due to multiple layers of jurisdiction. Division, district, state and central government and also the related bureaucracy.
- ◆ Foreign policy related imperatives which for example, may preclude receipt of international aid at the first instance due to political compulsions.
- ◆ Need for adopting an enhanced, professional and in-depth approach to humanitarian relief issues.

CONCLUSION

Disaster relief and mitigation preparedness is still at its nascent stage in India and the NDMA as a lead agency, is concentrating its efforts on spreading awareness, provide training and establish disaster response protocols and processes. However there is a need to incorporate other 'actors' and formalise a structure which would lead to, in a disaster situation, establishment of a HRSC incorporating best practices and an evaluation mechanism.

This paper has attempted to draw on humanitarian relief studies and resource to propose a framework for a HRSC in the Indian context and highlight some significant challenges in a disaster environment context. The issues discussed in this paper bring out the need, for increased understanding and study of humanitarian relief preparedness and efforts required in disaster situations

in India, leading to establishment of a comprehensive, collaborative environment. The NDMA, which is already substantially involved in disaster relief issues would need to focus its attention in ensuring a professional approach and increased research incorporating multiple agencies in using HRSC best practices in disaster management. Future research is needed with a focus on empirical studies on the need to establish best practices in contingent situations, adaptation of existing supply chains of private industry and modeling in transportation and inventory domains specific to geographical regions.

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