International Journal for Research in Engineering Application & Management (IJREAM)
ISSN : 2454-9150 Vol-04, Issue-05, Aug 2018

Relief Material Transportation Strategy For Post Disaster Recovery

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ABSTRACT- Time bound smooth and firm movement of relief material is required to minimize the impact of natural as well as man-made disasters. It is very much required that functioning of each and every stakeholder is clear & is an important part in creating relief material transportation strategy. Countries economy depends on reliable freight transportation during disastrous situation. However, natural and man-made incidents that happen both within the country and globally have the potential to impression the supply chain and overall freight movement, with repercussions on the commerce and the economy. The aim of this paper is to enable, facilitate and suggest decision makers in logistics planning as well as assessment of creating process for transportation of Humanitarian Assistance Disaster Relief (HADR) material to affected states/countries affected by Natural or Technological disasters.

KEYWORDS - Disaster Management; Humanitarian Assistance; Disaster Relief; Transportation Strategies; Freight Management.

I. INTRODUCTION

Disaster is an event triggered by natural or man-made causes that lead to sudden disruption of normalcy within society, causing widespread damage to life and property. Disruptions in India caused by frequent disasters due to earthquakes, landslides, droughts, floods and cyclones, and occasional man-made tragedies like the gas leak at Bhopal have stirred the nation's imagination leading to, inter alia, establishment of the High Powered Committee on Disaster Management.

According to International terminology a catastrophe is defined to be an unforeseen and often sudden event that causes great damage, destruction and human suffering that overwhelms local capacity, necessitating a request to the nationwide or global level for external assistance. Disasters can be separated into two major categories ***Natural and Technological Disasters***.

Natural disasters can be further split into three groups:

- *Hydro-meteorological disasters* include floods and wave surges, storms, droughts and related disasters (extreme temperatures and forest/scrub fires), landslides and avalanches.
- *Geophysical disasters* include earthquakes, tsunamis and volcanic eruptions.
- *Biological disasters* include epidemics and insect infestations.

Manmade, or *Technological disasters* are events that brings on a major crisis, may cause huge loss of life and assets and may endanger the environment in which it occurs. Technological disasters include industrial accidents (chemical spills, gas leaks, and radiation), transport accidents and other miscellaneous accidents such as explosions and fires that are not caused by nature. An example of a technological disaster is the 1986 Chernobyl nuclear reactor explosion.

FREIGHT MANAGEMENT & DISASTERS

[1]J.-C.M. Baraka reviewed challenges confronted by humanitarian disaster relief material logistics and supply chain organizations in the transportation of resources, migrants, and crises supplies for emergency relief operations. When a disaster (natural & man-made) forays the nation, some features of the affected locality must come to a stand-still in order to admittance, and even process, the loss.

Essential basic materials, medical supplies, such as catheters, cotton, syringes and oxygen, will be risked and could even be depleted, especially when natural disaster causes a medical emergency. Hospitals and other medical facilities like private nursing homes will deplete their food stock within a day and pharmacies will see their records vanish. Energy supplies will expire in just two to three days. Without admittance of proper transportation, individuals won't be able to get to work, crises response vehicles will be paralyzed and accumulating trash will quickly cause health and environmental hazards. This will also stop and cease air, rail and maritime transportation – our nation's economic lifelines.

This is just the tip of the mountain when it comes to the production industries that would suffer as a result of the

 DOI : 10.18231/2454-9150.2018.0675

stoppage of heavy movement vehicles. Major industrial units will see assembly lines stopping, banking system will use up their cash supplies, even the Defense authorities could see crippling effects. Natural disasters, like the one the [2]Nepal earthquake back in 2015, are disturbing on many levels, but making sure we literally keep the nation running with appropriate vehicle traffic management is vital for a speedy, healthy recovery.

II. TRANPORTATION PLANNING PARAMETERS

Transportation Network

Transportation systems are intended to function under defined conditions. Yet, interruptions such as those initiated by a calamity or by a blizzard are rather common and well mitigated. On instance, a commotion at a considerable measure takes place to the amount that the protection or safety of the entire country or locality is conceded. Material transportation is often measured as an unsafe system since intrusion in one of its components can have substantial impact on the financial and social well-being of a region of a nation. An operative way to measure how perilous an arrangement is would be to ruminate the impacts; its exclusion would have on the movement and activities it services. From a cost-effective perspective, the effects of disasters are majorly dependent on three factors; 1) the environment and extent of occurrence of disasters; 2) exposure level of communities and structures and; 3) vulnerability level of communities and infrastructures.

Modes of Transportation

Preferably, commuters or freight movements should swing toward manners that have a greater dimensions and resiliency. However, if a public transportation system is closed because of a emergency event, it can take quite a lot of days to be brought back in operational mode. In the meantime, those seeking to go back and forth may be forced to use their vehicles where under normal circumstances they would be using public transportation. This worsens jamming and may even lead to fuel deficiencies. For air transference, since most activities remain local in measure (city pairs of less than 1,000 km), it can be assumed that travellers will change to other modes, which can be badly prepared to deal with the impulsive demand surge. The market for another mode mostly concerns the road vehicle, railways, buses, trucks, tractors and even ferries where the condition warrants. Those alternative means must react rapidly by adding as much potential as possible, which may take place more efficiently if those eventualities are prearranged.

Route Identification

Disaster response routes empower crisis management services and supplies to transfer rapidly to where the requirement is utmost. This includes conveying and considering ill and injured individuals, stopping fires, reinstating essentials like water and electricity, and other important services. Catastrophe Response Roads are not Evacuation Roads .Disaster response ways are required for the fast mobilization of emergency responders during any crises situation. Disaster response roads will be triggered as needed by competent authorities during a catastrophe. Disaster response roads may be activated and demarked following a declaration of a local or state disaster management authority.

Transportation Costs

As the cargo conveyance parameters are getting increasingly at international boundaries difficulty & supply chain threats are significantly increasing. Emerging countries are predominantly more vulnerable to an assortment of disasters because arrangement, including transport, inclines to be of poorer quality and inefficiently managed and thus less resistant to commotions. A fundamental component in accumulation to the hazard is who holds the obligation for disturbances and their expenditures.

Topographical Data Associated with Routes

The prevailing database does not permit the user to influence, access, and enquiry the database other than in a very inadequate manner. The user is restricted to textual inquiries only, the assortment and inspection of crossing attribute data w.r.t spatial and topological relationships is not conceivable. Over related topographical data, such as land use, inhabitants, and the route system characteristics of the zone in the crossings locality, cannot be accessed in the available database. This capability of GIS, along with the concluding presentation of fallouts on a digital base map, will permit the user a better observation of the difficulty, enable good decisions, and permit a better understanding of what is to be achieved in a wider sense. The capability to define conditional inquiries, execute statistical analysis, produce thematic maps, and offer charting chances the crossing safety program by permitting for improve understandability of the data.

Disaster Relief Material to be shipped

[3]Over the last few years, natural disasters like floods & earthquake have been among the most prevalent major disruptions in nations. An important aspect of managing disasters involves practical & logistical planning to simplify the distribution and movement of relief materials to communities in need. It is very much required to develop a spatial model for natural as well as man-made emergency relief resources distribution.

III. POST DISASTER RELIEF MATERIAL REQUIREMENTS

[4]José Holguín-Veras in his paper “On the appropriate objective function for post-disaster humanitarian logistics

 DOI : 10.18231/2454-9150.2018.0675

models" argues that welfare economic principles must be incorporated in post-disaster humanitarian logistic models to ensure delivery strategies that lead to the greatest good for the greatest number of people.

[5]Post-disaster material distribution should be very appropriate and need based. Instead of doing many rounds and giving random items on ad-hoc basis, complete family kits should be prepared and distributed in one go. One standard relief set usually consists of the following materials:

- Clothes for adult male and female, appropriate to local climate and culture;
- Clothes for male and female children, appropriate to local climate and culture;
- Mats and blanket/bed-sheets depending on local weather;
- Basic utensils for cooking, storing and eating;
- Tent or tarpaulin if needed;
- Dry rations to last for two weeks;
- Essential commodities like torch, footwear, storage bags;
- Soap, and toiletries based on needs and local practices; locally appropriate materials for women's sanitary needs; and
- Special provisions for families with infants.

The most common relief materials shipped to assist the victims of a disaster are food, water, medicine, tents, personal hygiene kits, and water purification systems for immediate relief. Construction materials, hospital supplies, and generators are also commodities in high demand for subsequent relief, duly catering the specific demand of the disaster affected states/countries.

HITCHES IN DISPERSING RELIEF MATERIAL

[6]A typical transportation system for an operative disaster relief operation shows the limitations of freight movement in the SADC region .The risk & vulnerability of localized area where relief material has to be sent gets increased due to wide variations in topography, geology, soil, climate, flora and fauna, and various ethnic groups with varied socio-cultural traditions. Certain parameters that provide hindrance in smooth functioning of freight movement are as enumerated

- Last Mile Connectivity
- Route Conditions after Disaster
- Weight of Loaded Vehicles used in freight
- Specialized, Sufficient and Trained man power
- Sorting, Repackaging and Routing of donated or procured relief material by government agencies

IV. DISASTER TRANSPORTATION PLANNING

The freight management requires a well arranged and smooth response system wherein the parameters should clearly define the roles and responsibilities of each stakeholder. [7]Stephanie E Chang in his paper Transportation planning for disasters: accessibility method shows the systems for evaluating and enhancing the performance of urban transportation systems in the outcome of a disaster. There are certain points which have to be taken into consideration while making comprehensive and workable strategies. The points which the authorities have to consider are as follows:

1. Inter-agency coordination
2. International rules and regulation for freight movement
3. Communication and interoperability (local and international)
4. Process to ensure availability , demand & procurement of relief materials and marshaling of vehicles
5. Specialized transportation vehicles/ containers for perishable or nonperishable items
6. Rapid Custom or Miscellaneous Clearance
7. Identification of staging areas
8. Loading and unloading or relief materials
9. Distribution of material to include palletization and segregation areas
10. Security and warehousing
11. Financial aspects for freight transportation
12. Contingency Plan
13. Real Time Tracking of relief consignment

V. POST DISASTER FREIGHT MANAGEMENT

In order to provide the best, and most proactive, response for when disaster strikes, disaster relief organizations have to create specialized response teams, such as the Logistics Group and a coordination mechanism led by the Government Authorities. Logistics Group ensures strategic coordination, information management, and the facilitation of common logistics services by road, air, road and sea. This is all done through the support of logistics stakeholders. Certain humanitarian agencies and private organizations will provide free assistance and provide their services for smooth logistic mobilization support during disaster responses.

As the freight transportation parameters during disaster scenario is getting increasingly globalized and multifaceted, problems in freight management are becoming more noticeable to decision makers. Several are particularly vulnerable to an array of disasters because infrastructure, including transportation, tends to be of lower quality and mismanaged and thus less resilient to

 DOI : 10.18231/2454-9150.2018.0675

disruptions. An important element in addition to the risk is who bears the responsibility for disturbances and their costs during freight transportation. The main task of the post disaster freight management is to ensure the timely mobilization of financing and relief materials from donors and administering relief to vulnerable beneficiaries at disaster sites. Accordingly, the resource mobilization for providing relief materials should include the following:

- Preparatory phase
- Assessment phase
- Procurement phase
- Transportation phase
- Distribution phase

STAKEHOLDERS FOR INTERNATIONAL DISASTER RELIEF

Elements of Foreign Disaster Relief are provided in response to foreign disasters caused by the Natural Disasters. MHA/MEA makes a determination that these disasters are of a degree that foreign disaster relief shall be provided, NDMA and its components are tasked to support MHA/MEA to provide the affected State with a variety of Humanitarian Services, Supplies, and Transportation. Broad categories of aid include shelter, subsistence, and medicine as stated above. This document broadly focuses on the transportation of HADR commodities that fall within the domain all of these stakeholders. The coordination for relief material should be done by the following stakeholders/authorities: –

- Shipping
- Civil Aviation
- Defence
- Agriculture and Farmers Welfare
- Consumer Affairs, Food and Public Distribution
- External Affairs
- Home Affairs
- Railways
- Road Transport and Highways

Concerned Agencies of Various Stakeholders responsible for Need assessment, procurement, transportation and distribution should calculate expenditure as per actuals keeping in mind the different taxes and whole sale price index of various commodities. The same shall also include government rates of procurement. The same shall be made available to the nodal agencies within one week of dispatch of relief materials. The nodal agencies will consolidate the same and forward it to MHA/MEA for their further processing.

FACTORS GOVERNING FREIGHT CHARGES

- Parties for the shipment, with the shipper and the contractual party (if a service contract number is provided) being mandatory
- Type of commodity
- Container size, type and quantity
- Origin (‘from’) and destination (‘to’) There are additional details which can be supplied to enhance the booking request, namely (fieldwork, 2011):
- Temperature control parameter in commodity supply .
- At the origin, who will collect the container from the container yard or would the NGOs like the shipping company to deliver the container at their premises?

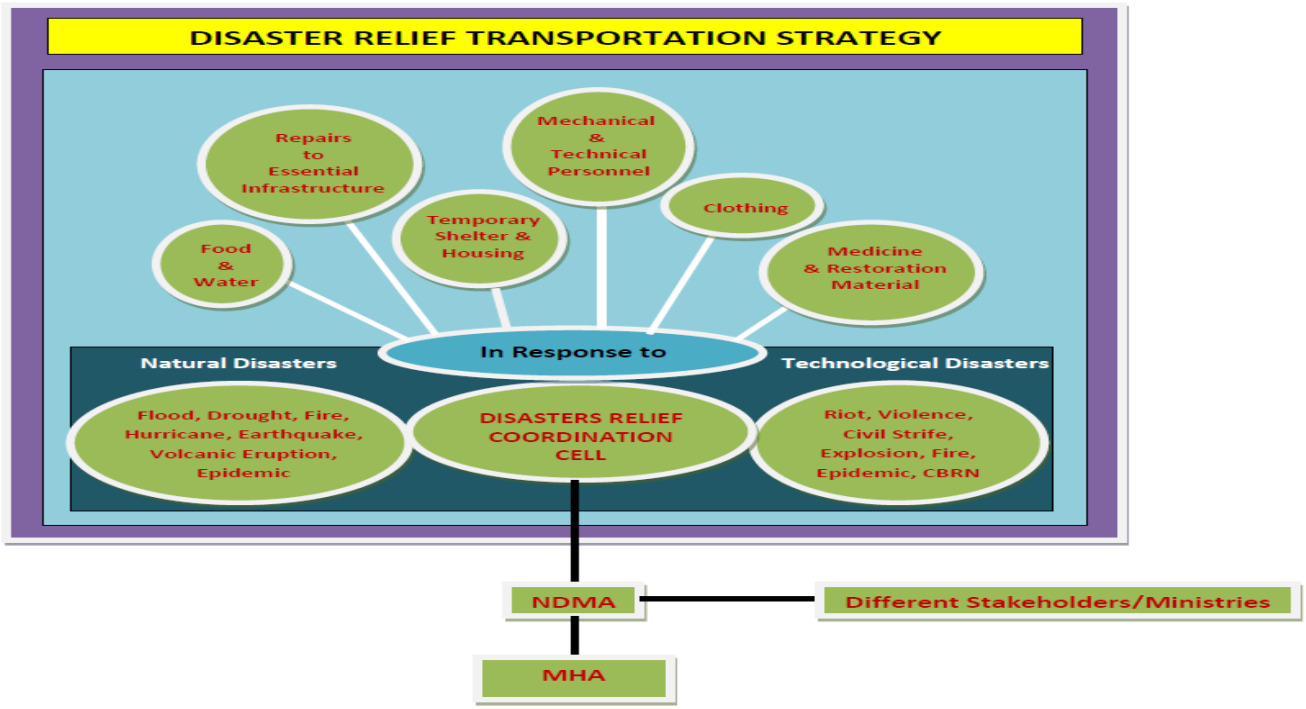

Fig: Disaster Relief Transportation Strategy

 DOI : 10.18231/2454-9150.2018.0675

The composition of the committee may be as :

Competent Authority ,Disaster Management	Chairperson
Competent Authority ,Disaster Management	Co –Chairperson
Joint Secretary , DM	Secretary
Shipping	Technical Members from authorities
Civil Aviation	
Defence	
Agriculture and Farmers Welfare	
Consumer Affairs, Food and Public Distribution	
External Affairs	
Home Affairs	
Railways	
Road Transport and Highways	

VI. CONCLUSION

The document examined the importance of the transportation of relief materials thereby providing a better understanding of what it entails. Secondly, it identified the challenges for seamless cross border transportation of commodities perspective that affects the supply chain of relief materials; finally, it examined the various stakeholders and their roles. The stakeholders in the supply chain of relief materials are responsible for timely and efficient delivery of the relief material. It is also important for stakeholders to improve the dwell time of relief materials.

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