

## Congestion at Airport and Disruption of Earthquake Response Supply Chain: Nepal Earthquake 2015

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**Abstract:** The magnitude of any disaster generally determines the level of response required in its aftermath and simply saying, as the magnitude goes up, the need for emergency supplies increases. Efficient supply chain management, which ensures the flow and storage of goods and services from the point of origin to the point of consumption, is thus very crucial in disaster response operation. Any untoward disruption in this chain only increases the agonies of disaster victims questioning their lives occasionally. Thus countries, in general, should keep their international airports operational round the clock to effectively handle the humanitarian assistance pouring in from across the globe in the event of any large-scale disaster, earthquake for example. This study is aimed at identifying the difficulties Nepal faced with its only international airport – Tribhuvan International Airport (TIA) leading to disruption of Earthquake Response Supply Chain at times in the aftermath of recent 7.8 Gorkha Earthquake. Attempts are also made to draw some lessons and make recommendations for improving supply chain management of earthquake response operations in general. Countries those are vulnerable to large-scale earthquake should have more than one international airport to manage the supply chain of Earthquake Response goods and services effectively and efficiently.

**Key Words:** Supply Chain Management, Earthquake Response, Humanitarian Assistance, International Airport.

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### I. Background

Nepal had been preparing for last couple of years for responding to eventualities like earthquake in the best possible way. To facilitate smooth conduct of relief operation from the international community, Nepal was prudent enough to build (with the support of UK Aid) and keep open a Humanitarian Staging Area (HSA) at the airport with effect from 27 Mar 15. It was intended to act as the main hub for airlifted and overland humanitarian assistance entering the Kathmandu Valley in case of an emergency.

In emergencies, the management of material resources is a challenging task because the necessary quantities of material are often not located near the ultimate point of need, and the transportation assets are rarely available in the form and quantity required to allow timely and effective response (Young and Peterson 2014). The recent earthquake response operation by the international community in Nepal is a glaring example of inefficient management of material and services especially in the initial few days mainly due to congestion in Nepal's only international airport, TIA.

In response to 7.8 magnitude earthquake on 25 April 2015 in Nepal, the International community instantaneously came forward with rescue personnel and emergency relief material to lessen the miseries of Nepali people. Nepal, being a land-locked country and having only one international airport again with a single runway, offered many operational challenges in its response to Earthquake 2015. Almost every day in the initial response phase, the Tribhuvan International Airport witnessed huge congestion due to increased operation of international aircraft bringing in rescue teams and relief materials from all around the globe. Congestion was so high in some days that resulted in delay, holding, diversion and cancellation of many emergency relief flights causing huge disruption in the Earthquake Response Supply Chain.

Supply chains, in simple words, are defined as 'a network of materials, information and services processing links (Chen and Paulraj 2004) with the characteristics of supply, transformation and demand. Supply chain management (SCM) ensures operational and financial efficiency of all business organizations. However, the concept is equally important for earthquake response operations since it involves transformation and transportation of goods and services to meet the assessed needs of the earthquake victims. Emergency goods and services involve the survival of victims and hence it requires a very responsive a timely distribution, which can be better ensured through an efficient SCM. Taken another definition, it is seen that the integration of activities and processes among the members of the supply chain is frequently referred to as Supply Chain

Management (Handfield and Nichols, 2003). From this point, it is very much essential to establish a strong relationship among the players working in every part of the supply chain of the relief goods and services.

### **Objectives**

The broad objective of this study is to see what all disruptive challenges Nepal faced in the 'Immediate Response Phase' of April 15 Earthquake in handling relief goods and services due to having only one international airport (TIA). However, the specific objectives of this study are as follows:

- a. Studying the traffic congestion of TIA.
- b. Seeing aspects of Airport Management in Nepal.
- c. Studying the Supply Chain from Bangladesh.

## **II. Methodology**

This paper is prepared after studying the 'Immediate Response Phase' of April 2015 Nepal Earthquake where relief operation was hindered primarily due to Nepal's having only one international runway and inadequate capacity in cargo handling there. The sampling is said to be purposive one and the respondents are mainly the earthquake victims, aviators of Bangladesh Air Force, personnel in ground handling and other personnel working in the airports of Nepal and Bangladesh. The case study is completed with the information collected through interviews of some earthquake victims and different key aerodrome personnel after visiting Nepal in March 2016. Besides, a wide range of literatures available in books, journals, organizational reports and research papers etc. have also been reviewed.

### **II. The 2015 Earthquake of Nepal**

The 7.8 Mw Earthquake of April 25, 2015 is said to be the most deadly event in the history of Nepal since the great 8.4 Mw earthquake in 1934. The earthquake not only claimed nearly 9,000 invaluable lives but also badly injured more than 20,000 people and marooned tens of thousands of ill-fated Nepalese. From the very first day, relief material started pouring in following its only International Airfield, the TIA. From the second day, the single runway of its only International Airfield started facing congestion. From the third day, the airport authority had to hold, divert and reschedule a great majority of incoming flights. Such holding, delay and rescheduling of landing time resulted a kind of disruption in the overall relief operation in the early response phase. Nepal was lucky that its single runway at TIA and single set of navigational aid remained intact even after the earthquake.

### **Congestion in the Airport and Its Consequences**

The only international airport of Nepal, the TIA, has limited open space in the airfield and it was also occupied with relief cargo from the very beginning of relief operation by international communities. Besides, huge area was also occupied by foreign national waiting for evacuation. The cargo storage area in the airport measured only 10,200 square meters. However, it has a hanger area of another 335 square meter. Importantly, the apron area did not allow more than nine aircraft to be accommodated. With regards to ground handling equipment, TIA was in a bad shape once the earthquake struck. Couple of forklifts, few high loaders, couple of transporters and some towing tractors was found to be quite insufficient to handle the cargo at TIA. Very soon international community like DHL provided some ground handling equipment that eased the situation to a great extent. It has been revealed from different earthquake scenarios that the responses to earthquake are usually multi-faceted and involve governments, nongovernmental organizations (NGOs), UN agencies, community people, military and private sector organizations. According to Moore and Antill (2000), humanitarian action should be led by one of the actors in the scene, who knows the business practices and academic theory in supply chain management. In case of Nepal, initially, multiple actors were in the leading position and there has been a custom barrier, which delayed the process of relief disbursement further adding to untoward congestion. The situation aggravated further to accommodate the outbound passenger flights for the foreign nationals who were stranded in the country.

Since Day-1 of response operation, relief goods were piling up at TIA mainly due to a customs backlog that resulted from the adherence to peacetime customs procedure except for few items like tarpaulins and tents. Steve Herman (2015) observes that import tax policy still remained on critical items needed for millions of hungry and homeless. An unhappy Jamie McGoldrick, the UN's resident representative in Nepal, stressed the need for more cooperative actions from customs official by saying, "They should not be using peacetime customs methodology." Similarly, social activist Anuradha Koirala, founder of Maiti Nepal, a local NGO, expressed her frustration as she had been trying to obtain approval from three ministries for medicine and mats sent by a donor in Hong Kong.

In light of the above, it is evident that airport congestion was the result of many factors like inadequate ground handling equipment, inadequate parking area, and insufficient storage space in the airport and stringent

customs procedure that made the congestion more critical. The congestion in the only International Airport, very often, disrupted the supply chain of emergency goods and services coming from different parts of the world. Various relief missions suffered from getting no landing permission and many of them had to land back to their original destination while some of them had to divert to other airfields of the neighbouring countries of India and Bangladesh. Some cases of holding, diversion and cancellation of flights are appended below:

- a. Liang (2015) observes that on 27 Apr 15, three C-130 Cargo aircraft of Royal Singapore Armed Forces could not land at Tribhuvan International Airport (TIA) due to traffic congestion and two of them had to land at Kolkata while the rest one was diverted to Patna. These three planes carried rescue personnel from the Singapore Armed Forces, Singapore Civil Defence Force and the Singapore Police Force. On the same day, TG 319 of Thai Airways could not land at TIA due to traffic congestion. Initially, it diverted to Kolkata and made a second attempt to land at TIA but failed again. The aircraft went to Kolkata to finally land back in Thailand to end the mission for that day. Ramesh Shrestha in an article on The Himalayan Times (2015) quoting an official of Japanese Embassy in Nepal says that 76-member rescue team from Japan could not arrive at Katmandu at the scheduled time due to congestion in air traffic on 27 April 2015. Again, a Malaysian Airlines flight landed at HazratShahjalalInternational Airport, Bangladesh after it was diverted from TIA on 27 Apr 15. One flight of Air Asia had to cancel its flight to Nepal on the same day after it was not given a slot to land at TIA.
- b. An article on India Today suggests that on 28 April 2015, four C-17 Globe master aircraft of India were not permitted to land at TIA. These Indian Air Force (IAF) planes were turned back midair and had been carrying communication equipment and rescue teams. Besides, The IAF had to re-locate four of its helicopters to Kathmandu outskirts to ease air traffic congestion in the TIA.
- c. Gardiner Harris (2015) observes that the US relief and rescue helicopters like UH-1Y was also delayed for long time to arrive in Nepal and US Marine helicopter pilot Lt. Col. Edward Powers saying, "We've been sitting on a ramp in Okinawa, Japan for 72 hours," waiting for permission to land at Kathmandu."
- d. As the author gathered from Air Traffic Control of Dhaka, on 26 Apr 15, a Biman flight with 80 passengers returned to Dhaka an hour after entering Nepalese airspace due to lack of permission. A BAF C-130 flight was also delayed by an hour and it had to loiter in the Nepalese sky.
- e. Group Captain Anam, the Director of Flight Safety of CAAB (2015) adds that from 26-29 April, HSIA in Bangladesh accommodated 41 diverted flights. These diversions were from Malaysian airlines, Malindo Airlines, Maldivan Airlines and few non-scheduled other flights to Nepal.

### **Glimpses of Airport Management**

The airport authority of TIA very soon realized that it had to improve the overall management to facilitate more frequent operation of aircraft to and from the TIA. Accordingly, it coordinated with various local and international agencies to bolster air operation from and to TIA and took following measures:

- a. Aircraft slot system was planned and jointly managed by TIA and Nepalese Army. Airlines opting for landing at TIA with relief goods and services had to secure prior permission in terms of a slot (hour).
- b. Meeting minutes of Logistic Cluster (2015, May 13) suggests that UN Resident Coordinator (UNRC) coordinated with Ministry of Home Affairs (MOHA) about prioritization of slot. Accordingly, relief missions were given priority over commercial flights. On the other hand, to maximize the use of military air assets in relief activities, the Logistics Cluster had a dedicated Civil/Military Coordinator stationed in Kathmandu airports to facilitate cargo operations.
- c. Conner (2015) in an article on 'Pacomnews' maintains that 36th Contingency Response Group from Andersen Air Force Base, Guam, worked at the TIA to facilitate cargo offloading and faster distribution of aid. During 2015 Earthquake they assisted the Nepalese to offload 4.27 million pounds of cargo from 94 aircraft.
- d. India Today (2015) reports that a movement control team was set up at Katmandu by Indian Army under the leadership of Major General J.S. Sandhu to facilitate relief operation through directing of relief convoys.

- e. Meeting minutes of Logistic Cluster (2015, May 5) also indicates that the DHL Disaster Response Team (DRT) and cargo handlers worked for supporting swift cargo movement from the airport apron to the Humanitarian Staging Area (HAS).
- f. Ministry of Home Affairs (MoHA) organized designated custom officials to facilitate custom and immigration since there had been complaints from humanitarian workers that the relief goods were taking long time to be customs and immigration cleared.
- g. The Hindu (2015) reports that TIA has seen three aircraft landing with heavy payload of relief materials—Boeing 747-400 from Israel, Airbus A350 from France and Ilyushin Il-76 from India and thus developed some cracks. Accordingly, to save the runway from major damage, a maximum weight limitation of 196 MT was imposed with effect from 3 May 2015 for the aircraft operated from and to TIA.
- h. Dearden (2015) in an article on the ‘Independent’ writes that three British military Chinook helicopters were not permitted to enter Nepal fearing that wind thrust generated from them would damage already weak buildings around. Nepali Media was also very vocal about the use of gigantic US Osprey Helicopter that blew the roof off the building. So, Ospreys were also not permitted to operate there.

### **III. Ground Handling Equipment Of Nepal At Tia**

The ground handling equipment of Nepal at TIA, Katmandu was too inadequate to handle major earthquake response operation. The problem aggravated further as TIA had to operate some passenger flights side by side. The table below shows the acute inadequacy of such equipment to handle a major disaster relief operation following the airport:

**Table 1:List of Ground Handling (Cargo) Equipment at TIA, Katmandu**

Serial No	Name of the Item	Number
1.	Fork Lift	2
2.	High Loader	5
3.	Transpoter	4
4.	Towing Tractor	16
5.	Belt Loader	12
6.	Push back tractor	5

*Source:* MrRafiqul Islam, Station Manager, Biman at Katmandu.

International community, however, bolstered the capacity of cargo handling by bringing in significant number of ground handling equipment. Deutsche Post DHL (DPDHL) Group, the world’s leading logistics provider, has deployed their Disaster Response Team (DRT) within 48 hours of earthquake. Besides, the 36th Contingency Response Group of US Air Force also arrived primarily from Hawaii with equipment to facilitate handling of relief goods as reported by Cole (2015, May 6). Aircargonews reports (2015, April 28) that with the ground handling equipment at TIA, Nepal could only offload two to three wide-body aircraft and the situation was too worse due to lack of space in the warehouse.

### **IV. Supply Chain of Relief Goods from Bangladesh**

Bangladesh has sent some relief goods and rescue personnel to Nepal during the initial response phase. Bangladesh Embassy in Nepal was in continuous touch with Ministry of Home Affairs (MoHA) of Nepal to coordinate the overall relief effort of Bangladesh. Bangladesh Embassy (BD Embassy) in Katmandu, in turn, used to inform the requirement to Ministry of Foreign Affairs (MoFA) in Bangladesh. MoFA used to coordinate with other concerned ministries and Prime Minister’s Office through Armed Forces Division (AFD). AFD used to play the key role for making all arrangements and finally send the items to Bangladesh Air Force for transportation by Air. However, some cargos were sent by road too. The schematic diagram is shown below.

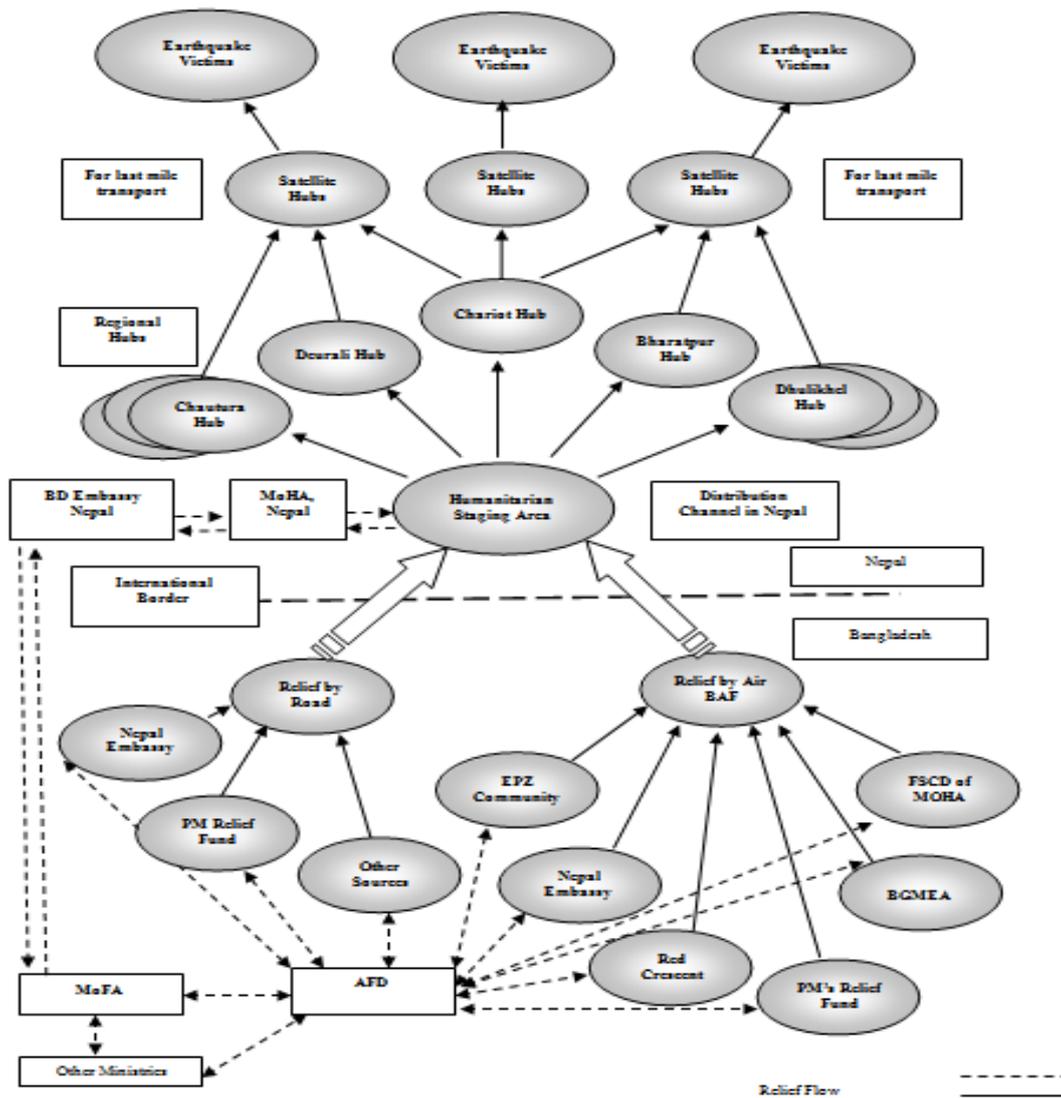


Figure 1: Supply Chain of Relief from Bangladesh.

## V. Lessons Learnt

Various lessons learnt from this study are as follows:

- a. The disaster response might face logistical bottlenecks like inadequate apron area, lack of cargo staging area, lack of trained people to off load cargo, inadequate ground handling equipment etc.
- b. Rapid Runway Repair (RRR) capability should be very part and parcel of airport authority and its capacity must cater for large craters. Nepal did not have large damage but it had to continuously maintain the runway to allow wide body cargo planes and at one stage had to impose maximum weight limitation of 196 MT.
- c. International support would always be there in case of major disasters. Neighbours like India and China, and great power like USA, UK would play their central role for any regional disaster. It is better to devise some mechanism to engage such players timely.
- d. Foreign nationals are the prime source of creating congestion in the airport. Evacuation is the foremost for the countries.
- e. Peacetime coordination is important for crisis-time use of diversion airfield especially in the neighbouring countries.

- f. Airfield is the single most important opening for the international community during humanitarian response since air is the fastest means to reach and stand beside victims.
- g. Supply chain of relief goods is a complex process and it needs coordination at different tiers.

## **VI. Recommendations**

The following recommendations are made from this study:

- a. Countries should keep more than International Airport exclusively available for humanitarian relief operation to handle a disaster. Every such airport may have provision for Staging area for humanitarian assistance, enough ground handling equipment along with trained personnel. Since the requirement is country-specific and disaster-specific required research may be conducted by vulnerable countries.
- b. The Rapid Runway Repair (RRR) capability of International Airports of disaster-prone countries may be enhanced by creating a dedicated RRR organization.
- c. Countries may devise mechanism right now to engage humanitarian assistance groups, aid workers, foreign journalists and others to unfold prompt effective response in case of emergency. Dealing with such agencies and personnel should be clearly spelt out in the response architecture of vulnerable countries.
- d. There may be MOUs or some agreement with neighbouring countries to use their airfields for any diversion of relief aircraft on account of traffic congestion or bad weather during response operation.
- e. There may be clearly spelt out customs policy for relief goods and services to enter a country during any major disaster. There may be special training to customs officials in this regard.

## **VII. Conclusions**

Every earthquake scenario is a fertile field to draw some lessons with no exception to Nepal Earthquake of 25 April 2015. The Nepal Earthquake offered many lessons to learn with regards to airport management and how to equip an international airfield for facilitating relief efforts by International communities to go unhindered. Disaster like major earthquake cannot be handled by the victim nation alone. So, there will be many countries, International bodies and other organizations that would come with their helping arms. Earthquake-prone countries might benefit themselves by drawing lessons from the experiences of Nepal and by taking appropriate measures. The supply chain of relief good from Bangladesh though studied in a simpler way but reveals that effective supply chain management requires coordination at many tiers and levels. Finally, to secure a smooth operation of disaster relief, countries should ensure that no undue congestion is created at the airport because of poor handling of cargo and passengers.

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