Lessons from Catastrophic Events for Post-Disaster Response

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Our goal is to avert this...

“We need medicines, something to eat …”

“We are asking for food, water, medicine, shelter and clothing. Aren’t we humans?”

(Pictures taken by JHV 10 days after the earthquake)
<table>
<thead>
<tr>
<th>Major components of our work</th>
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<tbody>
<tr>
<td><strong>Fieldwork:</strong> 9/11, Katrina, Indian Ocean, Haiti, Chile, Joplin, Japan, etc. etc.</td>
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<tr>
<td><strong>Diagnosis and characterization:</strong></td>
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<tr>
<td>- Causes of problems encountered</td>
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<tr>
<td>- How humanitarian logistics take place</td>
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<td><strong>Quantification:</strong></td>
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<tr>
<td>- Aimed at obtaining empirical estimates</td>
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<td>- Provide support to analytical modeling</td>
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<td><strong>Define mechanisms to improve response</strong></td>
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<td>- Policy Suggestions → FEMA, Catastrophic Planning Groups</td>
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<tr>
<td><strong>Basic research on analytical modeling</strong></td>
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<td>- To develop Decision Support Tools</td>
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Lesson #1:
Humanitarian Logistics is More Than a Technical Problem...
We are Dealing with a Socio-Technical System...

A social network of individuals orchestrate operations

The set technical activities performed by the social network

The supporting systems (e.g., transportation, communication) over which social and technical interactions take place

Resiliency and Disaster Response depends on and involves the HUMAN, the TECHNICAL, and the PHYSICAL

Lesson #2:
Disaster and Catastrophes Are Not the Same...
Disaster: Joplin, Missouri (50,000 residents)

- Challenging but doable local distribution
- Multiple entry points
- Private sector supply chains: partially destroyed
- Local supplies: partially destroyed
- Small to midsize geographic area

Disaster: Joplin, Missouri (160 deaths)
Catastrophe: Minami Sanriku (19,170 residents)

Most local supplies are destroyed
Few entry points
Private sector supply chains severely impacted
Extremely complex local distribution
Could be an extremely large geographic area

Catastrophe: Minami Sanriku (1,205 fatalities)

Most local supplies are destroyed
Few entry points
Extremely complex local distribution
Private sector supply chains severely impacted
Could be an extremely large geographic area
Lesson #3:
Commercial Logistics are DIFFERENT THAN
Post-Disaster Humanitarian Logistics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Commercial Logistics</th>
<th>Regular Humanitarian Logistics</th>
<th>Post-Disaster Humanitarian Logistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective pursued</td>
<td>Minimization of private (logistic) costs</td>
<td>Minimization of social costs (logistic+deprivation)</td>
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</tr>
<tr>
<td>Origination of cargo flows</td>
<td>Self-contained</td>
<td>Mostly self-contained</td>
<td>Impacted by material convergence</td>
</tr>
<tr>
<td>Knowledge of demand</td>
<td>Known with some certainty</td>
<td>Uncertain</td>
<td>Unknown/dynamic, lack of information/access to site</td>
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<tr>
<td>Decision making structure</td>
<td>Structured interactions controlled by few DMs</td>
<td>Structured interactions controlled by few DMs</td>
<td>Non-structured interactions, thousands of DMs</td>
</tr>
<tr>
<td>Periodicity / volume</td>
<td>Repetitive, relative steady flows, &quot;large&quot; volumes</td>
<td>Repetitive, relative steady flows, &quot;large&quot; volumes</td>
<td>One in a lifetime events, large pulse in demand</td>
</tr>
<tr>
<td>Supporting systems</td>
<td>Stable and functional</td>
<td>Stable, though not always functional</td>
<td>Impacted and dynamically changing</td>
</tr>
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</table>
Lesson #4:
We Need to Deal with Material Convergence…

What is the problem?

- The efficiency of the flow of high-priority goods depend on the flow of low/non priority cargoes

- The cargo that arrive to a disaster site (estimates):
  - 60% are non-priority,
  - 30-35% are low priority,
  - 5-10% are high priority
It happens in all disasters

Katrina, 2005

Haiti, 2010

Japan, 2010

Sandy, 2012

Lesson #5-A:
In Catastrophic Events the Local Distribution Is an Overwhelming Challenge...
Resources (staff-hours) consumed

Our estimates are that in Haiti, about 20,000 volunteers were needed to distribute supplies

Semi-trailer (driver and helper) moving 30 tonnes: Santo Domingo-Port-au-Prince (six hours drive)

Six 5 tonne trucks (driver and helper) transport to six PODs (1.5 hours each way)

PODs

Helpers split rations, organize distribution, handout rations

Loading: 10 staff-hours (forklifts)
Driving: 12 staff-hours
Total: 22 staff hours

Loading: 240 staff-hours (helpers)
Driving: 36 staff-hours
Total: 276 staff hours

Loading: 240 staff-hours
Rations: 1,080 staff-hours
Total: 1,320 staff hours

Relative manpower used → 1:12:60

Lesson #5-B:
Only the Local Social Networks Can Tackle the Local Distribution Challenge (Haiti’s Lesson)
Emergent Humanitarian Logistic Structures

- Three structures emerged with vastly different network topologies: Agency Centric Efforts, Partially Integrated Efforts, and Collaborative Aid Networks

ACEs in action
Implication

- After large catastrophic events, the most efficient way to distribute critical supplies at the local level is through the use of the existing social networks
  - Extending the mission of these networks is easier than creating a network from scratch
  - Outside efforts are doomed to be ineffective for distribution:
    - They are not geared for that, their strength is long-haul
    - Too many PODs are needed: cars are not an option, people cannot walk several miles to get supplies
    - Not enough man-power to man the PODs needed
    - Not enough local know-how
Lesson #6: The Importance of Private Sector Integration (The Chief Lesson from the Tohoku Response)

Post-disaster humanitarian logistic operations

- Inauspicious start, no agency was prepared
- During first 6 days, a very limited amount of critical supplies reached IDPs (some did not get any)
- There was looting...not reported in the press
- The needs were not being met...a crisis underway
- Then, a handful of food distribution companies:
  - Realized that private supply chains were not working, and that the government was not aware of the looming crisis
  - Approached the (surprised) government and volunteered to deliver supplies, it took them a week to start deliveries (others were turned away because of the fuel issue)
  - Volunteered for a month, fell trapped (government did not want to pay, they could not stop the service)
Implications

- Private sector participation is crucial
- For this participation to be effective, certain conditions must be met:
  - Both sides, public and private, must know each other
  - Public sector must plan for private sector help
  - Private sector must have a clear idea what is expected… among others…

Lesson #7:
Try to Deal with the Dynamic Nature of Supply and Demand
Temporal distribution of Requests (Katrina)

- The temporal distribution of requests for the months of August, September and October
- The number of requests doubled and almost tripled during the second and the third day of the emergency
- First eighteen days → 80% of the requests

Lesson #8:
Control Precautionary/Opportunistic Buying
In anticipation of shortages, households and businesses purchase almost ALL critical supplies in the market.

Local supplies destroyed, no supplies/services to purchase, no money to pay for them…

The tragedy is that these supplies are the one best positioned to help the survivors…

Lesson #9: Prevent the Collapse of Private Sector Supply Chains
Amount of Cargo/Person Consumed in Cities

- In normal conditions the amount of cargo entering a city ranges from 10 to 45 kg/person-day
  - Used for human consumption
  - To support manufacturing and commerce
- In disasters:
  - About 20 kg/person-day are needed by survivors
  - About 40-60 kg/person-day are needed by the response
- After a large disaster supply chains stop, or slowdown, reducing the flow of cargo to areas near the disaster that were not directly impacted
  - The humanitarian crisis is made significantly worse
  - In both Haiti and Japan, took two weeks for normal deliveries to resume...

Lesson #10:
Comprehensive Approaches Are Needed to Ensure Efficient Logistical Responses
Logistic committee

- Create logistic committees with representatives of all sectors of civic society:
  - Social networks
  - Distributors of critical supplies
  - Trucking companies with local and regional reach
  - Local social networks, etc.
  - Pre-designate locations as Points of Distribution
  - Companies that handle critical supplies, trucking companies
  - Train potential participants in post-disaster HL

- Research is needed...

Questions?

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