

Demands for tracking and tracing in humanitarian supply chains

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- Difficulties to capture robust data
 - Destructed information and communication systems
 - A large number of actors within a relief operation, and therefore the communication and exchange of information are complex
 - Identifying relief items in distribution centers in the affected area is a very crucial task
 - Tracking and tracing is a key function of logistics operations
 - Tracking and tracing increases information quality
- To identify the demands and issues regarding tracking and tracing (T&T) of the transported items through Humanitarian Supply Chains (HSCs)
- To propose feasible solutions for development of tracking and tracing systems for these supply chains, based on their requirements

Snapshot of tracked and traced objects in HSCs

Source	Use of tracking and tracing	Reason for tracking and tracing
Ozguven and Ozbay (2013)	Relief supplies	Inventory management. It shows how to synchronize delivery of relief items and consumption of the stocked relief items (consumption process)
Yang et al. (2013)	Environmental conditions, incidents, position of goods, important equipment, identifying a person or object in motion	Preliminary situation assessment, intervention and mobilization during emergency operations, (identifying information requirements to meet the needs of first responders in their emergency operations)
Baldini et al. (2012)	Identification of goods and the distribution of this information to all the involved partners. Secure perishable goods. Cryptographic authentication	To enhance and improve the security (mitigation of criminal activities) and management of relief supply chains
Narayanan and Ibe (2012)	Individuals	Present a Portable Disaster Recovery Network to discover survivors in an affected area by a disaster or any other rescue operations. This communication network support the rescue staff in helping victims
Yang et al. (2011)	Humanitarian aid supplies , rescue equipment, transportation, people and vehicles	Provide hybrid system architecture at the network level to manage information at distribution centre
Lee and Zbinden (2003)	Reconciliation of quantities needed and quantities supplied to affected area. Tracking costs of each operation, stock monitoring, past performance of supplier, loss and damage. Donation monitoring, monitoring market price and historical price	Present HLS system and provide the necessity of information and technology to enhance the effectiveness of operations relief

- Multiple case studies
- Focus on case organizations which are leading humanitarian agencies, coordinating and managing HSC operations worldwide
- Data source
 - 8 semi-structured Interviews with representatives from the studied organisations face-to-face or via telephone
 - Reviewing the documents of the humanitarian agencies
- CIMO logic is used as a well-established tool for analysing the collected data
- The CIMO logic specifies the context (C), in which certain interventions (I), through generative mechanisms (M), produce intended and unintended outcomes (O)
 - (C) Context: Which individuals, relationships, institutional settings or wider systems are being studied?
 - (I) Interventions: The effects of what event, action or activity are being studied
 - (M) Mechanism: What are the mechanism that explains the outcomes and under what circumstances are these mechanism activated or not activated
 - (O) Outcomes: What are the effects of the interventions? How will the outcomes be measured? What are the intended and unintended effects?

Problem contexts the organisations deal with	Interventions made by tracking and tracing which might help solving the problem context	Mechanism which the intervention affects through	Expected outcomes	Quotations from practitioners representing the organisations
<p>Manual efforts in the logistics processes due to using basic techniques like paper and pen to track and trace shipments from supplier to beneficiary</p>	<p>Using semi-automated and automated systems (e.g. barcodes and RFID) for capturing and storing data</p>	<p>Reducing manual work and the errors involved in it</p>	<p>Increasing the quality of tracking and tracing data and creating more visibility on HSCs</p>	<p>“T&T is an innovation and would simplify different processes and especially inventory management. Example 200.000 Hygiene packages to Syria, here I do not need to track each package but I would like to track the complete 200.000 packages. However, if I send out a hospital that consists of 50 packages in this case such system would simplify the processes.”</p>
<p>Lack of accurate estimation of the cost of transportation (cost monitoring along the supply chain)</p>	<p>Increasing accuracy of measurement of different steps through transportation of the product</p>	<p>Using tracking and tracing system providing easy access to the transportation record of items with unique identities</p>	<p>Providing more transparency regarding transportation of items, i.e. the elements affecting the transportation cost.</p>	<p><i>“Tracking and tracing is a fundamental pillar in a supply chain, to be transparent in processes, service and cost and to show our efficiency to donor”</i></p>

Pros	Cons
Improving tracking and tracing information to actors involved in the HSC	Increased investment costs for developing a standardized system and restructuring the supply chain
Cost and time reduction due to automated and standardized processes instead of manual processes	Data sharing between actors requires trust between the HSC actors
Mitigating fraud and theft	Convincing actors from the HSC to implement a tracking and tracing systems
Monitoring of relief items and equipment throughout the World	
Standardizing and interconnecting information system to exchange data	
Improving last-mile distribution	
Increasing trust and providing a transparent supply chain	
Providing reports in a timely manner to donor	
Sharing costs within actors that are participating in the collaborative track and trace systems	

- Using T&T simplifies
 - the on-time delivery of reports with accurate indicators to donors
 - the coordination of material flow
 - the management of reverse logistics
 - provides accurate data to manage the inventory
 - to recognize bottlenecks along the supply chain
- T&T support humanitarian organization to ensure the transparency of processes, costs and services along a HSC
- The current literature in humanitarian SCs is lacking appropriate knowledge
- The limitation of this research is the missing propositions for designing collaborative T&T systems

Thank you for your attention!

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