Humanitarian Aid and Disaster Relief Supply Chains

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This special issue reviews the recent emergence of research in supply chain management in the context of humanitarian aid and disaster relief. The frequency and intensity of such events is continually increasing and the models of supply chain success that apply to commercial entities do not seem to provide all the answers for humanitarian supply chains.

Following is a brief overview of the articles reviewed in this month’s special issue:

Scholten et al (2010) conduct structured interviews across five different non-governmental organizations to explore what issues these organizations are facing in their attempts to increase their level of agility. While agility is seen as a critical capability for such relief organizations, the pressure from donors of demonstrating short-term results generates a challenge when the strategies needed to achieve agility are long-term in nature.


Pettit and Beresford (2009) write a review article on the topic of critical success factors in supply chain management and how these factors may provide relevant and interesting insights into humanitarian aid supply chains. Factors include strategic planning, resource management and capacity planning, to name a few.

Thomas and Fritz (2006) discuss the challenges and obstacles that exist in developing effective partnerships in humanitarian aid and disaster relief supply chains. The article reviews the different types of partnerships that can be formed and prescriptive strategies for each type.

Van Wassenhove (2006) argues that the same lessons learned in commercial supply chains can and should be applied in humanitarian aid and disaster relief supply chains. One such lesson is the topic of preparedness. Five dimensions to preparedness are discussed and outlined. Another important topic discussed in this paper is the power of supply chain collaboration.

Tan-Mullins et al (2007) review the events surrounding the December 2004 tsunami that devastated Thailand and surrounding countries. The event, argues the authors, revealed some interesting trends in humanitarian aid and disaster relief; namely, relief efforts became more localized as existing network structures already in place among local communities were able to distribute aid much more efficiently than could the national government and other aid agencies.

Tatham and Kovács (2010) introduce the concept of “swift trust” in disaster relief settings. The phenomenon of “swift trust” takes place in hastily formed networks where individuals and groups quickly develop a level of trust that in normal circumstances take much longer to develop. The trust developed in this manner is a catalyst and enabler of the collaboration needed to address the urgent situation at hand.

Martinez et al. (2011) conduct a multi-group case study of large non-governmental aid organizations (NGO) and focus on the management of 4X4 light vehicles fleets. These vehicles are commonly used across multiple NGOs for both distribution and coordination during disaster relief and during development projects. The authors find that there is much opportunity for improvement in the coordination of these fleets at the national level.
Gibbons and Samaddar (2009) use mathematical computer simulation to demonstrate the importance of referral networks in health related emergency services. They find that even basic rudimentary referral networks generate significant benefits to the customer and in the ability for the system to achieve its goals.

One trend that is observed across the articles surveyed is that humanitarian aid and disaster relief supply chains experience unique challenges that are not readily found in traditional commercial supply chain. It appears that the incentive aligning mechanism of economic gain performs an important function in commercial supply chains that humanitarian aid and disaster relief supply chains do not enjoy. In other words, while the power of Adam Smith’s invisible hand helps drive efficiency across commercial supply chains, the invisible hand is painfully absent in non-commercial supply chains such that entities often avoid the necessary actions needed to achieve supply chain excellence. This poses an interesting challenge for both academicians and practitioners: how to drive the appropriate collaborative behavior and investments in a supply chain where economics and profits are not a driving force of cohesion.

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Title: (Le)agility in humanitarian aid (NGO) supply chains

Authors: Kirstin Scholten, Pamela Sharkey Scott and Brian Fynes


Overview: The concept of leagility refers to supply chains that are decoupled such that upstream from the decoupling point lean is the overriding priority while downstream from the decoupling point agility is the overriding priority. While this concept has been researched in for-profit business settings, Scholten et al. applies the concept of leagility to the humanitarian aid, non-governmental organization (NGO) arena where the concept of leagility has not been well researched and developed.

The authors in this paper conducted in-depth interviews at five different non-governmental humanitarian aid organizations to understand what practices, priorities and initiatives the organizations are engaged in and the role that supply chain management plays in their overall strategy. It is noted that 80 per cent of humanitarian aid operations costs are supply chain related. It is further noted that agility is a key capability that most humanitarian aid agencies seek to better service those they serve in times of need. Thus, the topics discussed in this paper are highly relevant.

Humanitarian aid supply agencies are supported by donors who increasingly expect greater levels of transparency and accountability with respect to the disposition of their financial contributions. As such, there is much pressure to demonstrate short-term benefits to expenses and investments. Investments in improving the agility of a firm, however, typically involve acquiring or updating information technology whose benefits are typically not demonstrated until disaster strikes. Paradoxically, the lack of short-term results to these investments is an impediment to justifying the necessary investments to improve agility. While the pressure to demonstrate leanness in the disposition of donations seems to conflict with the need for long-term investments in agility, the concept of (le)agility may enable humanitarian aid organizations to balance these seemingly opposed forces. Another related tool in developing agile humanitarian aid organizations is postponement, where materials are stored in their generic forms as long as possible before assembling or processing into end-use specific forms.

This research was exploratory in nature and highlights potential areas of investigation using empirical methodologies. The authors argue that application of already developed business concepts such as IT integration, process integration, postponement and le(agility) may play a significant role in helping humanitarian aid organizations both improve their performance and satisfy the short-term needs of their donors.
Title: Humanitarian aid: an agile supply chain?

Authors: Richard Oloruntoba, Richard Gray


Overview: The authors examine the applicability of supply chain management practices in business to the humanitarian aid sector especially focusing on agility. They assume that good SCM practices will embrace planning, long-term strategies, and collaboration. They discuss the differences between humanitarian and business supply chains.

Humanitarian supply chains generally suffer due to poor planning which leads to increased costs or the inability to deliver goods, and poor collaboration. Long-term strategies are also lacking but this may be because some organizations form around certain events or issues and thus have a short-term focus. This leads to a disconnect when the crisis is more long lasting. Coordination is often difficult because of the many groups involved (military, government, NGO’s), and often inadequate infrastructure (informational and physical). Another key difference between business supply chains and humanitarian ones is that the “customer” is often the donor or supplier of goods, rather than the recipient of the aid the supply chain is designed to help. These donors must be sold by showing the donation is being used properly.

Agility is somewhat difficult to implement in humanitarian supply chains because it is directly tied to unpredictable funding from the donors. A model representing an agile supply chain is illustrated in Figure 2. The upstream portion of the supply chain consists of donors linked to unstable funding and activities such as demand forecasting, mobilization, procurement, and transport sourcing. These lead to an inventory decoupling point, which should be pushed as far as feasible along the supply chain. These activities should be as lean as possible. Working the other way, aid recipients are linked to unpredictable disasters and depend on data from prior disasters, needs assessment, site selecting, planning and decision making, and recipient-specific deliveries.

This leads to an information decoupling point. Supply Chain research into metrics that measure the leaness of the upstream activities, better information systems for the aid recipients, and the nature of the inventory and information decoupling points will be beneficial in developing more agile humanitarian supply chains. It may be that postponement rather than the pre-positioning of goods will lead to greater efficiencies in the humanitarian sector. Better on site assessments, improved pathways to distribute information, and better integration (in particular, involving people with logistics expertise) will also contribute to greater agility.

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Overview: Humanitarian aid (HA) and disaster relief supply chains have much in common with commercial supply chains but they also are very unique in many aspects. First, the ultimate recipient of products and services are not a party to the ultimate financial transactions that fund the entire supply chain. Second, the nature, frequency and magnitude of products and services required for each “project” are highly unpredictable. Third, military organizations are often added as a part of the supply chain solution. Fourth, operations often take place in third world countries that lack the necessary infrastructure to support a highly efficient supply chain. While these unique characteristics set HA supply chains apart from commercial supply chains, Pettit and Beresford argue that there is still much that can be learned and borrowed from the commercial arena into the HA arena.

Critical success factors (CSF) are those factors that are necessary to achieving success in a company. The concept of CSF was first developed by Daniel (1961). It was then extended to supply chains by Rockart (1969), after which subsequent research has continued to refine and add necessary components to the list of CSFs. This paper posits 10 key CSFs that are critical to success in supply chain management and which should also be considered for success in HA and disaster relief supply chains. These CSF’s are: strategic planning, resource management, transport planning, capacity planning, information management, technology utilization HRM, continuous improvement, supplier relations and supply chain strategy. The authors lists all ten CSFs in a table on page 454, discusses each in turn and then gives citations that inform extant research on that particular CSF. Limited discussion is given on what unique considerations each CSF should incorporate for HA.

This paper is a review article, and as such provides an effective multi-decade overview of the concept of CSF’s in supply chain and how future research can proceed with this framework as it is applied to humanitarian aid and disaster relief organizations. Future research can build upon what has already been empirically established in commercial supply chain settings.
Overview: Disasters quickly reveal flaws in the distribution of aid whether in the form of cash or goods. In recent years, many companies have responded to crises around the globe, but the effectiveness of such aid was severely hampered by logistical problems, inappropriate donations or lack of manpower on the receiving end. Where partnerships between relief organizations and private companies already existed, aid distribution was more effective and far-reaching.

Many obstacles stand in the way of such partnerships. Aid organizations are susceptible to changes in leadership, financial difficulties, or scandals at the partner company. Companies struggle with finding the right “go-to” person within the agency. CEO’s looking to develop partnerships must determine if the goal is merely the donation of goods, or to make a long-term impact by developing better logistical practices. Effective partnerships will focus on the core competencies each brings to the table, and set established goals. Four types of partnerships are possible:

1. Single-Company Philanthropic Partnerships—This is best done by setting up donation procedures before a disaster ideally between a company that provides certain goods or services and a relief agency that uses those goods or services. Philanthropic donations tend to be targeted towards short-term relief.
2. Multicompany Philanthropic Partnerships—This arrangement eliminates needing to have a relationship with multiple relief agencies. Businesses join a consortium and provide a list of goods, services, and people they could supply should a disaster occur. This requires a go-between agency that requires its own funding. It can be difficult to communicate among members of the aid agency, but the results are more effective.
3. Single-Company Integrative Partnerships—These types of partnerships seek to impact relief in a more lasting way, by addressing all parts of aid process, not just through donations. One risk is that the partners’ brands will become intertwined and thus dependent on what happens inside each respective unit.
4. Multicompany Integrative Partnerships—Like multicompany philanthropic partnerships, multicompany integrative partnerships combine the resources of many companies that can then be coordinated and distributed to many relief agencies. Because these arrangements are the most complicated of the four, projects can take longer and are not immediately beneficial, but long-term results are tremendous. Companies will not gain the benefit of positive publicity nor have direct control over as they would with single company partnerships. Engaging a third-party to facilitate communication at both ends of the consortium is helpful. This type of partnership has the greatest potential to improve aid delivery when disaster strikes.
Overview: The advances in supply chain management embraced by the private sector are also applicable in the distribution of humanitarian aid. Both can learn from each other and through better collaboration, disaster response will improve and lives will be saved.

Logistics within the humanitarian realm differs from that in the private sector in the following ways: “unpredictable operating conditions”, “robust equipment requirements”, “politically volatile situations”, “pressure of time”, “high staff turnover”, “many stakeholders”, “greater donor accountability and transparency”, “unsolicited donations”, and “physical or geographic environments”. Humanitarian supply chains possess all the attributes of any other supply chain (i.e. material, information and financial flows), however they must follow principles of humanity, neutrality and impartiality in the course of their work.

Out of the four phases of disaster management (mitigation, preparedness, response and rehabilitation), Wassenhove focuses on preparedness and response with the underlying assumption that greater preparedness facilitates a more effective response. There are five parts to preparedness: human resources, knowledge management, operations and process management, financial resources, and the community that are all linked and interact with one another. The cost to train workers and improve processes often proves to be the bottleneck in improving humanitarian logistics.

Because of the complex nature of most current disasters, collaboration, not just among humanitarian organizations, but among military, government and businesses is key. Citing Donini (1996), disaster response can be coordinated by command, by consensus or by default. Each type of coordination is best suited for a particular stage of the crisis.

Businesses and humanitarian organizations can learn from each other’s strengths. Humanitarian organizations will obviously benefit from applying proven SCM methods. Business can likewise become more rapid, adaptable, and able to manage risk and prepare for potential disasters as relief agencies do. One way to foster this type of learning is through corporate social responsibility. Finally, operational research (OR) can contribute by furthering research on the humanitarian side of the following categories: supply chain design and management, systems and technology, project management, risk management, coordination and strategic alliances, performance measurement and scorecards, and process standardization and control.

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Overview: The response to the December 2004 tsunami that struck Thailand revealed some subtle changes in the way aid is received and distributed in both beneficial and harmful ways. In particular, more aid came from smaller groups, NGO’s and even individuals, rather than governments. It proved more difficult to track and account for. Disbursement tended to be more localized. Some played the system, redirecting aid, to benefit certain individuals, increasingly at the local level.

In examining these trends, it is key to recognize that the scales presented in such disasters (i.e. local, regional, and national) interact with each other in a dynamic way. Falling back on existing patterns of order or power often perpetuate existing social structures and hierarchies. In some cases, they provide a chance for some to break out of these limitations.

The study examined three ideas.

First, it looked at the pre-existing structures and how they affected aid distribution. Interviews and field research showed that those power structures that existed before the tsunami determined the flow of aid and tended to perpetuate established prejudices and traditions.

Second, access to resources through affiliation and relationships, an idea often called social capital, also influenced aid distribution in Thailand. It is important to note that the benefits came through the networks and that social capital had positive and negative impacts. When local networks were in place, distribution went much more smoothly and sometimes reached out to include those that were not specifically members. Local groups were able to supply what the larger organizations lacked. In contrast, some individuals were purposefully excluded because they lacked social capital. Competition also arose between networks.

Finally, the response to the tsunami revealed the development of new types of networks that provided relief. These tended to be smaller, informal and more community or purpose oriented. They were not limited by scale, distance, or nationality.

The authors suggest that the typical approach, to look at things based on national and international scales be integrated with a multi-scalar one that incorporates relationships within and among communities. Doing so will maximize the benefits of pre-existing structures, local networks, and emerging organizations all seeking to help in times of crisis.
Title: The application of “swift trust” to humanitarian logistics

Authors: Peter Tatham, Gyöngyi Kovács


Overview: The collaboration that takes place after a disaster occurs among various entities meets the definition of a hastily formed network (HFN). Because of the immediate nature of these events, typically these entities have not established trust in a traditional manner. Because trust is critical in any joint venture, but especially when time is a factor, the authors examine the idea of “swift trust” (Meyerson et al., 1996) as it applies to HFN’s established in the aftermath of disasters. They contend that trust is an issue within a participating entity as well as among the various members of the HFN. They also state that efficiency and effectiveness are facilitated by the presence of trust. This trust exists among all members of the HFN, and can fluctuate with time.

The 5 antecedent conditions of trust discussed by Hung et al. (2004) are then discussed as they relate to HFN’s and the development of swift trust.
1. Third party information—Based on reputation, third party information allows members to trust each other without having first-hand experience and defrays the risk involved in working with an unknown partner.
2. Dispositional trust—This antecedent references the fact that levels of trust vary from person to person. It is impractical to attempt to change existing dispositional trust.
3. Rule—When rules are followed (this also includes processes and procedures), trust is formed. Rules also prevent partners from veering from established goals and objectives, and allow new partners to join easily. This is especially important in providing disaster relief.
4. Category—The development of swift trust can be affected by the categories (real or perceived) to which partners belong. Categories can be based on demographics (i.e. race and gender) and also on structure (i.e. grid or group). For example, Military organizations are typically very hierarchical while NGO’s are more individualistic. Clear communication is key to overcoming categorical obstacles.
5. Role—This condition is based on the assumption that a particular role will be filled by a qualified person or organization and places the burden of responsibility for ensuring competence on aid agencies. The competencies of humanitarian logisticians still need to be established.

One key point is that trust is not the same as trusting behavior, especially in the humanitarian context where decisions can cost lives or increase suffering. Communication is also critical in developing swift trust in response to disasters but is often less than ideal when carried out over long distances, or dealing with intermittent or low-quality connections. Learning to develop swift trust is key to increasing the effectiveness of humanitarian HFN’s.
Overview: Field Vehicle Fleet Management (Field VFM) is defined as “decision-making on repositioning and load assignment for groups of transportation offices etc., to optimize performance.” This case study based paper researches Field VFM in four large international humanitarian organizations (IHO): The International Committee of the Red Cross (ICRC), the International Federation of Red Cross and Red Crescent Societies (IFRC), the World Food Program (WFP) and World Vision International (WVI). The fleets of these organizations consist of 4X4 light vehicles, which are critical in the last mile of distribution of emergency products and services. These vehicles also play an important role in the distribution of material and personnel during rebuilding and other non-emergency development programs.

The research questions that Pedraza et al. address in this study are: 1) how do IHO manage their field vehicle fleets? 2) What are the critical factors affecting IHO field VFM? 3) How does field VFM affect in-country program delivery?

In many humanitarian aid organizations, transportation is the second largest expense after personnel, yet the authors find that fleet management across these different IHOs differs in the degree of centralization across each organization. Some are more centrally managed while others are more regionally managed. Even in those organizations where field VFM is centrally managed, coordination ends at the national level once the vehicles have arrived in country. Therefore, there is no centrally managed fleet of vehicles once they enter the country of disposition. This results in inefficient silo-mentality management of what is one of the largest equipment expenses for these organizations. Extending fleet management to the national level thus represents a significant opportunity for savings for these organizations.

This case-based research also found that uncertainty in vehicle demand can originate from internally or externally-based sources. The factors that are externally based are analogous to firm operating conditions and can be modeled as such. Additionally, lack of coordination between sources of transportation and true need is a source of internally based demand uncertainty and inefficiency. The authors call on future research to focus on these propositions in order to further establish their validity.
Overview: The purposeful design of a referral network among interdependent yet structurally autonomous aid agencies or health care organizations can have a significant impact on their ability to serve those in need. In this research note, authors Gibbons and Samaddar propose the use of computer simulation to explore the varying degrees of connectedness and network design that optimize performance under such circumstances. The authors develop such a simulation from the ground up using MATLAB rather than using an existing simulation module. Existing modules typically come with more degrees of restriction as compared to a bottom-up simulation construction.

Referral networks are defined as “systems of relationships among organizations that allow them to direct people to appropriate services that are not available at their own facility” (pg 352). In the simulation example used in this paper, Gibbons and Samaddar model the first 30 days after an outbreak and test how various referral network structures perform in matching those in need with the professional services offered (vaccine delivery).

The first interesting finding is that a network that has a very basic and rudimentary referral structure enjoys a significant performance advantage vis-à-vis a network with no referral structure where the patient is tasked with finding his or her own referral. Second, once a basic network has been established, improving quality of communication in that network has more impact than increasing network density while holding communication quality constant.

Third, even random assignment of referrals with resources is better than leaving customers to search on their own. This research suggests that aid agencies, health care organizations and other emergency response organizations would be well served if they first implement a referral network structure, no matter how simple it may be. It was shown that there is significant benefit to even a small degree of network density as compared to none at all. Additionally, those organizations that have already established such a network may benefit by taking time to improve the quality of those links before investing in adding new referral network members.