
Does the Current Constraints in Funding Promote Failure in Humanitarian Supply Chains?

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Traditionally, most funding is made available when a disaster occurs. Disaster response is the implementation of what humanitarian actors did (or didn't do) in preparedness for any intervention. Based on a case study of a logistics change in the International Federation of Red Cross Red Crescent Society, this paper discusses how more funding of preparedness can radically improve the speed and quality of response. Findings contribute to our understanding of how changes in funding can improve and support faster recovery due to increased preparedness in disaster-prone areas. Illustrating how postponement/speculation logistics strategies are applied to flows of material, information, and human resources, it is concluded that associated changes of financial flows are required. Donors and NGOs must think of more 'speculative', long-term, and unearmarked funding with particular attention to risk sharing, cost recovery, and measurements. This paper contributes to further understanding of postponement/speculation in project-based settings (temporary supply networks), how funding and logistics (payment and materials flows) are related, as well as the present funding models' implications for efficiency and effectiveness in humanitarian aid. These are all areas that have been underresearched.

Introduction, Purpose, and Background

Very often, in the era of instant information, news correspondents arrive at the scene of a major disaster before or at the same time as government and humanitarian agencies. Initial reports tend to show the destruction and the effects on the population. When the situation has not been alleviated within a few days of the disaster, the same correspondents start to report on the failures of agencies to mobilise and deliver essential assistance. The Pakistan earthquake in 2005 exemplifies this tendency: 'Anger is mounting

among survivors of the South Asia earthquake over the apparently slow response to a disaster that killed at least 20,000'. (http://news.bbc.co.uk/2/hi/south_asia/4329218.stm) Generally, those providing humanitarian logistics services take the brunt of the criticism, and these problems are indeed due to supply chain failure.

Humanitarian logisticians have a difficult job. They must deliver relief items and resources into all disasters everywhere on the planet from a standing start within hours and days of the crisis. They are required to make sure inputs



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delivered meet minimum quality standards and increasingly that they coordinate deliveries with their counterparts in other responding agencies. From a donor and public point of view, these agencies have the funds and access to respond quickly, so, they ask, where is the problem? A closer look reveals that the solution to improving the effectiveness of these supply chains may not be in the hands of these supply chain operators at all. What is less often reported are the underlying contributing factors to delivery failures. 'We have received new pledges of 580 million dollars', UN emergency relief coordinator Jan Egeland (2007) told journalists. However, officials emphasised that it was not clear how much of the new pledges were earmarked for the world body's 456 million euro appeal for emergency relief aid to the earthquake over the next six months or whether the donation could also be used for other efforts including long-term reconstruction ([http://www.terraily.com/reports/\\$580M_Aid_Pledges_For_Pakistan_Sow_Confusion_For_UN.html](http://www.terraily.com/reports/$580M_Aid_Pledges_For_Pakistan_Sow_Confusion_For_UN.html)).

This type of confusion, reported from the same earthquake, is typical of donor funding patterns and models, and causes massive uncertainty and competition between agencies, particularly for their supply chains. This comes at a time when clarity and coordination are already in short supply.

The purpose of this paper is to consider the relationship between donor funding mechanisms and humanitarian supply chain operations. We have identified papers on aspects such as how disaster relief is viewed separately from development and how some projects, e.g. schools, are favoured over other infrastructures such as roads, ports, and sewage (e.g. Donahue & Joyce, 2001; de Waal, 2004; Hackl & Pruckner, 2006; Rowat & Seabright, 2006, Manfredo & Schultz, 2007, Pande & Pande, 2007) but no research focuses on the link between logistics and funding. The challenge of short-term earmarked donations has been highlighted, however (Gustavsson, 2003; Thomas &

Kopczak, 2005; Oloruntoba & Gray, 2006; Altinger et al. 2008), as well as problems of unwanted or inappropriate supplies (Economist Intelligence Unit, 2005).

This paper attempts to determine if the efficiency of a supply chain is directly affected by the funding mechanism employed, discusses how changing the way donors act could radically improve the way support is delivered, and explores the impact of that support for those affected. Using a case study that shows a change of the supply chain(s) of the International Federation of Red Cross Red Crescent Societies (IFRC), we discuss how present funding models affect current humanitarian supply chain operations.

What is the link between funding and humanitarian logistics?

Constituting a restructuring involving establishment of regional logistics units to increase logistics regional support and services, the change is discussed in view of the postponement/speculation principle (Alderson, 1950, Bucklin, 1965). In particular, the theoretical constructs and their implications are used to argue for the needs of other types of funding. Merit and constraint of funding models regarding efficiency and effectiveness of the supply chain are outlined and the paper presents practical implications of what could, should, and probably will happen in the future. Implications for further research are also delineated.

Research design

Given the lack of prior research and in particular empirical studies within the area, this paper is based

on an explorative case study (Voss, et al. 2002). With a starting point on the effects of the regional concept (Cuckow, 2006), the idea of developing this case came out of discussions with logisticians in the IFRC. As such, it is based on what is termed 'engaged scholarship' (Van de Ven, 2007), which means close cooperation between researchers and practitioners, not only to find solutions and collect data, but also to define and conceptualize the problem(s). The main purpose of the case study is to describe the change that has taken place and to glean insight into the main processes of disaster response and preparedness within the IFRC based on three main flows: materials, information, and payment (i.e., funding).

The case study is based on a multitude of sources, including technical artefacts (i.e., physical structures, product catalogues, and ICT systems), systematic interviews, documents, and archival material. A prestructured case outline for data analysis was also used for the purpose of construct validity (Ellram, 1996; Yin, 2003). In order to ensure reliability, a case study protocol guides was developed. Interview guides were developed and refined during the process depending on the interviewee. The questions concerned (1) a description of logistics systems, processes, and structures before and after the change; (2) the view on the change - advantages and disadvantages, main challenges, and implications for funding, assessments, coordination, and measurements; and (3) consequences of the change for the department and the function of service provision, competence requirement, and processes (logistics and others). More than 30 semi-structured interviews with a number of staff within the IFRC were undertaken between June 2007 and February 2008. (See appendix 1). Interviews were taped and transcribed and important elements in relation to the prestructured case outline were chosen. Artefacts were used to confirm facts emerging from the

interviews. The resulting descriptions were sent to the respective interviewees for the purpose of checking for possible misinterpretations, and the whole case study was checked by the head of logistics as well as the project manager. A case study database that included notes from each interview, detailed write-up of aspects of the case, and other documentation, was created.

The regional concept in the IFRC - a case study

The International Red Cross Red Crescent Movement incorporates the Geneva-based International Committee of the Red Cross (ICRC) and the IFRC as well as national societies (NSs) in 186 countries¹. As the world's largest humanitarian organization, providing assistance without discrimination, the IFRC programs reached over 30 million vulnerable people and assisted NSs in responding to 329 major emergencies in 2005. The IFRC programs are grouped into four main core areas: promoting humanitarian principles and values, disaster response (the largest), disaster preparedness, and health and care in the community. When local structures are overwhelmed by a disaster, a request for international assistance is made. In the first instance regional disaster response teams (RDRT) are launched to support the NSs, and if there is need for further assistance, the global disaster response tools - field assessment coordination teams (FACT) and emergency response units (ERU) - are sent. ERUs are held in permanent readiness and include logistics, IT/telecom, relief, field hospitals, basic health care, and a range of specialist water and sanitation units. Once on the ground, these units are coordinated by FACT.

Regionalisation of logistics- Preparedness where it happens

The role of the IFRC logistics unit is '[t]o support any responding National Society to prepare for and

(when required) assist in the coordination of sourcing, procurement, warehousing and transport of relief goods and equipment to meet the specified and required needs (disaster response plan) at least cost' (Heigh 2006). Traditionally, the IFRC supply structure was made up of a number of loosely coordinated stocks of the NSs and framework contracts with suppliers coordinated through headquarters in Geneva. This system was restructured to increase logistical regional support and services and resulted in a headquarter-based office in Geneva (Logistics Resource and Mobilisation Department-LRMD) and three regional logistics units (RLUs) located in Dubai, Kuala Lumpur, and Panama². In addition to LRMD and the RLUs, the NSs are staffed with personnel who have been trained in logistics, and there are logistics delegates for special operations in nine different places. The purpose of the regional concept is to build on and further develop existing logistics competencies at all levels. Local knowledge of the region and shorter distances to affected areas are vital.³ Hence, operational responsibility is regionalised with the LRMD delivering logistics services and tools and managing the global function.

Regionalised sourcing and procurement

The purchasing function of the IFRC is responsible for sourcing, procuring, and delivering goods required for disaster response operations. Four essential elements constitute the new purchasing approach: frame agreements, more decentralised purchasing based on new limits for sign-offs, standardisation of procurement processes, and standard specifications of items. Procurement can be undertaken at different levels: by the three RLUs (regional, e.g., basic relief items such as jerry-cans and tarpaulins), LRMD (global, e.g., drugs, vehicles, and tents), the field delegates,⁴ and sometimes also by the NSs (local country-specific items).

Prepositioning stock in regional warehouses

An important element of disaster response is to increase preparedness by prepositioning goods (Oloruntuba & Gray, 2006), which is what the IFRC has done now in the three RLUs. Not only does this secure deliveries in the immediate response phase, but it also may reduce costs of transportation because alternative and cheaper transportation means can be employed. Prepositioned items include basic relief items (e.g., shelter, kitchen sets, and mosquito nets), support items (e.g., vehicles and generators), and kits (e.g., for administration and emergency team survival). These are distributed over four types of stocking arrangements in addition to holdings by NSs in their home countries: (1) federation-owned stocks (FOS) are owned by the IFRC, located at RLUs, and managed as permanent stock, continually replenished and maintained; (2) participating national societies stocks in federation warehouses (PNS) are owned by participating national societies,⁵ located in RLUs and managed through standard service agreements between the RLU and NSs; (3) vendor-consigned items (VCI) are owned by suppliers and located at the RLU; and (4) supplier-reserved stocks in supplier premises (SRS) are owned by suppliers and located at their premises, but reserved for the IFRC.

1. Description of the general background of IFRC comes from Heigh (2006b) and 'What we do' - Disaster Management at <http://www.ifrc.org>.

2. Dubai handles all of Europe, Africa, the Middle East, Central Asia, and portions of Asia. Kuala Lumpur handles East Asia, South East Asia, Pacific and South Asia. Panama handles the Caribbean, Central America, North America and South America.

3. Different time zones pose serious challenges in communication. For example there is a 7-hour difference between Indonesia/Malaysia and Geneva, which requires much flexibility in the different ways and means to communicate.

4. Delegates are the staff personnel sent to the area to set up the operation and assist in its undertaking.

5. The terminology is changing, but participating national societies means those NSs that donate and support but are not struck by the disaster themselves, for example, when the Japanese Red Cross pays for prepositioning of stock in the Kuala Lumpur RLU.

Supporting the concept: IT-systems, human resources, and standards

The regionalisation could not have been undertaken without appropriate information systems and support. The development of HLS - the humanitarian logistics software for emergency response logistics - started around 2002 and required a real culture change within the IFRC logistics. It was not until the Tsunami operation that the importance of such an IT system was realised: 'By 6th January 2005, everyone realised they simply could not have been running the Tsunami operation without HLS. Suddenly the logistics department bought into it' (Head IT department, Sept., 10, 2007). HLS is now implemented in the RLUs with access to Geneva and training and development of IT competencies among RLU staff. IT provides a service catalogue listing explaining the services they provide and for whom.

The IFRC human resources have encountered significant challenges that have been accentuated by the implementation of the regional concept. Many staff are temporarily employed and are mobilized only when disasters strike, making it difficult to defend long-term and expensive training programmes. The IFRC tries to meet its main HR challenges regarding both recruitment and the need for more continuous training, planning, and coordination. 'You have to have more or less the same people in key positions [who] would be able to keep the same policy - to keep stability and consistency' (Head KL-RLU, Dec. 13, 2007).

With regionalisation, operational support has been completely decentralised. Now the task of the GVA-LRMD is to help the regional logistics coordinators with training, tools, and standards and to support them in training their local/regional staff and building logistics capacities within the local teams: '... it is important to keep control from here and to make sure that the standards we are developing are implemented in the regional logistics units ...' (Field logistics officer, June 28, 2007).

Funding

The requirement

When looking at supply chain funding, it is important to understand that responding organisations supply to and generally run not one but three types of supply chains:

The Permanent Supply Chain: In order to be responsive in highly volatile circumstances with a considerable number of variables, it is important to standardize as many processes and activities as possible. This standardisation cannot occur in the middle of an emergency and therefore must be carried out proactively. In general, this will take the form of permanent supply platforms, usually based in the regions to reduce lead times. These structures consist of the following key supply chain elements as described in the previous case: (1) infrastructure in the form of a set of offices and depots that hold prepositioned stocks and coordinate procurement and framework contracts for resources and transport; (2) process development where common roles, responsibilities, and actions for supply chain response are designed and materials for training local and regional logisticians are produced; (3) personnel composed of management, technical, and training positions, bolstered with specialist technical teams that can be deployed at very short notice; and (4) systems used to initiate, track, and replenish resources as well as provide information to make management decisions and report back to donors. This supply chain is generally predictable and stable, and demand figures can be used to plan resources. Examples include the UNHRD Depots and the IFRC regional concept as presented previously.

The Emergency Supply Chain: Depending on the resources available in the disaster area, specialist teams are usually deployed to help set up all supply chain activities. This can include mobilisation of resources; customs clearance; warehouse, transport,

and helicopter operations; procurement; fleet service; recruitment; and training. These supply chains are usually set up in days and can be active for a few weeks or many months at a time. This supply chain is generally unpredictable and unstable; demand figures cannot be used to plan resources.

The Project Supply Chain: Usually set up in the recovery phase of a disaster or to develop some resources in preparation for a possible event, the project supply chain is essentially a locally managed set of resources that provide a service similar to that of a commercial service provider, against which costs are recovered. This supply chain is generally predictable and stable, but requires local presence and market understanding of the integrating company.

Present funding models

This paper considers two types of funding⁶: long and short term (commonly seen as development and emergency response), which are further divided into tied (earmarked) and untied (unearmarked) donations depending on the stipulation of the donor, often on political grounds. This means that (1) the funding of permanent supply chains is usually negligible or short term; (2) the funding of emergency is earmarked extended short term; and (3) project supply chains get all combinations of funding. Figure 1 shows how funding has developed since 2002 in the IFRC.

6. UNHRD-United Nations Humanitarian Response Depots-is a World Food Programme Network able to deliver humanitarian relief items worldwide within 24 to 48 hrs. Providing storage, logistics support, and services to UN humanitarian agencies, international humanitarian organizations, and governmental and nongovernmental organizations, it reinforces capacity for humanitarian emergency response <http://www.unhrd.org/about.asp>, 2008.

7. It is noted that many in-kind goods are donated in an emergency response, but in general this tends to hinder rather than support the response and confuses the issue. Hence, we have not included this type of funding here.

Figure 1
IFRC funding 2002-2007 (Source: IFRC, 2005)

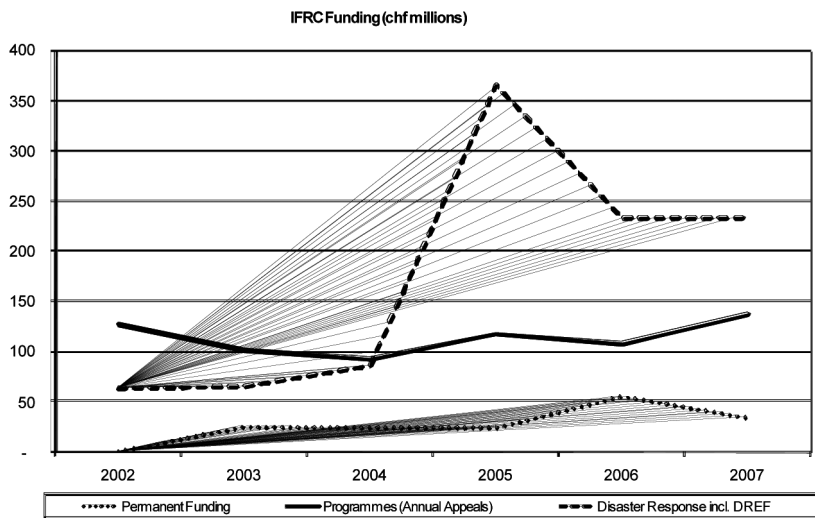


Figure 1 shows that the amount of funding needed for core platform activities, such as permanent structure, falls in real terms when considered against the emergency, for example, disaster response activities. *Hence, there is very little funding for the purpose of planning and managing permanent supply chains to maintain a stable support platform. The consequence is high competition for what is available, a lack of preparedness resulting in a high cost of setting up the emergency supply chain, and an inability to support the project supply chain.* The figure also illustrates what typically happens immediately after a major disaster, for example the Asian-Pacific Tsunami in 2004 when countless donations poured in. Such massive funding, while required immediately, must also be spent quickly, and tends to prolong the emergency period. Furthermore, funding of project supply chains depends entirely on the project because the permanent supply chain is unavailable to support its set up, leading to projects being outsourced with resulting failures and/or very high costs.

Theoretical underpinnings

The regional concept of logistics in the IFRC as previously presented can be characterized in terms of

the postponement/speculation principle that developed within the marketing channels literature in the 1950s (Alderson, 1950, 1957; Bucklin, 1965), later becoming essential in logistics (Zinn & Bowersox, 1988), and eventually also in supply chain management (Pagh & Cooper, 1998; Waller, Dabholkar, & Gentry, 2000; Boone, Craighead, & Hanna, 2007). Defined as 'changes in form and identity to occur at latest possible point in the marketing flow; and changes in inventory location to occur at the latest possible point in time' (Alderson, 1950, p.16), postponement was originally viewed as a device for individual institutions to shift the risk of owning goods to another (Alderson, 1957). The aim was to ensure flexibility as a response to demand uncertainties. Bucklin (1965) introduced the converse, that is, speculation, contending that '[t]he [postponement/speculation] concept . . . extends beyond the physical flow of the goods themselves to the flow of their title' (p. 29) and 'broadens the channel analyst's understanding of the intimate relationship between title and physical flow' (p. 30).

Most typologies of postponement/speculation that have been suggested relate to Alderson's original differentiation of time and

place, commonly denoted manufacturing⁸ and logistics, respectively (Heskett, 1977; Zinn & Bowersox, 1988; Pagh & Cooper, 1998). Garcia-Dastugue and Lambert (2007) define postponement of manufacturing as that of 'changing the sequence of activities to delay changes in form or identity' (p. 57), whereas time-based postponement implies 'the intentional delay of activities for as long as possible and includes delaying differentiation of products in terms of form, identity, or place, but it does not include changing the sequence of activities.' (p. 58). Manufacturing postponement is often based on standardization, modular design, and/or process structuring and might result in performing activities later in time, closer to when end-customers place the order, in which case it also involves time-based postponement. Time-based postponement focuses on finding the best location to position the decoupling points, that is, all decisions that increase the cash value of the product such as manufacturing (changes in form and identity) and logistics (changes in place). The theory is that holding inventory at a lower value reduces the direct variable costs associated with inventory, such as cost of capital for the assets employed and costs associated with the risk of products becoming obsolete.

Although the original focus was on risk, logistics researchers became more concerned with the implications for physical flows, such as the number of points at which products are handled, moved, stored, and assorted, regardless of the number of

8. Because the IFRC (similar to other such organisations) purchases what it uses and is not a manufacturer, it could be questioned why manufacturing postponement is relevant in this case. However, its definition, postponement of branding and packaging, for example, could also be included as part of the manufacturing process and thus is relevant in our case. Furthermore, use of sheltering kits (hammers, nails, and other tools) instead of tents as emergency shelter would be time as well as place postponement according to theoretical definitions.

Table 1
Summary of major characteristics in relation to postponement/speculation

Characteristics	Speculation when	Postponement when	Sources
Demand uncertainty	Lower	Higher	Pagh & Cooper, 1998; Waller, Dabholkar, & Gentry, 2000; van Hoek, 2001; Lee, 2002; Yang, Burns, & Backbone, 2004a; Yang, Burns, & Backbone, 2004b; Boone, Craighead, & Hanna, 2007
Supply uncertainty	Higher	Lower	Lee, 2002; Yang, Burns, & Backbone, 2004a
Product complexity	Lower	Higher, but modularised	Waller, Dabholkar, & Gentry, 2000; van Hoek, 2001; Yang, Burns, & Backbone, 2004a; Yang, Burns, & Backbone, 2004b; Boone, Craighead, & Hanna, 2007
Cost of lost sales	Higher	Lower	Zinn & Bowersox, 1988; Pagh & Cooper, 1998; van Hoek, 2001; Waller, Dabholkar, & Gentry, 2000; Yang, Burns, & Backbone, 2004a
Product type	Standard	Customized	Pagh & Cooper, 1998; Waller, Dabholkar, & Gentry, 2000; van Hoek, 2001; Yang, Burns, & Backbone, 2004a; Boone, Craighead, & Hanna, 2007
Product range	Narrow	Wide	Pagh & Cooper, 1998; Waller, Dabholkar, & Gentry, 2000; van Hoek, 2001; Yang, Burns, & Backbone, 2004a; Boone, Craighead, & Hanna, 2007

transfers, title, or the number of institutional entities involved in performing these activities (Heskett, 1976; LaLonde & Mason, 1985; Goldhar & Jelinek, 1983; Waller, Dabholkar, & Gentry, 2000). Few disadvantages of postponement were put forward during this period with focus on 'mass-customisation': short product life-cycles and just-in-time combined with the optimistic view of technology development, making economies of scope and postponement possible. With supply chain management thinking, this seems to be changing. Interorganisational aspects are yet again becoming more prominent (as they were in the early days of channel research) (van Hoek, 2001; Boone, Craighead, & Hanna, 2007). Risk sharing among supply chain members and difficulties in implementing postponement are being increasingly discussed (Lee, 2002; Yang, Burns, & Backbone, 2004a; García-Dastugue & Lambert, 2007). Costs of lost sales due to late deliveries, higher transport costs due to higher frequencies, and lack of economies of scale in processing are being pointed out as disadvantages. Hence, the combined principle as coined by Bucklin (1965) is again attracting interest. Table 1 gives a summary,

although simplified, of the major points viewed as particularly relevant in order to understand the reasoning behind the regional concept of the IFRC and the resulting funding implications.

Discussion

First, the regional concept is discussed in theoretical terms as presented in Table 1. Second, the implications of the change for funding are discussed, proposing other funding models for the support of the three supply chains, relating this to the postponement/speculation principle.

The regional concept combining speculation and postponement

With its regional concept based on decentralised unearmarked stocks, the IFRC has implemented a combination of speculation of stocks to increase preparedness simultaneously with postponement of labelling to increase flexibility in an emergency situation. Table 2 provides one example for each type of supply chain, illustrating the effects for efficiency and effectiveness.

With relation to the theory previously presented, the change can be conceptualised as (1) *manufacturing and time-based postponement* by changing the sequence of labelling and thus delaying changes in identifying basic relief items combined with delaying procurement of culturally sensitive items until (a) they have been ordered by a specific operation and (b) have been transported to the RLU; and (2) *manufacturing and time-based speculation* by (a) procuring greater volumes of items to stock up three RLUs before they are needed and (b) forwarding items to RLUs before they are ordered by a specific operation.

The choice of speculative stocks of basic relief items is consistent with the literature. As presented in our case study, the context of the permanent supply chain is characterised by stable demand and supply, limited product range constituting relatively simple products with standard specifications, and little customisation. The project supply chain, while having a fairly stable demand, requires other types of items compared to what is prepositioned in the RLUs. Hence, local procurement, that is

Table 2
Effects of the regional concept

Example 1: The permanent supply chain—The regional concept of the IFRC (Jahre, 2008)

In 2005, the IFRC secured seed funding to develop a sustained regional platform supported by a central management structure. The expenditure was 4.5 million CHF to develop the RLUs and upgrade the GVA-LRMD function. This also allowed all NSs to pool their assets and later led to a self-sustaining cost recovery service model.

Example 2: The emergency supply chain (Cuckow, 2006)

The RLU in Kuala Lumpur supported the set up of an emergency supply chain as a response to the Yogyakarta earthquake in Indonesia in August 2006. The supply chain was later measured against the previous supply chain responses in support of the earthquake in Pakistan in October 2005 and the Tsunami response in Indonesia in December 2004. The results of this comparison are summarised as follows: (1) the supply chain was fully operational in Yogyakarta three times faster than in Pakistan and almost six times faster than for the tsunami response; (2) 75% of *all* required items were available for distribution within the first eight weeks; (3) the distance relief items were transported to Yogyakarta was reduced by 46% compared to the Pakistan response and by 87% compared to the tsunami operation⁹; (4) at two months, the cost of package delivery was 83% less expensive in Yogyakarta than in Pakistan. Considering the project as a whole simply in cost terms, it is estimated that the new global logistics structures will increase logistics costs by an extra 1 to 1.5 million CHF per year. The changeover cost for the project was approximately 6 million CHF. If the Pakistan supply chain set up had been used to respond to Yogyakarta it would have cost around 18 million CHF rather than 9 million CHF, and would have assisted fewer than 50% of the families than were actually helped. Hence, the increased logistics and changeover costs are more than offset by the new arrangements.

Example 3: The project supply chain (Heigh, 2007)

The same RLU was used to support a Canadian Red Cross (CRC) rehousing project on the remote Island of Nias off the coast of Sumatra. In this case, the CRC employed consultants to define and implement the supply chain at a time when the RLU was not in place. After eighteen months the consultants returned stating that the project was too difficult. The CRC then asked the newly formed RLU to set up and run the supply chain. Four months later, using its regional contacts, the RLU had together with CRC designed a housing set, set up a pull supply chain incorporating six service providers, and were delivering houses to the site. The commercial quotes received when the consultants tried to set up a chain were not only incomplete, but also 30–40% more expensive than the IFRC solution.

postponement, is more common, making use of established regional/local supplier relationships, procurement processes, and other capabilities in the permanent supply chain. The emergency supply chain, in contrast, is characterised by unstable demand and supply and requires customisation of certain items (e.g., hygiene parcels). Hence, postponement of certain activities such as procurement of those items requiring customisation and labelling of the prepositioned stock until it is known where items are needed (i.e., after the disaster has occurred) is imperative in order to make the regional concept work.

Accordingly, it is the combined principle of postponement/speculation across the three types of supply chains that lead to reduction in total cost and service improvements including minimum response time to the occurring needs. With regards to the four main cost components, as suggested in the literature, response time (i.e., from need to

distribution) is of extreme importance in the immediate aftermath. Hence, the cost of 'lost sales' is extremely high (i.e., cost of 'lost lives') and outweighs very high costs in this first period when time is everything. Further, as most prepositioned stocks are owned by suppliers, inventory carrying costs are lower than usual, seen from the point of view of the aid organisation. Finally, in times of disaster, transport costs may increase immensely, due to both time constraints often requiring airfreight and a lack of capacity, therefore leading to increased prices in the surrounding area. Thus, compared to the normative models suggesting that transportation costs go down as inventory carrying costs go up with speculation, our case demonstrates lower inventory carrying costs with speculation relative to much higher human costs of not being able to help quickly enough. Furthermore, transport costs may increase considerably more than usual if there is time postponement (e.g., keeping stocks in Norway or

Geneva instead of in the RLUs). This suggests that the preparedness, that is the regional concept, has advantages in the temporary supply chain that outweigh the costs in the permanent structure. In particular, the link between the permanent and the temporary and the advanced transition speed from preparedness to emergency response has improved with the regional concept.

Implications for funding

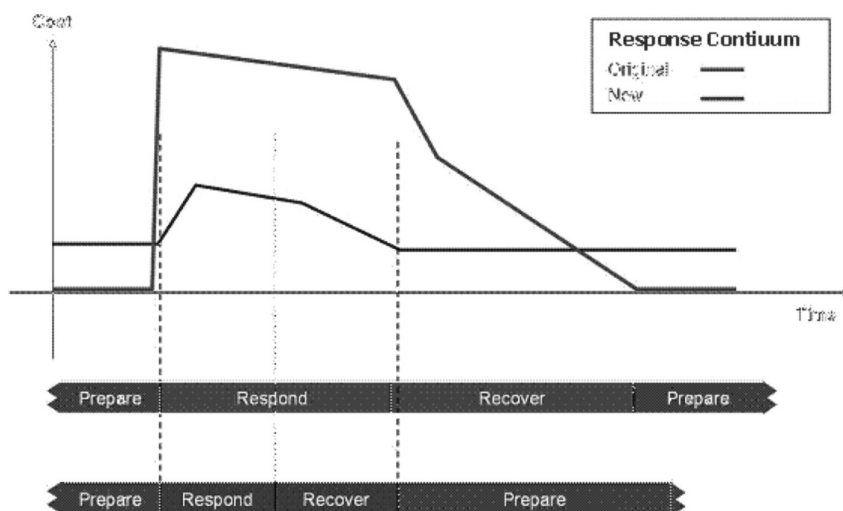
First, this case study shows that funding and resources are required to cover the investments and running costs of procurement and warehousing of relief items in an efficient and effective way. It takes time and competence to develop and update catalogues, systems, and manuals. Monitoring and

⁹ From where the goods were positioned at the time of the disaster (i.e., the RLU, Europe, Middle East, etc.) to the disaster area.

Table 3
Ideal funding model(s)

Supply chain	Preferred funding	Merits and constraints
Permanent	Can be tied or untied long term	Funding can be planned and managed to maintain a stable support platform. Minimises the cost of setting up the emergency supply chain and supports the project supply chain. Requires investments but provides less visible results.
Emergency	Untied short term	Funding required immediately but with maximum flexibility. Can be spent quickly. Provides, in conjunction with permanent, fast, effective assistance. Provides short-term opportunities for donor visibility.
Project	Tied or untied long or short term	Depending on the project, as long as the permanent supply chain is available to support the project supply chain set up, any funding mechanism can be accommodated. Becomes very expensive unless a permanent chain is in place.

Figure 2
Evening out the funding over time



measuring performance for further development and improvement also require funding. Staff must be hired on a more continuous basis and be trained and coordinated. It is expensive to develop and update IT systems. Providing the necessary continuous support to a geographically disparate user set is also costly. Funding needs for the permanent structure therefore increase.

Second, given that disaster response is only as good as the preparedness for the disaster, the importance of the permanent supply chain becomes clear. If it is set up correctly and in the appropriate location, the emergency element can be reduced to a minimum, and in addition,

project supply chains can be established easily. By their very nature, these supply chain types are symbiotic, but they require different funding types. The need for the permanent to better mobilise the temporary and the associated funding needs are presented in Table 3. This table also shows how funding models can be used to optimise the set of supply chains needed to develop the most efficient and effective service delivery.

Finally, regarding the postponement/speculation principle, it is clear that payment flows must change. The permanent structure requires more 'speculative' funding from the donors. Hence, as illustrated in figure 2, an evening out of the

funding over time with more for the permanent structure, less for the response, is required.

The basic premise is that the (extra) costs of more long-term unearmarked funding for the permanent structure are more than outweighed by the reduced cost of the temporary structure in terms of the emergency supply chain as well as the project supply chain. Continuing the current funding patterns means the availability of resources to help vulnerable communities is not aligned with the funding patterns when it is required. At best, this is a waste of money in the response and recovery phase. At worst, it has the potential to prolong the bad situation for those it is trying to help. A change in funding patterns so that the spending is ahead of the disaster curve has the potential to dramatically change the effect of interventions.

Conclusions, Implications, and Further Research

Using the theoretical logistics concepts of 'postponement' and 'speculation' of material, informational, and human resources, we conclude that similar concepts apply to financial resources. Changing structures and processes of materials and information flows require associated changes in payment flows. We have seen that the theoretical concepts can be used to describe and analyse the IFRC's logistics change. We have also seen that, based on the

particularities of the humanitarian context, the theory provides increased understanding of the motivation behind the change. First, there are three different types of supply chains with profoundly different characteristics of importance for the choices of postponement / speculation strategy. Second, the humanitarian logistics performance of the immediate disaster response (and the reconstruction afterwards), which is what most people (including donors) consider, is closely linked with the preparedness stage - the better prepared, the better the response. Third, due to the different supply chain characteristics, different funding is required. Putting more efforts into the permanent chain in order to better serve the temporary requires changes in the prevailing funding models.

There are a number of implications from the findings. First, a change in donor behaviour is required. The behaviour of the initial receivers such as the IFRC and other organisations must also change. The many who work within this sector are used to thinking of humanitarian aid in terms of disaster response operations and their associated funding needs. Hence, one important practical implication is that donors and (N)GOs¹⁰ must think of more 'speculative', long-term, unearmarked funding with particular attention to risk sharing, cost recovery, and impact measurement. Second, our case study shows that changes in logistics structures and processes can have profound effects on the use of donations. As logistics constitute such a high share of the total cost, it is puzzling that donors do not show more interest in logistics and supply chains of humanitarian aid. Our findings can help communicate these issues to donors (and NGOs) and advise them to become more concerned with these aspects. The aftermath of the Tsunami in 2004 sadly illustrated that 'all the money in the world' does not help in the provision of sufficient disaster response when one is not well

prepared: *'We were hit by three disasters in succession. First came the earthquake, then the Tsunami. And finally the relief agencies.'* (Words of an interlocutor in Indonesia during a Tsunami review [IFRC, 2005]).

Numerous issues arise regarding theoretical contributions and further research. First, this paper contributes to a broader understanding of the postponement/speculation principle in a project-based setting, such as temporary supply networks, and its link with permanent networks. Compared to previous logistics postponement research, the risk perspective as originally proposed becomes more important. Hence, one area for further research is in-depth studies with the purpose of theory development of postponement/speculation focusing on risk and project-based logistics - areas that have not received much attention in prior research.

Interorganisational applications require more attention to the risk aspects (Garcia-Dastugue & Lambert 2007). More in-depth analyses of the regional concept of the IFRC can make some interesting contributions to this point. Second, Boone, Craighead, and Hanna (2007) suggest research on postponement in service industries as a challenge in further developing the concept. Our paper contributes to developing some particular issues such as the use of postponement/speculation principle in connection with preparedness and response and the consequences for and of specific funding, but there remains much room for further research. Third, this paper fills part of a void regarding understanding of the third basic flow in logistics, namely payment, and how it links with the other two (Supply Chain Digest, 2007). We propose further studies within this area, also outside of the humanitarian logistics context. Fourth, we suggest more research on the link between pull/push, postponement/speculation, and decoupling points in a supply chain (Lee, 2002).

Our study provides an illustration of the need for accepting speculation in the permanent network to be able to go from push to pull in the temporary network. This leads us to our final point, which is to focus on couplings between temporary and permanent networks. Apart from Dubois & Gadde (2002), who discuss coordination and linkages within and between temporary solutions and more permanent networks in the construction sector, we have not identified prior literature that covers this particular aspect directly. Other research streams have been suggested (Jahre, et al. 2008), including 'projects as temporary organizations' (Lundin & Steinhörsson, 2003), 'networks as overlapping supply chains' (Herz, 2006; Jahre & Fabbe-Costes, 2005) and 'networks as resource combinations' (Jahre et al., 2006). In all project-based settings this should be an area of great interest for further research. Furthermore, many industries are increasingly becoming more project-based, requiring flexible solutions (Reichhart & Holweg, 2007; Bitran, Gurumurthi, & Sam, 2007).

10. National and international (non) governmental organisations.

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Marianne JAHRE is Professor at the Department of Industrial Management and Logistics at Lund University and Associate Professor at the Norwegian School of Management in the Department of Strategy and Logistics. She received her Ph.D. in logistics in 1995 at Chalmers University of Technology and is now docent there as well as visiting professor at Université de la Méditerranée in France. Her current research interests include disaster relief logistics, design and development of logistics resource networks, supply chain integration, the role of service providers and environmental logistics. She has co-edited and co-authored several books and published in journals including *International Journal of Physical Distribution and Logistics Management*, *International Journal of Logistics: Research and Applications*, *International Journal of Logistics Management*.

Ian HEIGH is a senior supply chain professional with over fifteen years' overseas experience in program planning and management in the areas of disaster response, strategic planning, logistics and supply chain management, engineering and reconstruction, livelihoods, and community development. In addition, eight years experience up to director level in the business industry working on all aspects of business improvements and operations including mapping, analysis, design, implementation, and measurement. Ian's practical experience is complemented by his academic achievements including an MSc in Logistics and Supply Chain Management at Cranfield University, where he won the award for Best Thesis. He has led both a commercial and humanitarian organization in winning the European Supply Chain Award for Excellence.

APPENDIX 1: INTERVIEWS UNDERTAKEN

Department/Division	Position	Date for interview
C&PD GVA ¹² (3)	Head, Acting Head, Officer	25.06, 10.09, 25.06.07
C&PD-DM GVA ¹³ (2)	Operations Coordinator, Acting Deputy Director	11.09.07, 5.02.08
C&PD-Shelter GVA ¹⁴	Head	25.06.07
DMU KL ¹⁵ (2)	Disaster Response Delegate, South Asia, Disaster Response Delegate, S-E Asia, E -Asia and Pacific	14.12, 14.12.07
KL-RLU ¹⁶ (5)	Regional Fleet Coordinator, Head, Regional Logistics Coordinator, Regional Logistics Coordinator, Regional Procurement Coordinator	13.12., 13.12, 13.12, 13.12, 13.12.07
LRMD GVA ¹⁷ (8+)	Logistics Adviser, Senior Procurement Officer, Head of Department, Senior Field Logistics Officer, Systems and Processes Senior Officer, Senior Logistics Officer, Reports and Tools, Acting Head of Logistics Department	Diverse 2006-08, 26.06, 25-26.06, 26.06, 25-26.06.07, 4.02, 5.02.08
P&CD GVA ¹⁸	Director	5.02.08
P&CD- RM&RM ¹⁹	Head	4.02.08
SSD GVA ²⁰ (2)	Coordinator, ECHO Thematic Funding Programme, Director	10.09.07, 4.02.08
SSD-Finance GVA ²¹	Senior Officer, Financial Analysis	5.02.07
SSD-HR GVA ²² (3)	HR Coordinator, Major Emergencies, Senior Officer, ERU, Training/Equipment Officer for FACT/ERU	11.09, 11.09, 10.09.07
SSD-IT ²³	Head	10.09.07

¹¹ Number of interviews in brackets and *italics*.

¹² Coordination & Programmes Division Geneva.

¹³ Coordination & Programmes Division—Disaster Management, Geneva

¹⁴ Coordination & Programmes Division—Shelter Dept, Geneva

¹⁵ Disaster Management Unit, Kuala Lumpur.

¹⁶ Kuala Lumpur Regional Logistics Dept.

¹⁷ Coordination & Programmes Division—Logistics and Resource Mobilisation Dept, Geneva

¹⁸ Policy & Communications Division, Geneva

¹⁹ Policy & Communications Division—Resource Mobilisation and Relationship Management Dept, Geneva

²⁰ Support Services Division, Geneva

²¹ Support Services Division—Finance Dept, Geneva

²² Support Services Division—Human Resources Dept, Geneva

²³ Support Services Division—Information Systems Dept, Geneva

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