

A Typology of Services in Disaster Relief: Evidence from Two Disaster Relief Chains

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ABSTRACT

Delivery of services in disaster relief chains (DRCs) is inadequately addressed in literature. Disaster relief delivery and associated DRCs are often discussed in terms of the delivery of tangible goods such as medicine, food and water. Research on services within relief is relatively scant. Based on two empirical case studies of DRCs in Australia, this article: analyses the types of services delivered in each of the two DRCs; proposes a typology and classification of services within disaster relief; and advocates a reconceptualization of disaster relief through an enlargement of the scope of conventional perspectives and discourses on disaster relief to include services and its delivery. The research is useful for analysing, classifying and planning of services and its delivery in disaster relief. It also opens up new research directions for disaster logistics and operations management scholars in the area of services and service delivery in disaster relief.

Keywords: Relief services, disaster services, disaster relief chains

Introduction and background

The provision of services in disaster relief has not been addressed in the disaster operations management (DOM) and humanitarian logistics (HL) literature. There is limited discussion of what services are, or mean in the context of humanitarian operations and disaster relief logistics. Although, research in this field is still growing (Apte 2009; Kovacs and Spens 2011), it may be worth noting that right from its infancy a significant quantity of research and publications seem to take a narrow ‘goods’ view of what the concept of disaster relief is, and what its delivery entails. In deed much of the available research base their assumptions and focus on the procurement, transportation and delivery of tangible, physical goods to those affected by disaster. Such a ‘goods’ view of disaster relief is evidenced by, for instance the abundance of research on valuable topics such as fleet transport operations and management (e.g. Pedraza-Martinez et al. 2011, Wohlegemuth et al. 2012), inventory, warehouses and transshipment depots (e.g. Beamon and Kotleba, 2006, Balcik and Beaumon 2008, Balciket al. 2008), and procurement and supply of relief goods (e.g. Arminas 2005, Bagchi et al. 2011, Duran et al. 2013, Ertem et al. 2010).

A narrow ‘goods’ view of disaster relief in HL and DOM research is not surprising given the nascence of research and the fact that access to data rich sites, organizations and individuals for the purpose of empirical research on services is often difficult to accomplish. Lastly, the services required and delivered during disaster relief are often dependent on the disaster context. Nonetheless, this empirical research is a start, and is based on findings from empirical case studies of two disaster relief chains (DRCs) in Australia. These include the Cyclone Larry and Newcastle earthquake DRCs. This article: (a) analyses the types of services delivered in each of the two DRCs; (b) proposes a broad typology and classification of services within disaster relief; and (c) advocates a reconceptualization of the concept of disaster relief through an enlargement of the scope of current perspectives and discourses on the logistics of disaster relief to include services and the logistics of its delivery. The rest of this article is structured as follows: The following section reviews and summarises the services, marketing and commercial-oriented literature and adapts it to the not for profit disaster relief context in order to establish a basis a discussion of services in relief. The method section summarises how data was collected and analysed and the methods utilized in the conduct of the research. The penultimate section identifies and analyzes empirical examples of delivered services in the delivery of disaster relief. This section also proposes a typology and classification of disaster relief and associated relief services, and advocates a reconceptualization and an enlargement of conventional perspectives on the scope of disaster relief and its delivery. A concluding section summarises and suggests research and managerial implications.

Services in the commercial literature and humanitarian and disaster relief

There is no consensus on what ‘services’ mean however, a standard marketing view of services is that services are ‘deals, performances, efforts conducted in critical contact with the customer or user’ (Clark et al. 1996, Lehtinen 1984). Services are deeds, performances, or actions (Gummesson and Groonros 1988). They are generally more intangible, personalized, and perishable (Groonros 2012). Services cannot be patented, stored or displayed (Groonros 2012). With services, there is a high level of heterogeneity as well as simultaneous production and consumption (Groonros 2012). They cannot be resold or returned, and service providers often affect service outcomes (Groonros 2012). Goods and services often complement one another for example cars frequently require servicing and valeting after their purchase. Other services are more tightly integrated with products such as catering and airliner maintenance. An ‘integrated solution’ combines products and services into a seamless offering that addresses customer's business or operational needs (Davies 2004, Groonros and Voima 2013, Johnson and Mena 2008, Wise and Baumgartner, 1999). However, other services are independent of goods and are ‘stand-alone.’ Overall, the main difference however between goods and services is intangibility.

Services may be viewed at many levels just like a product. A core service is what the buyer is really buying such as an oil change and tune-up for a car. The *basic service package* is the specific service offered to the user for example, price, guarantees and warranties. The *augmented service* is the totality of the benefits a customer receives or experiences when buying a product (Clark et al. 1996). Lehtinen and Lehtinen (1982) posited a three dimensional view of services: (1) *Interaction* which involves ‘interaction’ or close contact by the service provider with the customer or user during the course of providing the service such as during a dental check-up and a search and rescue operation (2) *Physical* which involves the physical quality of the service itself and how it is perceived by the customer or user, and (3) *Corporate aspects* which are the after-sales support services that refer to the bundling of products and services into integrated solutions (Bastl and Johnson 2012, Davies et al 2006).

In the context of humanitarian and disaster relief, many tangible goods delivered as a component of disaster relief are often integrated with a range of services. Medical products such as bandages and painkillers are not merely packaged, supplied, transported and distributed, but are also often administered to the wounded and sick. Likewise, surgical services may be provided to save lives in disaster sites. These examples of “integrated solutions” combine relief goods with a service, and are delivered concurrently. However, pure “stand-alone” services are independent of goods. An example is the operation of the Emergency Response Unit (ERU) which is often used as a spear-head by large international humanitarian organizations (IHO) for creating the foundation for a rapid response and a presence in the disaster site, usually in a foreign country (Rawls and Turnquist 2010). The ERU often consist of persons with varying service specialisations such as: public health / epidemiologist to assess short and long term hygiene and public health concerns; a sanitation engineer and assessor to design large scale toileting solutions; at least one medical doctor in emergency medicine and trauma for immediate first aid and so forth. These “stand-alone” services are undertaken independently while waiting for the arrival of more substantial relief personnel and relief goods. How data was collected and analysed is now presented in the following method section.

Method

The case study method was adopted in order to address the aims of the research. Case studies confer benefits where the theoretical base is relatively weak and the research environment ‘messy’ (Meredith 1998, Parkhe 1993, Robson 1993, Yin 2003). Disaster events and impacts and DRCs enacted as a response are often inter-related and inter-woven with variables often unfolding concurrently in an asymmetrical fashion which makes case studies suitable. Given the exploratory nature of this research, adoption of a case study approach enables accurate recording of actual practices and observations as well as in-depth understanding of the nature, type and complexity of the services delivered in the DRCs (Voss et al. 2002, Yin 2003). Early stages of theory development requires fewer number of case studies (Edmondson and McManus 2007, Parkhe 1993) hence it was decided that two embedded cases were adequate for addressing the research aims. The embedded case study design helps to focus the research by providing sensitivity to a shift in focus as likely with the holistic case study design (Yin 2003). The unit of analysis was the disaster relief services undertaken by the lead public sector disaster-mandated agency (PSDMA) and its network of co-responding organizations in providing immediate relief as part of the emergency response to disaster. The research analysed only qualitative data as quantitative data was deemed inappropriate given the nature of research aims. It was decided that secondary data analysis and face to face interviews were optimal. The units of data collection were publicly available secondary data such as newspapers, websites of disaster and emergency response organisations and websites of co-responding charities such as the Salvation Army and the Red-Cross. Background and secondary data collection and analysis were undertaken between the February, 2009, and December 2012. Approximately 150 hours were spent on the collection and analysis of secondary data.

It was decided that a purposive sampling strategy (Patton 1980) is appropriate. Hence, secondary data analysis was complimented by interviewing a sample of key informants in the lead public sector disaster-mandated agency (PSDMA) involved with providing services during the provision of disaster relief in Queensland and New South Wales (NSW) states of Australia where the DRCs under study were executed. The researcher also interviewed key informants and interviewees in the network of co-responding non-governmental organisations and charities as well as private service providers such as carriers. Case study and interview

protocols were then developed and DRCs for the Newcastle earthquake December 1989 and Cyclone Larry of March 2006 were ultimately selected for pragmatic reasons given their close geographical proximity to the researcher and relative ease of access to data and key informants. Ethical approval was received from the University of Newcastle Human Research Committee before proceeding with the conduct of field interviews (ethics approval number H-2009-0244, safety approval number 204/2009). The research adopted an in-depth interviewing method, utilizing a semi-structured format in the interview prompt guide. In-depth interviews enabled the researcher “to probe deeply to uncover new clues, open up new dimensions of a problem and to secure vivid, accurate inclusive accounts that are based on personal experience” (Burgess 1982, p. 107, in Easterby-Smith 2008). The semi-structured interview guide was developed to capture the range of services in each DRC, and the context in which services were delivered.

The researcher invited 101 potential interviewees across public sector organisations responsible for disaster management such as the Police, State Emergency Services (SES), Australian Defense Force (ADF) and non-governmental organizations (NGOs) such as the Red Cross and Salvation Army as well as private service-providers such as transport carriers. Twenty-seven consented to be interviewed and were interviewed in their offices. Interviewee roles required them to regularly respond to all types of disasters, provide relief, coordinate and/or execute the delivery of a range of services. Interviewees spanned multiple organizations in the responding network, multiple organizational levels and perspectives in the two cases studied, and brought a range of perspectives, roles, opinions, settings, events and experiences regarding the delivery of services during disaster relief. Interviews were conducted over a period of one year from Jan 2010 to Jan 2011. Duration of interviews ranged from one to two hours, and each was audio-digitally recorded and later transcribed verbatim. Interviews were then coded and analysed using the template analysis approach (King 1998) where a preliminary template is developed and subsequently used in the analysis of the transcriptions. The template is then continuously modified over successive rounds of analysis. Findings from the analysis were then sent to the interviewees and follow-up phone calls made to ensure clarity and accurate representation of their views. Results, findings and discussion are summarised in the following section for brevity.

Results, finding and discussion

This section of the article begins with a summary of the findings and discussion of the key types and categories of services delivered during the provision of disaster relief to those impacted by Cyclone Larry and the Newcastle earthquake. Verbatim extracts and quotes from interview transcripts are not included for brevity and word limit reasons. Examples of “stand-alone” and “integrated” services in relief are discussed concurrently and associated typology and classification of services presented in Table 1.

Table1. Typology of services delivered in Cyclone Larry and Newcastle earthquake DRC

Case 1 Cyclone Larry DRC	Case 2 Newcastle earthquake DRC
<ul style="list-style-type: none"> • Employment and financial-related services • Infra-structure related services • Environmental/ecological-related services • Personal-related services • Information-related services • Logistics-related services 	<ul style="list-style-type: none"> • Urban search and rescue services • Disaster victim identification services • Building and debris-related services • Emotional psycho-social counselling services • Financial-related services • Security-related services • Temporary accommodation services • Media and broadcasting-related services

Case 1: Cyclone Larry DRC services

Data suggests that government agencies made special pre-planned disaster relief services for affected economic segments of the region and communities that were impacted. Such relief services include:

(a) Employment and financial related services:

Immediate employment and job support services to aid employment-related relief programs such as immediate ‘work for the dole’ type arrangements. This service was aimed at helping impacted people whose places of work had been destroyed by the cyclone to be employed under those arrangements with only a fractional financial top-up from their original employers. Regional employers were the farms and plantations such as banana, avocado and sugar cane growers, as well as vessel owners and operators in the tourism sector of tropical Queensland. Special grants and specially structured soft loans for impacted persons and groups also fall into this category. Overall, significant attention seems to have been given to services for the agricultural, tourism, fisheries sectors during the initial relief phase of the response. These employment and financial related services may be construed as ‘stand-alone’ services delivered in parallel with relief products. In addition, hundreds of volunteers armed with emergency electricity generators were deployed free of charge to affected farms in the dairy and aquaculture industries to operate portable cow milking machines that were air-freighted to such dairy farms in order to kick-start the milking of cows and economic output. Volunteers also provided services by keeping the company of distressed cattle thereby helping to maintain animal welfare. Without the government’s providing such services to the regional economy all of the relief products targeted at individual beneficiaries would have merely been short term and ad-hoc in focus since the regional economy was heavily impacted by Cyclone Larry.

(b) Infra-structure related services

Data suggests an early focus on infrastructure repair services and the rapid repair of roads and restoration of radio broadcasting, electricity, and water and sanitation systems. These services were a part of the relief strategy undertaken in response to the disaster. Repair and restoration services focussed on a rapid restoration of these infrastructure elements, and such services were given first priority in the sequencing of the delivery of key components of disaster relief. This is because infrastructure has a great bearing on community perception of well-being and on whether the relief effort was perceived to be effective and successful or not. Hence, infra-structure-related services and repairs were provided as a top priority with the delivery of relief products. Major public infrastructure agencies such as the Department of Public Works, Ergon Energy and the Queensland State Disaster Management teams including the Australian Defense Force on site seemed to have prioritised the quick restoration and delivery of specific macro services for regional communities. Hence the rapid deployment of a range of heavy engineering response capabilities to restore roads, communications, the regional local radio station 4KZ, as well as repair and clear local schools of debris. The navy also helped on land and at sea, with heavy landing craft used to move equipment when roads have been cut due to flooding.

Such infrastructure services ensured the safety and free movement of road vehicles without the obstruction of foliage and felled trees; while the neutralisation of live electricity cables lying on roads ensured public safety. Clearing roads as promptly as possible was also

crucial to securing access to disaster sites by secondary relief teams. Access meant the ability to assess requirements of those affected and to subsequently deliver services and goods to meet beneficiary needs. As noted, these early 'services' were not directly targeted at individual beneficiaries but to the quick restoration of the regional disaster site, to bring it rapidly to a semblance of normality through the restoration of critical infrastructure such as electricity, water, communications (satellite phones), roads and so on from which relief targeted at individuals can unfold.

(c) Environmental/ecological-related services

The analysis undertaken reveals that miscellaneous environmental/ecological and environmental restoration services were provided independently. For example, volunteer wildlife carers were flown in from across Australia and sourced from local James Cook University ecological services department to help address hundreds of inquiries from members of the public about displaced and starving native animals, ranging from the cassowary (and endangered species) to snakes and crocodiles as well as possums, tree kangaroos, wallabies, flying foxes and other native wildlife. Data also shows that there were programmes aimed at fauna and flora conservation and restoration amongst others. Veterinary doctors also provided medical and surgical services to wildlife and animals while horticulturists restored plants. These environmental/ecological-related services were provided independently. The Preventative Waterways Debris Removal (PWDR) service, a waterway clean-up service focussed on clearing a significant number of high economic priority waterways for increased navigational safety. These include the canals, drainages, swamps, inlets and beaches in the cyclone affected area immediately after the cyclone. As a result of the cyclone, debris, foliage, trees and litter had been blown on to these waterways thereby restricting the operations of a range of vessels, and water-transportation in general. House, business and farm clean-up services were also provided for free as part of the relief service.

(d) Personal-related services

Person-related services that were delivered to individuals affected by the cyclone fall into several categories including: (a) emotional support; counselling services (grief); and miscellaneous advice on how to deal with particular situations and problems that the individual may have experienced (psychosocial support services); and (b) search and rescue services that involved rescuing people from flooded homes and areas, plucking people stranded on roofs by helicopters, and rescuing people from the torrents of swollen rivers. Such rescue services often result in (c) immediate medical intervention (d) transportation to emergency wards by helicopters and (e) nutritional recuperation services. Person-related services that were delivered to individuals affected by the cyclone also include housing related services such as (f) members of the State Emergency Service (SES) putting tarpaulins on the roofs of houses to stop the leakage where roofs have shifted as a result of the wind storm. This forestalls the need to move residents to temporary shelters in other locations as such affected residents are encouraged to stay in their own homes. In instances of serious damage to roofs where tarpaulins could not be used, temporary sheltering is provided, mainly in designated hotels and motels that government agencies pay for (g) personal counselling and emotional services delivered include emotional/grief support, counselling services and advice on how to deal with particular situations (psychosocial support) and for looking after mental well-being and public health.

(e) Information-related services

Information services provided to those impacted by Cyclone Larry vary from circumstance to circumstance. However, they include for example information on about how to complete and submit, may be, an insurance claim form, or information on available government schemes to for example help beneficiaries to clear their farm, or information on post-cyclone employment, or information about a workforce to help clear the business, as well as information about physical relief goods such as water, food, clothes, and if a business, information on equipment, spare parts, fuel and so forth. Other examples of information services provided pertain to the dissemination of public awareness information as regards for example updates on on-going relief activities, registration of missing and found persons as well as updates on evacuated persons. As relief unfolded, there were also daily newsletters and bulletins to provide the latest disaster management information to the members of the public. The Australian Broadcasting Corporation (ABC) was used to broadcast information about relief as well as local newspapers. Door knocking services was often the commonest way of retailing disaster information to households apart from mass media broadcasts on radio.

(f) Logistics-related services

Logistics-related services were mainly delivered by private sector, for commercial companies in services such as transport/ road haulage (Toll Logistics and Linfox), as air/transportation (Qantas freight 747s and ADF military helicopters/Chinooks). Warehousing and storage services were provided by both government and the private sector and used as staging posts for distribution operations for relief products. Logistics service providers (trucking firms) were key to the carriage and distribution of relief goods although the ADF already spear-headed the effort given its specialised trucks and capabilities.

Case 2: Newcastle earthquake DRC services

In the DRC for the Newcastle earthquake the emphasis was on relief services such as:

(a) Search and rescue-related services

The search and rescue of persons trapped in collapsed buildings with a view to saving lives was of highest priority in the immediate aftermath of the earthquake. Urban search and rescue (USAR) services were delivered together with emergency first aid care and the triage of injured persons for onward transportation to emergency departments. This occurred for example at the collapsed Newcastle Workers Club and at other buildings that had collapsed around the central business district of Newcastle and Hamilton, the two most affected suburbs of Newcastle). Hence, services delivered were about USAR, first aid and transportation by ambulance to hospitals. Ambulance Services were the most important category of ‘suppliers’ of relief in the immediate aftermath of the earthquake.

(b) Disaster victim identification (DVI)

Dead bodies had to be properly identified and removed from sites and taken to the morgue. Therefore, disaster victim identification services were delivered and bodies evacuated.

(c) Building and debris-related services

Collapsed buildings blocked roads and restricted access to ambulances, fire brigades and other emergency services. Hence, the second highest priority in the DRC was the clearance of debris by Army and City Council bulldozers as well as private demolition companies who had heavy equipment. These services were delivered to give further access to the paramedics and emergency services, and building inspectors. Services to do with the clearing of debris from roads, cordoning off of unstable and dangerous buildings and outright demolition of others were of key importance as engineering/building experts were flown in from all over Australia to speed up the process of building inspections and services. Demolition services were provided to prevent people from going back to inhabit dangerously cracked buildings. Earthquake debris included: aggregate; concrete; timber; metals; plaster board; plastics bricks; asbestos sheets; mortar; metals; nails; sand screws; and sharp stones. Demolition waste and earthquake debris was permanently disposed of at landfills, and there was no recycling and (modern) safe disposal of debris.

(d) Emotional and psycho-social counselling services

In the days and weeks after the earthquake, emotional and psycho-social counselling became one of the most dominant services provided.

(e) Financial-related services

Cash was handed out to affected persons by the Department of Community Services (DCS). Many community members were desperate as the earthquake occurred on 28th December 1989, when many had exhausted their cash supplies. Also, the disaster happened through the school holidays which meant that people were already short of money as they had spent a lot of money on Christmas and the holidays. So the NSW state government bore a lot of the initial financial relief effort whereas it should have been a wider all of government financial response.

(e) Security-related services

In the aftermath of the earthquake and during the provision of disaster relief, there were concerns about the potential for looting by criminal elements in the city. Hence, soldiers and airmen from the Royal Australian Airforce were used as support staff for the Police and the SES in manning the barricades and cordons around the earthquake impacted zones. The soldiers and airmen were also used in guarding public buildings, restricting public entry to the central business district and affected suburbs as well as providing security to building inspectors and demolition and bulldozer crews.

(f) Temporary accommodation services

Other services delivered the evacuation and transportation of people who had lost their homes, or had their homes sealed-off to motels and other temporary accommodation. These people were identified, sorted and interviewed about their personal circumstances before being allocated to various motels in unaffected areas of the city.

(g)Media and broadcasting-related services

Mass media especially radio stations were used extensively during the earthquake as a means of communications with the public as well as communications between members of the emergency services. There was no widespread use of computers, online information systems or mobile phones in 1989. Hence, the media was used as a communication and information tool for members of the Police, Fire and Ambulance services who had been on holidays. For example, to broadcast the urgent message that responders on leave such as Police should report back to their duty posts immediately. The media also served as a public enlightenment tool to inform the public. The media was also used for decision-making by responders regarding giving the public timely information in respect of evacuees and the progress being made by the emergency services in disaster response.

Conclusions

Data suggests that the concept of disaster relief is much broader in scope than the conventional, narrow notion of disaster relief, DOM and HL being primarily concerned with delivery of medicine, food and water. This research compels that disaster relief should be re-conceptualized as a broad portfolio with a range services (as well as goods) to be sourced, transported, delivered and distributed at disaster sites. Therefore relief teams may need to secure commitment in advance from governments/donors/suppliers to keep supplying or financing the range of needed services (and goods). The concept of the relief portfolio will also help responders pre-identify improvement opportunities in the relief portfolio in the pre-disaster mitigation/preparedness phase disaster management and humanitarian aid planning. The study opens up a new research direction for scholars of HL and DOM.

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