EMERGENCY LOGISTICS IN NZ: LEARNING FROM AID ORGANISATIONS

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Introduction

New Zealand (NZ) is prone to natural disasters, including earthquakes, floods and storms. The consequent need for rapid and well-coordinated emergency responses led the NZ Government to establish the Ministry of Civil Defence and Emergency Management (MCDEM), which is the lead agency for in-country disaster management. Among its many responsibilities, MCDEM supports the development of disaster management structures and systems and facilitates the cooperation across a range of responding agencies at the local, regional and national response levels (Webb and McEntire, 2014). These include the NZ Police, Fire Service, Ministry of Health, and Defence Force (Fogarty, 2014). Although a robust disaster management framework exists comprising legislation, plans, guidelines, processes and procedures, acknowledged deficiencies include the management of critical resources, the availability of professional logistics expertise, and the performance of the distribution of relief supplies (MCDEM, 2015c).

The responses to international humanitarian and domestic emergencies share common requirements. They need to be rapidly organised and require the swift mobilisation of human and material resources, as well as the fast delivery of supplies. However, global aid organisations have considerable expertise in managing agile supply chains (Charles *et al.*, 2010). They have developed a range of good practices that enable them to adapt to rapidly changing and unpredictable circumstances and to move swiftly from a 'dormant' and temporarily inactive operating state to an active, fully operative one (Kovács and Tatham, 2009). Hence, this paper aims to identify whether the supply chain procedures practised by global aid organisations might offer insights for improving responses to domestic emergencies.

To that purpose, logistics practices utilised by two well-respected global aid organisations are examined and good practices from the humanitarian logistics field are identified. Then, a review of the publicly available emergency management and logistics-focused documentation, including MCDEM's logistics guidelines (MCDEM, 2015b), is used to ascertain whether these practices are used by the NZ's emergency management agencies. Conducting such a comparative study is expected to support the identification of mechanisms and tactics having the potential to improve the flow of relief items in the aftermath of a disaster in NZ.

Good practices in humanitarian logistics

The sampled organisations

The two humanitarian aid organisations selected for this study, namely the United Nations (UN) World Food Programme (WFP) and the International Federation of Red Cross and Red Crescent Societies (IFRC), are well-recognised for their extended logistics expertise. This expertise has led to both organisations receiving supply chain excellence awards (IFRC, 2017f; Logistics Manager, 2014) and making their services available to other humanitarian organisations (IFRC, 2017e; WFP, 2015).

WFP is the UN agency specialising in the provision of food assistance to a yearly average of 80 million people in 80 countries. WFP views logistics as a key part of its humanitarian work and operates 5,000 trucks, 20 ships and 70 aircraft on an average day (WFP, 2017a). This proven logistics expertise has resulted in WFP being mandated to lead the UN Logistics Cluster that coordinates the logistics and supply chain activities of UN agencies and other organisations in emergency operations that require a joint response (Logistics Cluster, 2017a).

IFRC is another prominent humanitarian actor that reaches 150 million people worldwide each year through 189 National Societies. Based on its 90 years of experience with humanitarian deliveries, logistics has come to play a central role in IFRC's operations. Its reputation has resulted in IFRC

becoming a recognised provider of emergency supplies and logistics services in international disaster situations (Chomelier *et al.*, 2003; IFRC, 2017f).

The following sections examine the logistics practices of WFP and IFRC, identified by reviewing their websites and other publicly available documentation. As confirmed by the humanitarian logistics and supply chain management literature, the following six practices were identified for their ability to support the rapid mobilisation and deployment of emergency supplies.

Decentralised stockpiles
Both WFP and IFRC maintain a permanent network of logistics units strategically located close to disaster-prone areas as well as ports, airports and major roads. In particular, WFP manages the UN Humanitarian Response Depots (UNHRDs) on behalf of 82 partners (UN agencies, governmental as well as non-governmental organisations). This network of six logistics units located in Italy, Spain, Ghana, Dubai, Malaysia and Panama enables the delivery of stockpiled emergency supplies within 24-48 hours to any disaster-affected area (UNHRD, 2017a; WFP, 2017c).

Similarly, IFRC operates a permanent network of five regional logistics units (in Malaysia, Dubai, Kenya, Spain and Panama) plus smaller stockpiles of relief items in different parts of the world. Pre-positioning contingency stock enables IFRC to deliver urgently needed supplies within 24 to 48 hours of an emergency and to meet the immediate needs of 450,000 people anytime (IFRC, 2017f).

In short, maintaining decentralised stockpiles in well-connected regional logistics units enables humanitarian organisations to rapidly push emergency supplies to the field in the immediate aftermath of a disaster, i.e. before the actual needs of those affected is established and the supply chain is switched into its pull configuration. Pre-positioning supplies at strategic locations also improves response times (mostly due to the shorter geographical distances needing to be covered) and supports cost-efficiencies due to the more efficient management of infrastructures and inventory (Laguna Salvadó *et al.*, 2016).

Product standardisation and the development of a catalogue of standard items
Product standardisation is common in the humanitarian sector. For example, within the framework of the UNHRD initiative, WFP has developed a catalogue of standardised items including health products, food supplies, and shelter items (UNHRD, 2017c). IFRC similarly maintains a catalogue of 4,000 standard products that facilitate the selection of relief items and streamlines their purchase; two benefits that are particularly valuable in emergency situations (IFRC, 2017c).

Identifying the most suitable/demanded relief supplies and including them in a catalogue of standard items enables humanitarian organisations to reduce the number of goods that are purchased and maintained in stock, to increase inventory turnover and, as a consequence, to reduce the complexity of logistics systems (McGuire, 2015). Thus, product standardisation supports economies of scale and process efficiencies which, in turn, streamline logistics operations and lead to cost reductions in the procurement and storage of relief items. Product standardisation also increases inter-agency compatibility and, ultimately, enhances cooperation between humanitarian organisations as well as flexibility through stock exchanges (Schulz, 2008). Finally, standardisation enhances product consistency and improves the quality of the relief items when organisations specify clear product characteristics as well as a minimum level of quality requirements to be met by suppliers, e.g. through tests and controls (IFRC, 2017g).

Framework agreements with suppliers
Framework agreements are long-term arrangements set up with specific suppliers in advance of an emergency to establish the general purchasing terms and conditions (Balcik and Ak, 2014; Schulz, 2008). They reflect the reality that procurement is a time-consuming process involving the meticulous qualification and selection of suitable suppliers through strict tendering procedures. Also, in the aftermath of a major disaster, competition arises between humanitarian organisations that seek to purchase the same types of items at short notice. Such rivalry creates shortages of goods in the market and leads to inflated prices. Framework agreements provide a solution to such unfavourable factors (Balcik and Ak, 2014; Schulz, 2008).

IFRC first introduced framework agreements in 2001 to secure appropriate prices, to guarantee the quality and quantity of the goods purchased, and to ensure that delivery terms meet predefined requirements. IFRC mostly uses global framework agreements for the procurement of standard emergency supplies such as blankets, tarpaulins, kitchen sets and mosquito nets. Some of these agreements cover a minimum level of stock to be maintained by the suppliers, either at IFRC's above mentioned regional warehouses or the supplier's premises. In doing so, IFRC ensures that stocks are available in sufficient quantities at any given time to respond promptly to emergencies (IFRC, 2017d). WFP also negotiates and concludes framework agreements with UNHRD's core suppliers to secure favourable prices and guarantee quality and timely deliveries (UNHRD, 2017b).

Information management and visibility
Making the right information available to the right people at the right time is key to a successful emergency response. Critical logistics information includes demand information (where and when aid is required and in what quantities), cargo information (the actual location and quantities of the relief items, stored or in transit), as well as planning maps containing access information (e.g. ports and airports, road conditions, blockages, etc.). Information is essential to provide visibility over humanitarian logistics and supply chain operations and to support analysis and decision-making (Logistics Cluster, 2015; Tomasini and Van Wassenhove, 2009).

Both IFRC and WFP have developed information management systems that enable them to capture and disseminate critical supply chain information (e.g. to track and trace the relief items). In particular, IFRC has developed a web-based information platform called the Disaster Management Information System (DMIS) which provides timely information about disaster trends and the level of resources available, and enables users to coordinate their actions and share disaster management best practice (IFRC, 2004, 2017b).

WFP has gone a step further and developed an integrated platform that retrieves data from its various information management systems and consolidates all of the relevant supply chain information to provide end-to-end visibility of WFP's operations. The information available for every operation in the Supply Chain Management Dashboard (SCM-D) includes funding details, resource requirements and shortfalls, procurement information, and logistics-relevant data (e.g. transport as well as stock volumes and locations). This integration of supply chain information enables informed decision-making and enhances collaboration between organisational departments/units by breaking down the organisational silos. It also enables WFP to identify potential supply chain risks, challenges and opportunities (Sithole *et al.*, 2016).

Similarly, WFP's Relief Item Tracking Application (RITA) is an online tracking tool that provides easily accessible information on stock levels, movement requests, consignments, and delivery performance (Logistics Cluster, 2017b). To support timely and effective decision-making, WFP also uses early warning systems to anticipate natural, political and economic risks and, ultimately, to identify vulnerabilities and potential disasters. Geographic information systems (GIS) generate paper and digital maps of WFP's operational environments (WFP, 2013).

Inter-agency collaboration
Since a humanitarian response typically goes beyond the capacity of any single organisation, inter-agency cooperation is critical in the aid sector (Tatham *et al.*, 2017). Collaborative initiatives range from exchanging information to sharing logistics resources (e.g. warehousing and transport) and pooling procurement efforts. The benefits of collaboration include cost savings through volume consolidation, the better use of available logistics resources, the reduction of overlaps, and less competition between organisations striving to secure the same resources (e.g. relief items, storage space and transport capacity) (Schulz, 2008).

Both IFRC and WFP actively engage in collaborative partnerships with other humanitarian organisations. For example, IFRC has a partnership agreement with the UN Refugee Agency for the delivery of humanitarian aid to the people affected by conflicts in the Middle Eastern region, and one with UNICEF for matters concerning health, water sanitation and logistics (IFRC, 2017a).

WFP similarly supports inter-organisational logistics cooperation within the extensive UNHRD network by creating opportunities for sharing warehousing infrastructure, improving inventory management, and achieving more flexible and rapid disaster responses. In particular, UNHRD uses three stock pooling mechanisms. Firstly, in addition to storing and managing the stocks owned by its partners, UNHRD maintains 'white stocks', namely relief items owned by suppliers but stored in the UNHRD depots based on framework agreements concluded with the suppliers. As white stocks do not carry a logo, they can be released and ownership transferred to partners in response to actual needs. The benefits of this system are, for the partners, the availability of stocks without having to pay for them until they are needed and, for the suppliers, the storage of the goods free of charge (Schulz, 2008; UNHRD, 2011). Secondly, UNHRD supports the use of 'virtual stocks', i.e. relief items owned and stored by the suppliers on their premises but allocated to the UNHRD network by a framework agreement. The goods are released at a pre-negotiated price as soon as a partner needs them and UNHRD issues a purchase order. Such a system reduces inventory carrying costs (the capital, storage and insurance costs) as well as the risk of obsolescence for the UNHRD partners (Schulz, 2008; UNHRD, 2011). Finally, to further facilitate the sharing of relief items, UNHRD has implemented a system of stock loaning and borrowing. Under this arrangement, partners can borrow items owned by other humanitarian organisations and replenish them at a later stage. The advantages of this system are, for the borrowing organisation, the immediate availability of stocks (due to the absence of order lead time) and, for the lending organisation, a higher level of stock turnover (Schulz, 2008; UNHRD, 2011).

External partnerships

Partnerships maintained by IFRC and WFP go beyond those with other humanitarian organisations to include collaborative agreements with the private sector and with standby partners. Private sector partnerships enable aid agencies to benefit from the technical expertise and experience of companies that have core competencies in logistics or logistics-related fields. Thus, WFP has teamed up with global companies that can support and complement their logistics and supply chain management operations (e.g. Agility and UPS), as well as with transport and equipment manufacturers. For example, Renault Trucks deploys technicians to train WFP mechanics throughout Central and West Africa (Renault Trucks, 2017), and Caterpillar, the manufacturer of construction equipment and engines, regularly donates equipment to support WFP's operations (WFP, 2014, 2017b). IFRC has also established private-sector partnerships. For example, it signed an agreement with Airbus Corporate Foundation which is designed, among other things, to facilitate the transport of humanitarian supplies to the field, and to exchange logistics training staff (IFRC, 2012).

WFP and IFRC also have standby partnership programmes in place with government agencies, non-governmental organisations as well as private companies to maintain a roster of trained and experienced professionals who can be deployed at short notice. The use of such standby partners allows humanitarian organisations to rapidly complement their capacity and gain access to staff with specialised skills that are not available internally (WFP, 2017b).

Emergency logistics practices in NZ

Background information

This section examines the extent to which NZ emergency responders use the above six humanitarian logistics practices. Initially, the publicly available documentation produced by MCDEM was reviewed because of its recognition that logistics plays a critical role in disaster response. MCDEM also provides guidance on what constitutes good logistics practice in support of effective and efficient relief operations (MCDEM, 2015a). Additional items were sourced, for example by exploring the references contained in MCDEM's documents. Table 1 outlines the reviewed documents.

Title	Author	Year	Pages
Logistics in Civil Defence Emergency Management	Ministry of Civil Defence and Emergency Management	2015	122
CDEM coordination centre – Logistics	Ministry of Civil Defence and Emergency Management	2015	42
The NZ Coordinated Incident Management System (CIMS)	Officials' Committee for Domestic and External Security Coordination,	2014	2 (Section 4.2.5)

	Department of the Prime Minister and Cabinet		
Guide to the national civil defence emergency management plan	Department of the Prime Minister and Cabinet	2015	8 (Section 29)
Quick guide to emergency procurement	Ministry of Business, Innovation and Employment	2014	4
Guidelines for T-card use	National Rural Fire Authority	2014	10
Exploring NZ's capability to strategically manage logistical responses to major civil defence and emergency management events	Shaun Fogarty (Massey University)	2014	231
National Reserve Supplies	Ministry of Health	2015	Webpage

Table 1: Documentary sources used

Decentralised stockpiles

The logistic guidelines of MCDEM (2015b) emphasise that swift responses to emergencies are supported by the procurement and storage of critical resources in advance of the actual disaster event. In particular, responding agencies are advised to hold stocks of the supplies and equipment typically needed in the immediate aftermath of a disaster, especially if the affected area is likely to be cut-off. Critical resources include welfare items (e.g. blankets, bedding, cots, lighting, sanitation equipment), construction materials (e.g. sandbags, shovels, chainsaws), and information and communication equipment (e.g. laptops, phones, radios).

No mention is made of national stockpiles of critical emergency items being strategically located in NZ beyond the national reserve of health stocks managed by the Ministry of Health. This stockpile of drugs and medical items is designed to support a swift response to a pandemic or other health emergency, for example in the aftermath of a disaster. The stock items are stored at multiple sites across NZ to facilitate distribution and reduce risks (Ministry of Health, 2015). Apart from this national health reserve, it seems that no national contingency stock of emergency items is being maintained (i.e. beyond the stocks built and held by individual agencies).

Product standardisation and the development of a catalogue of standard items

Mechanisms to expedite the purchase of resources in emergency situations are in place in NZ (e.g. the arrangement of pre-approved financial delegations and the implementation of a flexible purchasing process deviating from the normal procurement rules) (MBIE, 2014; MCDEM, 2015b). However, it appears that no product standardisation process has been attempted to rationalise procurement operations. Since emergency management in NZ is based on cooperation between agencies and levels of response, product standardisation and the development of a joint catalogue of standard items would appear to offer significant value, such as facilitating stock exchanges, reducing operational complexity and streamlining logistics operations.

Framework agreements with suppliers

Framework agreements, which ensure the availability of resources in emergencies and secure price and delivery conditions do form part of the NZ emergency management practices. According to MCDEM's logistics guidelines, formal contracts, or Memoranda of Understanding, should be negotiated and concluded by NZ response agencies for resources that are not available internally, and that cannot be made available by other response levels (e.g. regional and national levels) or by other agencies. Such purchase arrangements are typically established for critical resources and resources regularly needed in emergency responses (MCDEM, 2015b).

Information management and visibility

In NZ, ongoing communication and interaction among functions and agencies are critical to emergency operations. Mechanisms are in place to capture and disseminate timely and accurate information and to provide visibility on logistics operations during emergency responses. In particular, responding agencies use a common, web-based information management tool called Emergency Management Information System (EMIS) that is designed to maintain situational awareness, record information, track data and generate reports. From a logistics perspective, EMIS is used to track tasks and resources, to create and process resource requests, and to store documents (e.g. request forms). Moreover, to enhance supply

chain visibility, resources are tracked through several processes from the time a responding agency has requested them to the time they are no longer needed. The records are maintained/updated when resources are requested, received, stored, issued to field teams, and returned/disposed of (MCDEM, 2015b).

If EMIS is not available to support resource management, other mechanisms can be used to track resources, including whiteboards and T-cards. T-cards are a paper-based recording tool developed by the NZ National Rural Fire Authority. They are also used by other agencies to track key resources during emergency operations. Different colours are assigned to different types of resources, and each card records the status of each resource (e.g. available, required, allocated) and its location (National Rural Fire Authority, 2014).

Inter-agency collaboration
Collaboration is a key characteristic of responses to NZ emergencies because emergency management takes place across a range of responding agencies at the incident, local, regional and national response levels (MCDEM, 2015b). When an agency is unable to meet its own resource needs, it must cooperate with other agencies and response levels. Thus, emergency responders must coordinate their logistics activities and resources (DPMC, 2015).

A common framework ensures consistency and supports coordination across agencies (e.g. emergency management groups, governmental agencies, fire services, police, the NZ Defence Force, and ambulance services). Specifically, the logistics guidelines of MCDEM (2015b) are focused on creating a common understanding of logistics, on providing a consistent and coordinated approach to logistics operations across all stakeholders, and on streamlining their logistics actions. With all this in mind, the guidelines advise logistics staff of responding agencies to ensure that processes and procedures are in place for accessing internal and external resources (for example, for issuing and processing resource requests). Inter-agency logistical collaboration extends to the exchange of staff and skills (in procurement, supply, transport) to increase capacity and capabilities when gaps are identified in response to an emergency (MCDEM, 2015b).

External partnerships
In NZ, the military organisations seem to be well integrated into emergency management operations. In particular, the Defence Force usually conducts aerial reconnaissance and supports transport operations and medical evacuations in the initial response phase. Similarly, the utility organisations (telecommunication, construction, water and energy) play their part by restoring essential infrastructure services damaged by a disaster event (Fogarty, 2014). Except for these important collaborations, partnerships with the private sector appear to be insufficient. As highlighted by McLean *et al.* (2012), who independently reviewed the emergency response to the February 2011 Christchurch earthquake, the skills and expertise of commercial logistics companies are essential to successful responses to large-scale disasters and should, therefore, be more extensively used. According to Fogarty (2014), who surveyed 84 emergency management professionals in NZ, there remains a lack of knowledge and understanding of the way in which NZ logistical resources and expertise can be mobilised and used, and the value that commercial businesses can add to emergency management. Going a step further, Fogarty (2014) argues that partnerships should also be developed with NZ's fast-moving consumer goods companies due to their extensive logistics and supply chain expertise and their ability to ensure that foodstuffs will be available on the shelves of local retailers in the aftermath of a disaster.

Discussion: lessons learned from humanitarian logistics

Reviewing the emergency logistics practices in NZ in the light of those employed by WFP and by IFRC enables us to identify some important similarities and differences. Firstly, both in the humanitarian and NZ emergency contexts, framework agreements with pre-selected suppliers are used to establish the purchasing terms and conditions for resources likely to be in high demand during the initial disaster response phase. Doing so enables the responding agencies to speed up the mobilisation and deployment of resources in an emergency, and to avoid goods shortages and inflated prices following a disaster. Secondly, the comparative study shows the importance of information communication and resource visibility in both the humanitarian and NZ emergency contexts. Accurate and timely logistics information

(in particular, resource tracking) is needed to support prompt decision-making and to ensure that available resources are deployed and managed most efficiently and effectively. Thirdly, the need for inter-agency collaboration is common to the humanitarian and NZ emergency contexts because responding to a disaster typically goes well beyond the capacity of any single agency. Rather, a successful response comes from people, teams and agencies sharing information and coordinating their actions to avoid gaps and overlaps and to achieve alignment.

Beyond these similarities, it appears that lessons can be learned from humanitarian logistics and could be invaluable if applied to the NZ emergency context. Firstly, product standardisation and the development of a catalogue of standard items could be an effective way to improve emergency management in NZ as these practices have the potential to simplify and streamline procurement processes and the downstream logistics activities. Most importantly, standardisation would support inter-agency compatibility and the exchange of resources that is a cornerstone of the emergency management system in place in NZ. Secondly, the NZ responding agencies could consider pooling and pre-positioning critical supplies at strategic locations, while also implementing resource-sharing mechanisms such as stock loaning and borrowing, and white and virtual stock sharing. In the immediate aftermath of a disaster, such mechanisms can support the timely availability of urgently needed relief items, speed up their deployment and reduce the cost of stockpiled resources. Thirdly, the NZ responding agencies could consider developing external partnerships beyond those that exist with the military and the utility organisations. In particular, collaborative agreements with commercial companies (especially in the logistics/supply chain management and fast-moving consumer goods sectors) would offer clear opportunities (including access to technical expertise about the rapid mobilisation of resources, the implementation and management of responsive supply chains, and the application of new and innovative methods).

Contribution, limitations and further research avenues

The authors agree with Fogarty's contention that humanitarian logistics concepts and practices apply to the management of disasters that occur in developed nations (Fogarty, 2014). This paper confirms that the consideration of humanitarian logistics practices does present opportunities to improve the emergency response to disasters in NZ. In particular, three potential areas are identified: product standardisation, the pre-positioning of pooled supplies, and the use of external partnerships to gain logistics skills and apply new techniques.

This pilot study is not designed to evaluate the current logistics and supply chain capacities and capabilities of NZ's emergency agencies. Its findings are based on documents that are available online and not on an exhaustive review of actual emergency management practices. Rather, this study reflects on good humanitarian logistics practice and aims to stimulate discussion and further investigation on the improvement of the current emergency logistics mechanisms in NZ. Hence, additional research is needed to establish a complete overview of NZ's emergency management landscape and to identify gaps and areas for improvement more systematically and exhaustively. It is also fully accepted that this paper does not explore every good practice that is used by humanitarian organisations, but only those that could be identified within WFP's and IFRC's publicly available documents. Additional topics highlighted in the broader humanitarian logistics literature (e.g. rapid and flexible funding practices, a culture of continuous improvement, and the use of emerging technologies such as 3D printing, drones and airships) also deserve further attention.

Conclusion

In the context of highly complex disaster management operations, such as those organised in response to the 2010 and 2011 Christchurch earthquakes and the 2016 Kaikoura earthquake, emergency management authorities and agencies should reflect on how they operate. The global aid organisations have developed expertise in the implementation and management of responsive and flexible relief supply chains, and have developed humanitarian logistics practices that appear to have significant potential for NZ's disaster responders.

References

- Balcik, B. and Ak, D. (2014), "Supplier selection for framework agreements in humanitarian relief", *Production and Operations Management,* Vol. 23 No. 6, pp. 1028-1041.
- Charles, A., Lauras, M., and Van Wassenhove, L. (2010), "A model to define and assess the agility of supply chains: building on humanitarian experience", *International Journal of Physical Distribution & Logistics Management,* Vol. 40 No. 8/9, pp. 722-741.
- Chomelier, B., Samii, R., and Van Wassenhove, L. (2003), "The central role of supply chain management at IFRC", *Forced Migration Review,* Vol. 18, pp. 15-16.
- DPMC (2015), "Guide to the national civil defence emergency management plan", Department of the Prime Minister and Cabinet, available at http://www.civildefence.govt.nz/assets/guide-to-the-national-cdem-plan/Guide-to-the-National-CDEM-Plan-2015.pdf (accessed 8 August 2017).
- Fogarty, S. (2014), "Exploring New Zealand's capability to strategically manage logistical responses to major civil defence and emergency management events", Massey University, available at http://mro.massey.ac.nz/handle/10179/5815 (accessed 8 August 2017).
- IFRC (2004), "Information management and coordination", available at www.ifrc.org/docs/appeals/annual03/019703annrep.pdf (accessed 8 August 2017).
- IFRC (2012), "Airbus Corporate Foundation and International Federation of Red Cross and Red Crescent Societies sign cooperation agreement", available at http://www.ifrc.org/en/news-and-media/press-releases/general/airbus-corporate-foundation-and-international-federation-of-red-cross-and-red-crescent-societies-sign-cooperation-agreement/ (accessed 8 August 2017).
- IFRC (2017a), "Current active agreements at regional and global level", available at http://www.ifrc.org/en/who-we-are/governance/working-partners/agreements/ (accessed 8 August 2017).
- IFRC (2017b), "Disaster Management Information System", available at https://www-secure.ifrc.org/DMISII/Pages/00_Home/login.aspx (accessed 8 August 2017).
- IFRC (2017c), "Emergency items catalogue", available at http://www.ifrc.org/en/what-we-do/logistics/procurement/catalogue-/ (accessed 8 August 2017).
- IFRC (2017d), "Framework agreements", available at http://www.ifrc.org/en/what-we-do/logistics/procurement/framework-agreements/ (accessed 8 August 2017).
- IFRC (2017e), "Global Logistics Service", available at http://www.ifrc.org/PageFiles/91193/GLS%20services%20leaflet.pdf?epslanguage=en (accessed 8 August 2017).
- IFRC (2017f), "Humanitarian Logistics", available at http://www.ifrc.org/en/what-we-do/logistics/ (accessed 8 August 2017).
- IFRC (2017g), "Quality-Standards-Inspection", available at http://procurement.ifrc.org/catalogue/quality.aspx (accessed 8 August 2017).
- Kovács, G. and Tatham, P. H. (2009), "Responding to disruptions in the supply network - From dormant to action", *Journal of Business Logistics,* Vol. 30 No. 2, pp. 215-229.
- Laguna Salvadó, L., Lauras, M., Comes, T., and Grenade, M. (2016), "A study on the sub-regionalization of humanitarian supply chain: the IFRC case", 13th International Conference on Information Systems for Crisis Response and Management, Rio de Janeiro, Brazil.
- Logistics Cluster (2015), "Information management", available at http://dlca.logcluster.org/display/LOG/Information+Management (accessed 8 August 2017).
- Logistics Cluster (2017a), "About us", available at http://www.logcluster.org/about-us (accessed 8 August 2017).
- Logistics Cluster (2017b), "RITA: Relief Item Tracking Application", available at http://www.logcluster.org/cargo-tracking (accessed 8 August 2017).
- Logistics Manager (2014), "Revealed: all the awards winners", available at http://www.logistics manager.com/2014/11/22827-revealed-all-the-awards-winners/ (accessed 8 August 2017).
- MBIE (2014), "Quick guide to emergency procurement", available at http://www.procurement.govt.nz/

procurement/for-agencies/key-guidance-for-agencies/emergency-procurement (accessed 8 August 2017).
- MCDEM (2015a), "Logistics guideline published", available at http://www.civildefence.govt.nz/about/ news-and-events/news/logistics-guideline-published/ (accessed 8 August 2017).
- MCDEM (2015b), "Logistics in Civil Defence Emergency Management", available at http://www.civil defence.govt.nz/assets/Uploads/logistics-dgl/DGL-17-15-Logistics.pdf (accessed 8 August 2017).
- MCDEM (2015c), "National capability assessment report", available at http://www.civildefence.govt.nz/ assets/FINAL-National-Capability-Assessment-Report-2015.pdf (accessed 8 August 2017).
- McGuire, G. (2015), "Handbook of humanitarian heath care logistics", available at http://www.humanita rianhealthcarelogistics.com/handbook.htm (accessed 8 August 2017).
- McLean, I., Oughton, D., Ellis, S., Wakelin, B., and Rubin, C. B. (2012), "Review of the civil defence emergency management response to the 22 February Christchurch Earthquake", available at http://www.civildefence.govt.nz/assets/Uploads/publications/Review-CDEM-Response-22-February-Christchurch-Earthquake.pdf (accessed 8 August 2017).
- Ministry of Health (2015), "National reserve supplies", available at http://www.health.govt.nz/our-work/emergency-management/national-reserve-supplies (accessed 8 August 2017).
- National Rural Fire Authority (2014), "Guidelines for T-card use", available at http://www.nrfa.org.nz/ Templates%20%20forms/Guidelines%20for%20Tcard%20use.pdf (accessed 8 August 2017).
- Renault Trucks (2017), "WFP partnership", available at http://corporate.renault-trucks.com/en/wfp (accessed 8 August 2017).
- Schulz, S. F. (2008), "Disaster relief logistics: benefits and impediments to horizontal cooperation between humanitarian organizations", University of Technology, Berlin, available at https://deposit once.tu-berlin.de/handle/11303/2383 (accessed 8 August 2017).
- Sithole, B., Silva, S. G., and Kavelj, M. (2016), "Supply chain optimization: enhancing end-to-end visibility", *Procedia Engineering,* Vol. 159, pp. 12-18.
- Tatham, P. H., Spens, K., and Kovács, G. (2017), "The humanitarian common logistic operating picture: a solution to the inter-agency coordination challenge", *Disasters*, Vol. 41. No. 1, pp. 77-100.
- Tomasini, R. and Van Wassenhove, L. (2009). *Humanitarian logistics*. Basingstoke: Palgrave Macmillan.
- UNHRD (2011), "Standard operating procedures", available at unhrd.org/docs/STANDARD_ OPERATING_PROCEDURES_01_06_2011_v1.3.pdf (accessed 8 August 2017).
- UNHRD (2017a), "About us", available at http://unhrd.org/page/about-us (accessed 8 August 2017).
- UNHRD (2017b), "UNHRD e-Catalogue", available at http://unhrd.org/page/unhrd-e-catalogue-how-it-works (accessed 8 August 2017).
- UNHRD (2017c), "UNHRD Product catalogue", available at http://unhrd.org/e-catalogue (accessed 8 August 2017).
- Webb, C. and McEntire, D. A. (2014), "Emergency management in New Zealand: potential disasters and opportunities for resilience", in D. A. McEntire (Ed.), *Comparative emergency management*, FEMA Emergency Management Institute, Emmitsburg.
- WFP (2013), "WFP's emergency preparedness and response branch", available at http://documents .wfp.org/stellent/groups/public/documents/resources/wfp257407.pdf (accessed 8 August 2017).
- WFP (2014), "Caterpillar: delivering hope in the Ebola crisis", available at https://www.wfpusa.org/ articles/caterpillar-delivering-hope-ebola-crisis/ (accessed 8 August 2017).
- WFP (2015), "WFP Logistics in 2014", available at http://documents.wfp.org/stellent/groups/public/ documents/communications/wfp275144.pdf (accessed 8 August 2017).
- WFP (2017a), "About", available at http://www.wfp.org/about (accessed 8 August 2017).

- WFP (2017b), "Partnerships", available at https://www.wfp.org/logistics/partnerships (accessed 8 August 2017).
- WFP (2017c), "UN Humanitarian Response Depots", available at https://www.wfp.org/logistics/humanitarian-response-depot (accessed 8 August 2017).