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Real-Time Information and Managing Infrastructure in Humanitarian Logistics Operation: An Exploratory Study

Lee Ker Qing[a]; Dazmin Daud[a],*

[a]Department of Logistics Management, Faculty of Business and Information Science, UCSI University, Kuala Lumpur, Malaysia.
*Corresponding author.

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Abstract

The purpose of this paper is to provide a view pertaining to humanitarian logistics operation from two Malaysian organizations. It focuses on two perspectives: real-time information and managing infrastructure. It deals with the exploratory approach using open-ended questionnaires. The findings show that views from the respondents vary. It is considered to have made a significant contribution to the literature, by using the Malaysian organizations which relate to humanitarian logistics operation.

Key words: Humanitarian logistics; Real-time information; Managing infrastructure; Open-ended questionnaire

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INTRODUCTION

In Malaysia, the attention pertaining to disaster response was raised after the Asian Tsunami in 2004. It alerted a better humanitarian aid operation. This is because logistics operation is the key success factor in a complex humanitarian supply chain (Christopher, 2011). Tomasini and Wassenhove (2009) described humanitarian logistics as activities that concerned with human welfare during and after a disaster. Governments or organizations deploy humanitarian aid to those who are affected by a disaster such as Asian Tsunami. These organizations are unable to deploy any humanitarian aids to the affected areas if they do not have real-time information and availability of infrastructures. Efficiency and effectiveness of humanitarian logistics to the disaster area are vital since it requires a large-scale provision of aid.

Logistics functions in the humanitarian logistics must be able to support Governments or organizations to perform response operations in order to coordinate performance, eliminate redundancies and maximize usage of resources (Pan American Health Organization, 2001). Furthermore, humanitarian logistics needs to learn from modern logistics supply chain as they have to deal with unexpected turbulence and uncertainty (Christopher, 2011).

Globally, humanitarian logistics organizations have been focused as an important function by the United Nation. For example, the World Food Programme (WFP) established its first United Nations Humanitarian Response Depot (UNHRD) in Brindisi, Italy on 1st June 2000. The UNHRD has facilities to store cold and dry food, provide logistics support and services to United Nations (UN) and other humanitarian agencies. It can serve the disaster areas within 48 hours within the service region. In Malaysia, the UNHRD operation is in Subang, Selangor and it is supported by the Royal Malaysian Air Force (RMAF) to ensure speedy distribution to affected regions.

In Malaysia, a study about humanitarian logistics is not been widely explored. Pettit and Beresford (2009) literature only explained the critical success factors in the context of general humanitarian aid supply chains. In addition to that, very few literature reviews have emphasized the nature of humanitarian logistics in Malaysia (examples see Pettit & Beresford, 2009; Schulz & Blecken, 2010). In order to gain more knowledge about humanitarian logistics in Malaysia, an exploratory study was conducted with two organizations that practise humanitarian logistics operations. The scope of the study focuses on two issues. Firstly real-time

information and then managing infrastructure in association with humanitarian logistics operations. A qualitative method was applied in this study. Data was gained through face-to-face interviews. Below are the research questions and the research objectives:

Research Questions

- To what extent lack of real-time information affect efficiency in humanitarian operations?
- In what way humanitarian organizations manage infrastructure from depots to disaster area in humanitarian operations?

Research Objectives

- To determine the importance of real-time information in humanitarian operations.
- To explore the nature of managing the infrastructure from depots to disaster areas.

1. LITERATURE REVIEW

Gaps are revealed in humanitarian logistics practice, research, education, as well as between these. Few education programs to date consider the skill needs of humanitarian logisticians, but future trends in practice and research can be used to develop them further. More empirical and practice-near research is called for at the same time as there is a need for comparative analyses, generic models, and theory building in humanitarian logistics especially from the Malaysia perspective.

Humanitarian logistics is an operation activated as a response to catastrophes (Kovács & Spens, 2007). This includes activities such as supporting aid work and disaster relief. Kovács and Spens have explained that to ensure the success in the logistics operations for aid work as well as disaster relief, three phases of disaster relief operations are required. These phases are preparing for a disaster, immediate disaster response, and reconstruction.

There is a study that emphasized the need to operate effectively supply chain management in humanitarian logistics. Tomasini and Wassenhove (2009) described the evolution of supply chain management in disaster relief as well as the involvement of private organizations. They added that understanding operation management is the key factor for the successful in any humanitarian operations. Meanwhile, gaps in the humanitarian logistics exist in the areas of practice, research and education (Kovács & Spens, 2011). Few education programs to date consider the skill needs of humanitarian logisticians.

The Asian tsunami in December 2004 has triggered problems in coordinating information and other resources to the affected areas (Jahre & Jensen, 2010). There are challenges in defining standards for basic logistics information as well as logistics operating procedures in the case of humanitarian logistics. Each organization has its own logistics operating procedures. For example, the effect of the tsunami on infrastructure was not given high attention before the Asian tsunami in 2004 (Ghobarah, Saatcioglu & Nistor, 2006).

Real-time information refers to the controlling and monitoring procedures that can track the emergency supplies (Pan American Health Organization, 2001). It includes the demand from disaster area, shipment of supply resources of relief from depot to disaster area and storage information. Pan American Health Organization further elaborated that the shipping process in humanitarian logistics must:

- Know the route taken by the supplies and thus be able to identify. For instance, where a consignment that has not reached its destination might have been detained;
- Identify all the people who have been responsible for the shipment, from its point of origin to its final destination; and
- Have the necessary documents to keep track of the shipping and reception of the supplies.

The application of the Integrated Information Technology System (IITS) in humanitarian logistics is not at optimum level compares to commercial logistics (Fritz Institute, 2005). In theory, the IITS should support procurement, distribution, tracking and tracing of goods and funds from relief centres to the disaster areas. In addition to that, the system assists the supply chain activities to improve responsiveness, and also to enable organizations to retain and transfer knowledge in a systematic way.

The IITS still has a long way to be implemented totally in humanitarian logistics operations. Findings from Balcik et al. (2010) showed that factors such as person in charge, funding of operations, resource scarcity/oversupply and cost of coordination contributed to efficiency of the successful usage of integrated information system.

Logistics functions such as transportation and its infrastructure play an important role in humanitarian logistics. In the context of humanitarian logistics, efficient transport operation refers to the delivery of relief resources, which is from depots of supplies until the resources reach the disaster area (Pan American Health Organization, 2001). It also emphasizes the need to consider alternatives strategic routes due to the possibility of damaged transport infrastructure (ports, airports, highways, railroads, and waterways). Considerations also must include any possibility of bottlenecks which can occur in the storage of disaster area, the delivery routes, the transit area, effective communication and accessibility hangars and warehouses, or loading and fuelling equipment.

Assessing the importance of infrastructure in humanitarian logistics has been mentioned in various literature (examples see Kovács & Spens, 2007; Oloruntoba & Gray, 2006). According to Kovács and Spens (2007), transportation and infrastructure are among the salient characteristics of humanitarian logistics. Lacking of these two factors would result the destabilization and the possibilities to assure quality of food and medical supplies. Failure of critical

infrastructure such as bridges, harbour docks, hospitals and communication systems delayed search and rescue operations and relief efforts, which increased the suffering of the survivors (Ghobarah, Saatcioglu & Nistor, 2006).

Oloruntoba and Gray (2006) made a comparative study between humanitarian supply chains and conventional business supply chains. Their findings concluded that the humanitarian supply chain, through an effective information infrastructure and sensitive needs assessment mechanism at the field level would enhance supply chain agility by being very responsive to the changing needs of end users, and by being able to respond almost immediately to those changes. Humanitarian organizations must continuously improve from the perspectives of agility and adaptability of their logistics strategies when it involves in disaster relief (Wassenhove, 2006).

2. METHODOLOGY

The objective of this study is to determine the importance of real-time information towards operation, including the consideration of infrastructure from depots to disaster areas in humanitarian logistics operations. In this study, a qualitative method was used through series of interviews. The interview questions are designed from the combination of significant information from related humanitarian logistics literatures. This is done in order to establish validity and to ensure the study covers relevant and important issues.

Table 1
Demographic Information and Open-Ended Questions

Section A: Demographic information	
Question 1:	Position
Question 2:	Nature of service
Question 3:	Past and recent contribution
Question 4:	Uniqueness of the organization
Section B: Managing humanitarian logistics	
Question 1: Views to humanitarian logistics	
What do you think of the current scenario pertaining to humanitarian logistics?	
How do you differentiate between humanitarian logistics and commercial logistics?	
Question 2: Difficulties to acquire real-time information	
What is the issue faced by humanitarian logistics industry in obtaining real-time information?	
What are the reasons that cause humanitarian logistics difficult to obtain real time information?	
What is the consequence without having sufficient real-time information in humanitarian logistics?	
Question 3: Difficulties in managing with the infrastructure from depots to disaster areas	
How do you manage the infrastructure from depot to disaster area?	
What are the issues faced by humanitarian logistics organization in managing infrastructure from depot to disaster area?	

An open-ended questionnaire survey was used in the exploratory study. An open-ended questionnaire is a measurement question where the respondent chooses the words to frame the answer (Cooper & Schindler, 2008). The design of open-ended questions in the exploratory study was based on the guidelines from Reja, Manfreda, Hlebec, and Vehovar (2003) and Krause (2002) instruments. Four demographic questions and 3 open-ended questions were designed for the questionnaire (see Table 1).

Qualitative method was used in this study. In order to obtain more information from the two organizations, a judgment sampling was used since the respondents' nature of work was directly involved in the humanitarian logistics operations in Malaysia. This would be able to provide good and reliable data for this qualitative study.

Table 2
Summary of Respondents' Information

Organization	Position
World Food Program – United Nations Humanitarian Response Depot – Subang, Selangor, Malaysia.	Logistics Officer
World Food Program – United Nations Humanitarian Response Depot – Subang, Selangor, Malaysia.	National Logistics officer
Crisis Relief Services & Training Berhad, Subang Jaya, Sealangor, Malaysia.	Logistics Manager

The respondents for the interview consisted of three logistics officers from two organizations. The respondents had a vast experience in humanitarian and logistics environment as well as holding respectable positions in their respective organizations. The interviews took place between 11st October 2013 and 17th October 2013. The interviews were in English and were recorded using voice recording devices with the consent from the respondents. Their views were sought to provide inputs pertaining to managing humanitarian logistics in Malaysia. Table 2 summarizes the respondents' information.

3. FINDINGS

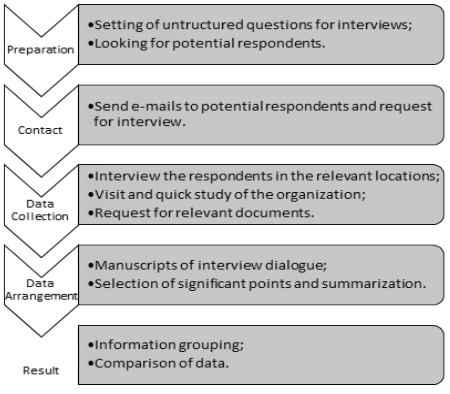

Figure 1
Flow of Findings

The flow of findings is shown in Figure 1. Activities in this flow of findings are grouped into preparation, contact, data collection, data arrangement, and results or findings. Method in Figure 1 was modified from Cooper and Schindler (2008) research design for qualitative method.

Table 3
Basic Information about United Nations Humanitarian Response Depots and Crisis Relief Services & Training

Organization	United nations humanitarian response depots (UNHRD)	Crisis relief service & training (CREST)
Nature of Organization	Inter-agency network managed by the World Food Program (WFP)	Malaysian born international Non-Governmental Organization (NGO)
Year of Establishment	2010	1998
Scope and uniqueness	Widest logistics network timeliness, cost efficiency, coordinated response, standardized items, staging areas, and training facilities.	Deployment team in remote disaster area, search and rescue phase, relief phase, development phase, the first Malaysian Christian foundation based international NGO only focusing on natural disaster ground relief delivery.
Contributions	From year 2010 to 2013: Deployment of relief items to Afghanistan, Bangladesh, Bhutan, Cambodia, Indonesia, Japan, Laos, Myanmar, Nepal, North Korea, South Korea, Pakistan, Philippines, Thailand, Solomon Islands, Ethiopia, Comoros, Iraq, and Mozambique.	From year 1998 to 2013: Deployment of relief items to Cambodia, China, India, Indonesia, Iran, Japan, Malaysia, Myanmar, Pakistan, Philippines, South America, Thailand, and Turkey.

Table 4
Managing Humanitarian Logistics

Category	UNHRD	CREST Malaysia
Current scenario of humanitarian logistics	- Regular natural disaster in Asia. - Building response capacity.	- Advance technology to ease communication and custom procedure.
Concept of humanitarian logistics	- Mobilize whatever resources to get goods direct to the beneficiaries in fastest way. - To save life. - Can be risky.	- Direct shipment within the shortest time even it is expensive. - Recognize the three phases, urgent, very urgent and can be delay.
Issue in acquiring real-time information	- No major issues in obtaining information. - Example: Davao, Philippines – A situation of insufficient information about the capacity of Davao airport. As they do not have an office and regular flights, staff of World Food Program office in Davao contacted the airline portal and the officer to send photo of the airport to UNHRD. The result was acceptable.	- Difficulty in getting accurate information especially in third world countries. - Example: Myanmar, mobile clinic operation - started in 2 villages by bringing an amount of medicine. There were more families and residents in second village than first village, hence the medicine have finished 50% in first village.
Reasons caused that unable for organization to get accurate real-time information	- Improper information or delayed information; - The UNHRD website is not user-friendly, the system is outdated and complicated, and it is difficult to reach the desire information.	- The collected data might not be reliable once disaster strike, the numbers of people might have huge difference from the data. The data is just for a rough planning; - Political Issue. - Language Barrier. - Example: In one case, the local army asked for 30% of the resources, and they escorted the team to the destination and the distribution was done well.
Consequences without sufficient real-time information during operation	- Delayed and insufficient information could affect the deployment of items and response time. - Stock stacked in the port or depots. - Example: The Comoros – A situation that cannot get accurate information from airline about the status of the cargo. It is difficult for forwarding agent to track the status of cargo because Comoros is not a common destination. The cargo was delayed and stuck in Yemen.	- Bias information. - Disposal of resources which stacked in the port. - Resources might not be suitable for the beneficiaries. - Example: Japan, instant noodles sent from Malaysia got quarantine and stuck at the port. At final, the goods were demolished.
Managing infrastructure from depot to disaster area	- Items are sent from UNHRD to port or the airport, it do not directly send to disaster area. - There are few points of entry in most of the places, seaport and airport are basic. - Warehouse functions are to store received items. - A destination that has regular flights is easier and faster to send relief.	- Handle goods from “door to port concept”. - Then, the “port to door concept” will leave it to local people, as they know the ground and custom procedure, better communication, and for them to build future relationship for a long term planning.

To be continued

Continued

Category	UNHRD	CREST Malaysia
Methods of managing infrastructure from depot to disaster area	- No limitation on, uses whatever transportation methods possible; - For some shorter distance location, backup and bulky items can be sending by road; - Important item can be send by air freight; - Example: Vientiane, Laos – All the while, shipment was made by air freight, one day the agent suggested to use road transport. Everything can be transport in one trip and road can be cheaper; - Example: Haiti in 2010 - The port was heavily damaged, which could not receive any containers. A landing craft was mobilized in deep sea and deliver goods to the beach by transferring to the smaller ship. - Example: Aceh, Indonesia – City was broke and damaged. Mobilize missiles, using of smaller air craft to shutter to the destination.	- Normally take charge of door to port and try avoiding door to door.
Issues in managing infrastructure from depot to disaster area	- Partial shipment would take few days to complete due to flight schedule and cargo slots; - Example: Vientiane, Laos - The custom clearance made some delay because of the air ways bill was stated 200 family kits, the custom of destination cannot clear the partial shipment first, until all the items received.	- After disaster, there will be no electricity, especially in non-urban area, thus it creates difficulties in communication. - When all communication cut off, there will be an issue to locate where the disaster strike, resources then are unable to reach those who need it.

Basic information about the two organizations which operate humanitarian logistics in Malaysia is shown in Table 3. Perceptions pertaining to the humanitarian logistics by the Malaysia organizations are shown in Table 4. Contents in Table 4 are based on the Research Objectives from this study.

DISCUSSIONS AND CONCLUSION

The findings in Table 4 pointed out views pertaining to real time information and infrastructure related to humanitarian logistics operations. Respondents described the real-time information as the first-hand information. It is the primary source of information that enables humanitarian workers to identify the scales and typed of resources needed. As accessibility in disaster area can be very poor, obtaining real-time Information is crucial. As quoted from the CREST Malaysia's respondent "to deliver the right on field needed supplies, in the right conditions and the right quantity to the right place to the right people".

If there is a lack of real-time information, it will result in delaying search and rescue activities. In addition to that, unreliable information would cause a waste of resources and cost. Kostoulas, Aldunate, Mora and Lakhera (2008) emphasized the application of real-time information which allows efficiency in humanitarian operations. This, however, requires infrastructure to support the real-time information by coordinating among agencies involve in the humanitarian operations.

Respondents from both organizations gave cases that occurred outside Malaysia, indicating the lack of logistics humanitarian operations in Malaysia at the large scale. Countries like Philippines, Comoros, Haiti, Indonesia, Myanmar, Laos and Japan were tapped during the interviews. All respondents agreed that in all disaster cases, getting the right and fast information would determine the success of humanitarian logistics operations. Concepts such as language, country's ideology, filtered information, poor website were detected from respondents' views pertaining to real-time information in relations to humanitarian logistics. Future studies should focus on these concepts in order to gain in-depth inputs in the case of humanitarian operations in Malaysia.

In the case of managing infrastructure, respondents stated that their organizations managed the movement of goods from their depot to the disaster area. When it reached to the affected area, the efficiency of their operations was determined by the availability of local agencies. At this point of juncture, all types of transportation available were used to enter the heavily damaged disaster area. As viewed by one respondent, "urban disaster area in mega cities can be a challenge, because it is very hard to identify the number of people affected". This shows the need for high coordination and sharing of resources by all parties involved in the humanitarian logistics operations (see Kovács & Spens, 2011). This is to ensure smooth movement of goods such as food and medicine to the affected locations.

One respondent added that with the aid of infrastructure, distributing relief aids such as food and medicines become much faster. Furthermore, dealing with these affected areas can be much easier due to the participation of local community leaders who provided information to the humanitarian organizations. Future study should focus more on how infrastructure acts as a moderator in influencing the association between coordination and smooth operation in the perspective of humanitarian logistics. One respondent emphasized the need to establish collaboration with the local and other government agencies for infrastructure coordination. All respondents agreed that every case of disaster is different, thus, it has different solutions.

This study has limitations. First, only two organizations were used in the study. The findings pertaining to research objectives were base on the views from respondents who were working in these two organizations. This would result in bias of the respondents' answers. Second, there is a limited number of local organizations involve in the humanitarian logistics in Malaysia. This restricts the number of respondents.

In conclusion, this initial study suggests that real-time information and managing infrastructure appear from respondents' views pertaining to humanitarian logistics operation. Learning from Malaysia humanitarian logistics organization will be important as disaster relief operations indicate how to manage this type of environment with the needs of real-time information and infrastructure.

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