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Identification and prioritization of coordination barriers in humanitarian supply chain management

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ABSTRACT

In the wake of disaster, several organizations work for the welfare of the disaster victims, although lack of coordination among them hampers the performance of relief operations. This study sets out to explore and prioritize the coordination barriers in the humanitarian supply chain management (HSCM), particularly in the Indian context to enhance the performance of relief operations. The study is divided into three phases. Initially, barriers to coordination were identified through an extensive literature review, allied to brainstorming sessions with experts. These were then grouped into 5 categories, i.e. management barriers, technological barriers, cultural barriers, people barriers and organizational barriers. Secondly, a survey questionnaire was designed, tested and refined to incorporate the views of the managers involved in the relief operations of the disaster that occurred in the Uttarakhand (a Northern state in India) on June 14, 2013 in order to empirically verify the barriers to coordination. Finally, barriers were prioritized on the basis of their severity using fuzzy analytic hierarchy process (F-AHP) which considers the uncertainty of the data and impreciseness rather than crisp value. The results indicate that lack of top management commitment, improper organizational structure to create and share knowledge and lack of policy for coordination are the major barriers. These are the areas that need to be handled first in order to remove coordination barriers. The findings of the study throw some new light on the coordination issues in HSCM and provide a more effective, efficient, robust and systematic way to overcome coordination barriers.

1. Introduction

Q4 The occurrence of natural disasters is on the rise in India. It belongs to the category of most disaster prone countries in the world [54]. India is the seventh largest country in the world and covers an area of 3,287,590 km^2 extending from the snow-covered Himalayan heights to the tropical rain forests of the south. The unique geo-climatic and socio-political conditions of India as it is surrounded by mountains and the sea make it more vulnerable to natural disasters [5,54].

With regard to the vast area of the Indian landmass, around 60% of the landmass is susceptible to earthquakes of different intensities; over 40 million hectares is susceptible to floods; about 8% of the total area is susceptible to cyclones and 68% of the area is susceptible to drought. Floods, earthquakes, cyclones and hailstorms are responsible for the most frequently occurring disasters in India. According to Singh [77] India was rated as one of the "high risk" countries in absolute terms along with six other countries (Mexico, the Philippines, Turkey, Indonesia, Italy and Canada). Singh [77] also cited that the direct financial loss due to natural disasters alone accounts for 2% of India's GDP and up to 12% of central government revenues.

For the purposes of this paper, a disaster is defined as "a serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources" [91, p. 9]. In the past, India has witnessed various devastating natural disasters, such as super cyclones in Orissa in the year 1999, an earthquake in the Gujarat in the year 2001 and the Tsunami in coastal states in 2004. In June 2013 a cloud burst in Uttarakhand caused heavy floods in the area of Uttarakhand, Haryana, Delhi, Uttar Pradesh, Himachal Pradesh and some of the regions of Tibet and Nepal. 95% of the casualties occurred in the Uttarakhand. More than 5000 people were affected by this flood. Table 1 gives an illustration of the losses due to disasters during the period of 2001–2010 [54].

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Table 1
Year-wise damage caused due to different disasters during the last ten years in India.

Year	Lives lost humans (in no.)	Houses damaged (in no.)	Cropped area affected (in lakh hectares)
2001–02	834	3,46,878	18.72
2002–03	898	4,62,700	21.00
2003–04	1992	6,82,209	31.98
2004–05	1995	16,03,300	32.53
2005–06	2698	21,20,012	35.52
2006–07	2402	19,34,680	70.87
2007–08	3764	35,27,041	85.13
2008–09	3405	16,46,905	35.56
2009–10	1677	13,59,726	47.13
2010–11	2310	13,38,619	46.25

To deal with the complex and emergency situations arising due to disasters, actors involved in the humanitarian supply chain (HSC) are motivated to coordinate with each other to enhance the efficiency of relief operations [93]. Actors in HSC refers to various stakeholders who are directly or indirectly involved in the relief operations such as the government of the host country, governments of other countries, private donors, aid agencies, humanitarian relief organizations (HROs), logistic providers, the military, media and the local people [41].

The coordination issues in the supply chain have been widely studied in the commercial context [29,46,48,7,8], but only a very few studies are available in the humanitarian context. Coordination in the context of HSCM is defined as "the relationships and interactions among different actors operating within the relief environment" [11]. Coordination between personnel involved in relief activities is not easy to establish in a short period of time if their relationship has not been in place prior to the disaster [24].

In the case of a commercial supply chain (CSC), lack of coordination among the supply chain (SC) members increases the inventory costs, lengthens delivery times and compromises customer service [76]. Yet the timely delivery of goods and services is crucial to victims for whom it is a matter of life or death in the case of HSCM. 'Time is money' may be the mantra in the commercial supply chain but 'time is life' is paramount in the case of HSCM. The objective of coordination in HSCM is to save more lives and provide first aid, water, food, clothing, shelter, medical supplies, and medical treatment on time to reduce the suffering of the victims.

Van Wassenhove [93] also states that logistics account for 80% of the activities in HSCM, emphasizing that coordination is key to improving relief chain performance. Chandes and Pache [20] also supported this study, noting that unless humanitarian actors "learn how to collaborate and co-manage relief chains" performance cannot be enhanced. This has "dramatic consequences for stricken populations."

Management of humanitarian relief activities also becomes more complex due to the increase in the number of stakeholders. This includes not only the national and international HROs but also governments of different countries, military, media, individuals and private organizations etc. [41]. A single organization is unable to respond to the multiple needs and wants of the disaster victims [20,4,41,53,73,94]. All stakeholders work towards the same goal, making it essential that everyone works in a coordinated manner as these actors have different resources and supply chain arrangements in terms of cost, time and quality [11,81,9].

Despite the importance of coordination in HSCM [20,29,35,4,41,50,53,55,59,62,66,73,79,94], social and behavioral research indicates that coordination is a major challenge among actors in HSCM [36,60,85,87,93]. Therefore, this study is designed to suggest how to strengthen the coordination among them while delivering aid by identifying and prioritizing the barriers to coordination in HSCM.

In literature, the barriers to coordination in HSCM have been identified but they are based on the past studies and expert opinions gathered from few experts. In this study, barriers were empirically verified with the managers involved in the relief operations of the disaster that occurred in the Uttarakhand and the weights were gathered from a number of respondents, hence the list of barriers is revised one. Therefore, this study is a pioneering attempt to prioritize coordination barriers in HSCM, particularly in the Indian context.

As stated above, coordination in HSCM is reasonably low due to the presence of various challenges such as "the concept of demand unpredictability, the suddenness of demand, high stakes associated with on time delivery and lack of resources that extend to issues such as supply, people, technology, transportation and financing" [10]. Hence it is necessary to remove barriers. However, it is not possible to instantly remove all barriers. It is important to recognize various constraints such as limited resources in terms of capital, time, human resources and policy initiatives, so prioritizing the barriers on the basis of their severity is essential for stepwise implementation of solutions. The perspective for prioritization of barriers is to focus more on the critical barriers to have the best possible outcomes as the resources are limited in terms of capital, time, human resources, etc. In view of this limitation, the objectives of this study are as follow:

- To explore coordination barriers in HSCM relevant to the Indian context.
- To prioritize the identified barriers on the basis of their severity and to derive key managerial insights.

2. Literature review

Various researchers have highlighted the challenges in HSCM [10,17,40,41,69,73]. Certain factors such as uncertainty about occurrence of disaster, irregularity in demand and less time to deliver the relief material with the constraint of lack of resources [10] are indicative of the challenges in HSCM. These were also cited by Richey et al. [71]. Furthermore, the actual challenges faced in HSCM depend on the scale, type and region of the disaster where it occurs [71]. For example, earthquakes and wars affect the physical infrastructure of a region, leading to special routing problems and planning of delivery systems [12,64,90,96]. Similarly, security issues related to complex emergencies such as natural disasters or in times of famine in war situations affect questions of inventory control [13,14]. Thus, different types of disasters pose particular challenges for humanitarian logisticians.

The other challenges to HSCM reported by Richey et al. [71] are "lack of vehicles, low use of advanced ICT technologies, lack of communication, lack of supplies, lack of equipment, difficulties in enforcing standards, lack of knowledge of humanitarian organizations, brain drain, lack of governance, dependence on government declaring state of emergency, lack of transport infrastructure, lack of early warning systems, absence of legislation, security problems, lack of coordination." The report entitled "Disaster Management In India" also identified some of the challenges to HSCM as inadequate early warning system, lack of pre-disaster preparedness, inadequate and slow relief, lack of co-ordination, slow rehabilitation and reconstruction, poor management of finances for post-disaster relief, symbolism rather than relief and no instruction for pre-seismic period. Various researchers have highlighted the importance of coordination in HSCM and also stated that this is an area which requires

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