



# Managing in-country transportation risks in humanitarian supply chains by logistics service providers: Insights from the 2015 Nepal earthquake



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## ABSTRACT

Humanitarian supply chains (HSCs) play a central role in effective and efficient disaster relief operations. Transportation has a critical share in HSCs and managing its risks helps to avoid further disruptions in relief operations. However, there is no common approach to or culture of risk management that its applicability has been studied through recent cases. This paper incorporates an empirical research design and makes a threefold contribution: first, it identifies in-country transportation risks during Nepal response. Second, we evaluate afore identified risks through an expert driven risk assessment grid. Third, we use our field data to study how some humanitarian organizations in Nepal response used logistics service providers for managing moderate- and high-level transportation risks.

In this paper, we use both qualitative and quantitative methods. Our qualitative analysis reveals that some of the most important in-country transportation risks were delivery delays; market fluctuations; insufficient capacity; loss of cargo; cargo decay; unreliable information; and ethical concerns. Our quantitative work shows that while participants categorized the first three risks as high-level, the rest were ranked as moderate-level. More investigation in our field data indicates that using logistics service providers (LSPs) helped humanitarians significantly to manage afore in-country transportation risks during Nepal response. It also improved overall HSC performance with respect to flexibility, effectiveness, efficiency, and responsiveness. While this finding empirically confirms the “tools” role of LSPs for managing in-country transportation risks in response, it implies another role for LSPs; “contributors” to performance improvements.

## 1. Introduction

Supply chain risks are, fundamentally, the outcome of uncertain events that prevent the supply chain from achieving its performance aims [1]. In the context of disaster response, these risks emerge due to wrong assessments and misjudgments based on uncertainties (supply, demand, fleets, locations, etc.), complex operating conditions in the field, the effect of the disaster on local labor and infrastructure, and structural differences between responders, especially humanitarian organizations (HOs) [2]. While there is a growing awareness among HOs about the nature of risks in response contexts, current approaches to risk management in such contexts are often ad hoc, inconsistent and fragmented [3]: there is no common approach to or culture of risk management among HOs. Differences are particularly stark between HOs, including in relation to which risks they prioritize, how they balance them, and how they link them with disaster relief objectives [4].

Disaster relief operations crucially rely on the functionality of humanitarian supply chains (HSCs) where transportation is a key operational element [5]. Specifically, in-country transportation, that covers means for shipping relief items and aid to beneficiaries, moving personnel and/or affected people, and conducting needs assessments, plays a significant role in disaster response. There is, however, a lack of research about how and to what extent managing in-country transportation risks within the HSC fosters effectiveness, efficiency, and responsiveness and in turn, better response performance. Especially the need for corresponding empirical work has been pointed out [6–8].

Our empirical work is based on a field research after the 2015 Nepal earthquake, including systematic observations and interviews. Our field study objectives include identifying relief distribution bottlenecks in Nepal response along with investigating those approaches that helped HOs to deal with logistics challenges (e.g., capacity). We use findings of our qualitative field study to develop a survey regarding the impacts of in-country transportation risks on HSC performance. Given the risk

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analysis results, we study the impact of risk management techniques that we observed during our field research.

Our multi-method approach in this study is therefore aimed at (a) identifying particular in-country transportation risks that threatened relief operations in Nepal; (b) assess identified risks by the help of practitioners; and (c) analyze a common approach that studied HOs used for managing some moderate and high transportation risks, i.e. employing logistics service providers (LSPs).

Related literature regarding the role of LSPs in disaster relief is described in Section 2. The research design is presented in Section 3. In Section 4, outcomes of data analysis are explained with respect to our research aims. Then, we discuss our research findings and implications for theory and practice in Section 5. We conclude with opportunities for future research in Section 6.

## 2. Literature review

In this section, we present the theoretical framework of our research. First, we compare risk management strategies in commercial and humanitarian contexts and narrow the scope of our research. Then, we review the role of LSPs in disaster relief operations and position our contribution in the literature.

### 2.1. Risk management and humanitarian contexts

Supply chain risks are classified differently in the literature; internal and external [9]; operational and disruption [10]; and micro and macro [11]. Despite different titles, afore taxonomies often cover risks with similar characteristics. While external, macro, or disruption risks are driven by the event of a natural or man-made disaster, risks in internal, micro, or operational category originate from internal activities of organizations, HOs in our study, and their relationship with partners [9–11]. Our study focuses on the latter category, micro risks, which include demand, supply, manufacturing, and infrastructure risks [12]. According to Pontré, Welter, Malta, Faria and Chernyshova [4], researchers have paid considerable attention to the risks of demand, supply, and manufacturing. However, infrastructure risks - the risks that are related to information technology, transportation, and financial systems - are rarely addressed [2,13] although their disruption can lead to serious problems in HSC [14].

Due to the critical role of transportation in HSCs, managing its risks is of great importance. Supply chain risk management literature suggests four techniques and strategies for managing risks, i.e. control & accept, become flexible & reduce the probability, cooperate & transfer, and mitigate & avoid [15]. However, not all of afore strategies are applicable in humanitarian response contexts due to: the urgent nature of interventions, the short time-frame for achieving 'success', the tangible objectives set for disaster relief, and the comparative simplicity of partnerships in commercial SCs [3].

Accept and avoid strategies are not easily applicable humanitarian response. In general, accept strategy is used when the risk cannot be further reduced, transferred or avoided [12]. Accepting risks in the chaotic response implies further disruptions and can result in more social and financial loss, in comparison to other contexts. Also, avoiding strategy yields trade-offs between weights of the risk and the humanitarian imperative - the urgency and scale of the need for life-saving assistance [3]. Due to the higher weight of humanitarian imperative in majority of cases [3], this strategy is seldom taken into account in humanitarian response, in comparison to commercial contexts. In the latter, a risk may simply become unacceptable based on a profitability cost-benefit analysis which may lead to a decision to end the activity or quit the operation [12].

Reducing risk probability through enhancing flexibility [16] is an effective strategy for humanitarian contexts but may not be always efficient. In this regard, Hajdarovic and Jensen [17] provide supporting evidence about the positive influence of some commercial practices

toward improving flexibility on the responsiveness of HSCs [17]. However, the cost-effectiveness of such practices has not been yet studied in humanitarian contexts. Accordingly, a recent study shows that more than 90% of HOs could not provide a medium level of flexibility in their SCs during Nepal response [18]. Implementation of some approaches for enhancing flexibility requires comparable access to monetary and non-monetary resources which demands careful consideration and planning [18].

The remaining strategy, transfer, means "allocating risks to the parties best able to manage them" [5]. In this regard, Tang and Musa [12] contend that LSPs, i.e. logistics service providers, can improve the management of underlying risks in SCs. The term LSP refers to a company provides logistics services for other companies [19]. Skjoett-Larsen, Halldorsson, Andersson, Dreyer, Virum and Ojala [20] define three LSP categories with respect to the services they provide: physical logistics activities, organization and responsibility for implementation, and third-party logistics providers (3PLs). Recently, the category of fourth-party logistics providers (4PLs) has emerged which refers to 3PLs with broader involvement in management and decision-making [21,22].

Some HOs (e.g. Canadian Red Cross) benefit from transferring strategy for dealing with transportation risks: they delegate some (or all) logistics services, e.g. transportation, to LSPs [23], or other HOs, as humanitarian LSPs [5]. Some other HOs (e.g. IFRC) invest on reducing strategy through improving flexibility in their SCs [24]. In this paper, we focus on reducing and transferring strategies for managing in-country transportation risks. We limit our study scope to the first two categories of LSPs due to their common usage in recent humanitarian response operations [25].

### 2.2. Logistics service providers and their roles in disaster relief

In HSC literature, although very few studies can be found, LSPs has been studied within three roles in relief operations: as "members", "actors", or "tools" [25]. As "members", LSPs share their resources with HOs, transfer their knowledge, and expand their partners' network. Heaslip [7] acknowledges that business can extend much needed technical expertise to the assisted HO and 'fill gaps in humanitarian action.' In return, as Binder and Witte [26] note, LSPs achieve positive branding, improved staff motivation, access to business intelligence, and a desire to 'do good.'

As "actors", LSPs support HOs through partnerships and coordination. The former refers to offering all kinds of logistics activities [25]. Samii [27] indicates that cooperation between HOs and LSPs can result in cost efficiency, timeliness, accuracy, and flexibility. Furthermore, Abidi, de Leeuw and Klumpp [28] present the positive influence of LSPs on relief operations in complex disasters environments and provide key drivers for increasing and simplifying collaboration between them and other HSC actors. In the scope of coordination, LSPs are referred to as enablers of supply chain integration [29], vertical coordination [30], and horizontal coordination [31,32].

As "tools" LSPs provide professional logistics services to HOs [25]. Bealt, Fernández Barrera and Mansouri [33] study the use of LSPs among some HOs and find that practitioners prefer to use LSPs in preparedness (44%) more than immediate response (41%), mitigation (6%), and recovery (9%). However, Binder and Witte [26] contend that whether in preparedness or response LSPs can bring several advantages in mobilization, transport and distribution of relief items. In other studies, the use of LSPs has also shown improvements in effectiveness [34] and responsiveness [35] of relief operations.

Some studies contend that the role of LSPs, regardless of type, in humanitarian operations is still marginal [26,36] and very few LSPs have been involved in recent disaster relief operations [25,31,37]. Three directions can be observed. First, there is some concern about incorporating LSPs in the humanitarian context with respect to their impacts on the humanitarian principles of impartiality, neutrality, and

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