

Decentralized Approaches to Logistics Coordination in Humanitarian Relief

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Abstract

Nongovernmental organizations (NGOs) involved in humanitarian relief provide supplies and services to people in need. Transportation and logistics are big parts of NGO operations, as agencies transport and distribute supplies to and within the affected regions. Improving efficiency of their logistics systems has potential to significantly decrease agencies' operational costs and expand their services. Logistical coordination in humanitarian relief can bring together players with various expertise, experiences and capabilities within an affected region to share and mutually benefit from collaborative work.

Coordination is commonly adopted in commercial settings; however, in the humanitarian relief domain, there has been limited success in coordination among NGOs. We present findings from an ongoing joint university – nonprofit organization research project on logistical coordination in humanitarian relief. We work closely with logistics personnel for NGOs to get an in-depth understanding of operations in practice. We identify critical components and challenges related to coordination and recommend strategies to overcome these obstacles, focusing on decentralized approaches. Our research goal is to use the expertise of our nonprofit partner, Aidmatrix Foundation, who has implemented coordination platforms in other humanitarian domains, distributing food, medical supplies and disaster relief, to develop a new system to enable logistical coordination in humanitarian relief.

Keywords

Humanitarian Relief, Logistical Coordination, Non-government Organizations

1. Introduction

In the recent years, natural disasters have been occurring with higher frequency and greater magnitude [1]. In 2009, 335 natural disasters, not counting biological disasters, were reported worldwide [2]. The scale of recent disasters often requires the involvement of many organizations and agencies in the relief efforts. For example, in 2004 Asian Tsunami, over 40 countries and 700 nongovernmental organizations (NGOs) provided assistance to the impacted region [3]. With so many players involved in a single region with a common goal of aiding people in need, effective humanitarian coordination is essential to reducing the duplicated efforts and providing better services [4].

Transportation and logistics are major components of the operations of relief organizations, and improving efficiency of transportation and logistics systems has potential to significantly decrease operational costs and to expand humanitarian relief services. Logistical coordination in humanitarian relief can bring together players with various expertise, experiences and capabilities within an affected region to share and mutually benefit from collaborative work. However, the large number of involved organizations and diversity of the engaged players make effective logistical coordination a challenging task. The different relief players often include United Nations (UN) agencies, international and local nongovernmental organizations (NGOs), the Red Cross Movement, governments of the affected region and military. These organizations have different logistics capability, size, authority,

organizational structure, political position and level of experience in the disaster relief environments, all of which are potential obstacles for collaboration. Various humanitarian organizations have put a great amount of effort to improve the effectiveness of logistical coordination and facilitate the sharing of capabilities and expertise. Despite ongoing efforts and potential benefits, there are outstanding issues to achieve more effective coordination in humanitarian relief.

This paper presents findings from an ongoing joint research project on humanitarian relief with Northwestern University and Aidmatrix, a nonprofit organization that provides supply chain management technologies for humanitarian relief. The first phase of the project, covered in this paper, consisted of the review of published academic work on the current state of coordination in humanitarian logistics, an extensive set of interviews with governmental and nongovernmental organizations involved in relief efforts (both domestic and international), and interviews with a number of commercial entities providing transportation services to humanitarian relief agencies. Throughout the paper we omit the names of interviewed organizations to maintain their anonymity. In this paper, we present an analysis of the current state of logistical coordination and identify obstacles preventing more effective coordination. We present strategies to address these obstacles and facilitate logistical coordination in humanitarian relief.

The rest of the paper is organized as follows. In Section 2, we provide a brief overview of the current state of humanitarian coordination. In Section 3 we present challenges and obstacles faced in humanitarian logistics coordination, based on our findings from literature and interviews with participating organizations. Based on the identified challenges, we propose strategies to facilitate coordination, in Section 4. Section 5 concludes this paper and outlines our next steps of this logistical coordination in humanitarian relief project.

2. Current State of Humanitarian Logistics Coordination

In most disasters, a large number and variety of UN agencies, NGOs, commercial partners, government and military organizations are often involved in the relief effort. These players comprise a very diverse group of agents, which can impede collaboration. Despite the challenges associated with humanitarian coordination, there is an overwhelming consent that effective coordination is critical to efficient and effective relief efforts. This topic has received considerable attention in the field of practitioners and the academic literature; see, for example, [4-7]. The tools and systems currently in place to facilitate humanitarian coordination can be divided into two categories: centralized and decentralized systems, depending on the presence of a central player with the authority to direct the entire relief operation.

2.1 Centralized Coordination in Humanitarian Logistics

In the centralized system, a single agency has authority to direct the relief effort coordination. In this setting, the coordination is usually executed with a command approach [8], where the central agency controls the logistical resources, gathers information centrally and makes decisions for the collaboration participants. In the centralized coordination system, UN agencies often play the role of a central actor and take charge of the logistical coordination decisions [9], effectively coordinating the humanitarian organizations by command. For example, in the relief operations following 2000 Mozambique flood, the World Food Programme (WFP) and UN High Commissioner for Refugees (UNHCR) took charge of the usage of available logistical vehicles and arranged the schedule for the supply deliveries [10]. The U.S. Federal Emergency Management Agency (FEMA) has increasingly adopted technology to assist in coordination. For example, using Aidmatrix technology, FEMA brings together government entities and Voluntary Organizations Active in Disaster (VOAD) members to manage and share donations for disaster relief [11].

In 1991, the United Nations established the Office for the Coordination of Humanitarian Affairs (OCHA), an organization specially focused on facilitating coordination of humanitarian response [12]. Its main coordination strategies are planning, information sharing and task division. OCHA conducts needs and damage assessments in the affected region following a disaster. This information is shared with other agencies, and OCHA develops plans to facilitate operations of the agencies. Other coordination tools were developed by OCHA to address specific aspects and needs of relief operations. Humanitarian Civil-Military Coordination (UN-CMCoord) facilitates the coordination between the civilian and military organizations involved in humanitarian relief; On-Site Operations Coordination Centre (OSOCC) is usually established in the region immediately following the disaster and serves as a “local headquarters” for disaster management operations; and Central Register of Disaster Management Capacities

serves as a central database “of all specialized personnel and teams of technical specialists, as well as relief supplies, equipment and services available”[7] within UN, NGOs and government organizations.

There is currently no consensus that centralized system is the best approach to relief operations and whether the United Nations should play the role of a central coordinator in the emergency relief environment. A number of case studies and reports analyze UN operations as the central coordinator. In [7], Kehler conducted three cases studies where she analyzed the success and shortcomings of the humanitarian coordination led by the UN. Based on these findings, Kehler suggests that UN should play the role of a partner to facilitate coordination with other organizations instead of the central planner. Stephenson further argues that the decentralized system is more preferred to facilitate the coordination [13]. In some cases, such as 2004 Asian Tsunami, the magnitude of the disaster is so overwhelming that the UN does not have sufficient relief capacity and is unable to lead the coordination [14].

2.2 Decentralized Coordination in Humanitarian Logistics

In most humanitarian relief operations, no single organization or agency, including the UN, has authority over other involved parties [15]. In theory, the government of the affected region can have authority to coordinate the humanitarian relief; however, the disaster is often overwhelming to an extent that local government might not be fully-functional or functional at all following the tragedy. In such situations, the logistical coordination follows a decentralized system and is conducted by consensus, where each relief organization makes its own decisions to share information, expertise and responsibilities with other actors [8].

Inter-agency groups, such as Inter-Agency Standing Committee (IASC) [16], Inter Agency Working Group (IAWG) [17], and National Voluntary Organizations Active in Disaster (NVOAD) [18], are examples of decentralized coordination. Their main objectives are to develop system-wide humanitarian policies, establish common ethical frameworks, provide systems for information sharing, understand the role of each agency in the coordination, identify existing gaps in operational capacities, maintain good relationships within the group, and resolve disagreement among agencies. The inter-agency groups also organize forums and conferences to help establish relationship among all members; which, in turn, allow agencies to form coordination relationships during the disaster relief operation.

A number of organizations have developed web-based platforms that use information technology to assist information sharing and coordination during disaster relief operations. The United Nations has also promoted several platforms for decentralized coordination. For example, OCHA has established several internet platforms to aid collaboration, such as www.irinnews.org (Humanitarian News and Analysis), ReliefWeb.org (gateway to near real-time information on humanitarian emergencies and disasters), and RedHum.org (humanitarian information network for Latin America and the Caribbean). The goal of these websites is to facilitate information sharing among agencies and public donors. Humanitarian Supply Management System (SUMA) is another platform that provides easy-to-use software designed for inventory tracking and management of the donations [19]. The United Nation Logistic Cluster Center (UNJLC) [10, 20, 21] has been another important player in facilitating logistical coordination in humanitarian relief. UNJLC system has become well recognized among UN agencies and other international NGOs, which allowed it to gather and share important data from many agencies involved in the relief efforts [19]. In this paper we focus on decentralized humanitarian coordination systems, where each organization makes its own decisions when and how to coordinated.

3. Obstacles and Challenges of Humanitarian Logistics Coordination

As discussed in Section 2, there has been considerable effort and initiative in the facilitation of logistical coordination among NGOs and other agencies involved in humanitarian relief. While some efforts are more successful than others, there are still untapped benefits and need for improvement in coordination. In this section we discuss the challenges faced by players involved in logistical coordination of humanitarian relief. The literature on humanitarian logistical coordination provides a broad overview of current challenges and obstacles, predominantly based on reports, observations and case studies. We complement this information with interviews with logistics experts in the field.

3.1 Large Number and Diversity of Participants

The relief organizations involved in a disaster, range from large UN agencies, commercial partners and government/military entities to smaller NGOs. As observed in the Haiti earthquake, some small NGOs are formed only after the disaster occurs. These players differ significantly in many ways, such as organizational structures,

operational policies, missions, political positions and logistical capacities. These have been identified as important contributing factors to the challenges of humanitarian coordination in the literature, see [13, 22], as well as in our interviews. For example, a number of US doctors volunteering their medical services in Haiti following the 2010 earthquake identified that the differences in Haitian hospital operational policies and organizational structure from those of the American hospitals made it difficult for them to provide services to their patients. In the case of any disaster requiring assistance from the international community, language barrier can pose challenges to coordination. Not only does language create problems for NGO personnel to communicate with local populations, but inter-agency communication among NGOs from different countries is also a problem. For example, doctors coming from different countries to volunteer in Haitian hospital could not decide on the language to be used for medical charts of the patients.

Local government is an important player in humanitarian relief efforts, and the state of the affected country must be considered in humanitarian coordination. Underdeveloped countries may be unable to provide financial and logistical support to the NGOs to facilitate the coordination. This is especially the case when disaster is overwhelming to an extent that local government might not be fully-functional. Following the 2010 earthquake, Haitian borders were in a chaotic situation and visas were not required to enter the country. Since the government could not effectively control entrance or maintain records of the border operations, an overwhelming number of humanitarian organizations and individual volunteers joined relief operations. This added to the chaotic situation of the country, making the logistical coordination a greater challenge. Furthermore, without authority, the roles of organizations involved in relief operations are not clearly established and coordination is more challenging to form [15]. In disasters caused by political unrests, some humanitarian relief agencies and donors are limited to the populations they can serve, which can further impede coordination.

3.2 Urgency of Humanitarian Relief Response and Limited Time to Establish Coordination

The urgency of relief response and pressure to distribute emergency supplies in timely manner are key obstacles to forming collaborative relationship between relief effort participants. Most of the literature cite these factors as considerable challenges [13, 22]. In the chaotic environment following a disaster, it is very hard to get accurate and timely information required for relief missions. Consequently, NGOs must make complex strategic and operational decisions in a very short time period, where insufficient response would cause additional devastation and death in the region. These extreme conditions make it difficult for organizations to communicate and coordinate with other agencies while making their own decisions.

From our interviews, we have also learned that collaboration between organizations is not easy to establish in a short time period if their relationship were not in place prior to the disaster. For example, in the case of large international NGOs that often have long-term missions worldwide, NGOs are willing to collaborate with each other in one region if they already have some prior successful coordination in another region. The primary reasons driving this practice are the establishment of trust between the agencies and resolution of cultural and operational policy differences between the organizations. This is observed in the following story of a doctor working in Haiti after the earthquake. He posted a request for assistance with the transportation of medical equipment into Haiti using the Aidmatrix web-based portal, which connects NGOs in need of transportation services with the transportation providers. A large international shipping company offered to transport the equipment with the requirement that recipient be an NGO formally registered in Haiti, which this doctor was not. Aidmatrix reached out to one of its partners in Haiti that was a registered NGO to be the official recipient. With the help of trusted partners, the shipping company delivered the equipment. These partnerships facilitate coordination; lack of such partnerships can impede the success of coordination. Therefore, as one considers increasing the scale of coordination to include organizations without existing partnerships, the issue of trust emerges as a significant challenge.

3.3 Limited Information Sharing and Communication

Accurate and current information about the affected region, including damages and needs assessment, is instrumental to efficient relief efforts and logistical coordination. Unfortunately, the chaotic nature of a disaster makes information sharing a challenging task. From our interview with an international health organization, we have learned that at the early stages of the disaster relief process, local governments often do not have capability to understand the current relief situations, particularly comprehensive knowledge of relief supplies entering a country and existing needs. Without information about the specific needs and available commodities, coordination between relief organizations is a significant challenge. As a result, each NGO transports the supplies they believe to be the most important for the relief operation without considering supplies delivered by other organizations. This, in turn,

may cause the logistical system to clog up with less important commodities, preventing more critical items from reaching the affected region. Furthermore, limited information sharing often causes repeated efforts and gaps in services within affected regions.

In one of our interviews, a large international shipping company described their experiences of donating transportation services to NGOs. The shipping company was actively involved in sending donations from the donors' countries to Haiti following the earthquake of 2010. However, due to inefficient information sharing system between the affected country and donating parties, supplies were often blocked at the border as they were not matching the current needs of the survivors. As the result, the shipping company had to assume the role of a negotiator between donors and potential receivers of the supplies. A non-for-profit organization coordinating airline service donors and NGOs transportation needs emphasized that many coordination problems are caused by lack of ground transportation support at the "first- and last-mile". The organization was able to secure transportation of the supplies from one airport to another airport; however, they encountered problems when the donors did not have the ground transportation capability to deliver supplies to the airport or pick them up at the destination airport. In fact, absence of communication between international donors and potential recipients often results in supplies being sent to the affected region without established arrangements for the "last-mile" distribution to the beneficiaries.

3.4 Allocation of Costs, Benefits and Risks

In any collaboration, allocation of costs, benefits and risks pose significant challenges. Due to non-for-profit nature of humanitarian relief work, mechanisms and tools used in commercial sector to facilitate logistical coordination, such as no-show penalty fees and overbooking, cannot be directly implemented to humanitarian logistics. The current absence of formal agreements and standard contracts customized to humanitarian relief operations create a challenge for NGOs to share the risks, costs and benefits associated with coordination among all the participants. Lack of good risk sharing mechanism is considered in literature to be an important obstacle that impedes humanitarian logistics collaboration and requires the development for new metrics and inter-agencies relationships to address this problem [22]. The need for a good mechanism to share risk, costs, and benefits among all the participants has also been raised in a number of interviews. Many practitioners discussed situations in which agencies involved in coordination had to assume the risk of their partner organizations.

One large international NGO discussed the difficulties of logistical coordination with other organizations in their efforts to share logistical capabilities in an African country devastated by civil war. The large NGO had a long-term project in the country and established working relationship with local trucking companies. When other organizations joined the relief efforts with additional supplies for the affected region, increased competition for trucks and driver services inflated transportation prices. The large NGO offered transportation services to the other organizations through their existing contacts. However, without effective logistical coordination contracts in place, this left the NGO vulnerable when some partner agencies failed to meet transportation deadlines. As a result, the large NGO underutilized its transportation capability and was responsible for storing undelivered supplies for other agencies.

The competition among NGOs adds another obstacle to humanitarian logistics coordination. In the absence of a single planner in the relief chain, the relief operation is a decentralized system where every actor has the same objective but different abilities. At the same time, the NGOs do not necessarily form the coordination automatically in the emergency relief environment, and often they even compete with each other for the scarce resource [9], such as media attention since most of their financial support comes from monetary donations.

3.5 Limited Personnel Dedicated to Logistics and Coordination

Coordination among agencies requires personnel within each party to facilitate the collaborative work; however, small NGOs might not be able to effectively join the coordination due to limited human resources [4]. For example, to facilitate coordination between relief organizations, the leading organization (often a UN agency) organizes inter-agency weekly meetings to share up-dated information, establish agreements between agencies and divide relief tasks. However, the smaller NGOs cannot allocate their personnel to attend such meetings on regular basis. At the same time, small NGOs often play an important role in logistical coordination. One of our interviewed organizations has a staff of just several members and uses two trucks to transport supplies between hospitals, warehouses and other ad hoc sources, yet the organization has been instrumental to the relief efforts in Haiti following the earthquake. These volunteers are on-call 24 hours a day, 7 days a week and do not have the resources to attend coordination meetings.

The increasing frequency of disasters in recent years forces humanitarian organizations to constantly move their relief teams from one affected country to the next [23]. For example, to assist with relief efforts following 2004 Asian tsunami, 88% of large NGOs had to reposition relief workers from ongoing operations in Darfur. As a result of constantly changing environments, relief workers often do not have time to learn from their practices and observe the success or failure of preceding coordination. Without feedback and ability to learn from practice, it is difficult to improve humanitarian logistical coordination among relief organizations.

4. Strategies to Facilitate Logistical Coordination in Humanitarian Relief

To facilitate logistical coordination in humanitarian relief operations, we recommend strategies that can be integrated into a web-based system (or a platform). Some components of these strategies are currently in practice, and we identify outstanding research questions pertaining to others. The strategies address the challenges and obstacles identified in Section 3. In this section we discuss specific tools and features that are necessary for facilitation of a successful coordination and how each of these features addresses the challenges identified earlier.

4.1 Web-Based Systems for Easy Access and Low Personnel Requirements

Internet accessible systems, such SUMA, UNJLC and various Aidmatrix platforms, have been relatively successful in facilitating logistical coordination in humanitarian relief. Web-based systems are easily accessible by users from various geographic locations, which is critical to facilitating coordination between agencies, as well as information sharing between donors, transporting partners and NGOs. Such a system would enable smaller NGOs to join coordination activities without requiring significant personnel commitment on their side. Web-based coordinator systems can allow NGOs to place requests, offer services and share information and experiences with other NGOs from anywhere in the field. For example, a small group of NGOs partnered with transportation and logistics providers recently founded LIFT, to coordinate transportation to disaster regions via Web [24].

4.2 Membership Subscription to Reduce Risk

Requiring organizations to subscribe to such a coordination platform can help with issues of inter-agency trust and risks associated with logistical coordination. For example, in the case of AirLink, a web-based platform that matches NGOs with transportation needs and airline companies, “all NGOs are thoroughly vetted before becoming AirLink members and airlines can review vetting documentation” [25]. Membership restriction can also help identify “qualified” organizations that are more likely to be responsible and have the capability necessary to join the logistical coordination. Successful vetting of members can lead to more reliable and capable participants, which would reduce the risk and encourage more inter-agency coordination. One drawback of membership subscription is that it limits who can participate and benefit from logistical coordination. This can be problematic in many relief efforts. A related question requiring further study is the scalability of a system to be able to dynamically increase in size and scope when disaster occurs. Recent advances in social network analysis make it easier to identify potential collaboration between organizations even if no prior relationship exists [26, 27].

4.3 Mechanisms to Mitigate Risk and Allocate Costs and Benefits

In the setting of commercial logistics, several papers have studied the use of contracts to properly allocate shared costs and facilitate coordination; see [28-30]. This literature focuses on designing attractive cost allocation and revenue sharing mechanisms to reduce collaborators’ costs or increase revenues individually and collectively. The first step in designing such contracts is to evaluate the overall cost reduction associated with collaboration and then properly allocate the reduced cost among actors. In the setting of humanitarian logistics, cost reduction might not be the predominant incentive to coordination, and the effectiveness of saving lives and providing better services must be considered in evaluating coordination. In fact, the objective of increasing NGO service level through coordination can often incur higher, rather than lower, cost. Reducing the operational risk of the individual relief agencies is another attractive incentive for NGOs to join the logistical coordination. Given the range of risk sources and the challenges adapting risk measures from commercial applications to disaster relief, this is a promising area of further study. Due to the urgent nature of relief operations, collaborative contracts and templates must be established in advance such that they can be quickly activated and easily used in the chaotic environment following a disaster, particularly with NGOs with no prior history of collaboration.

4.4 Easy to Use Information Sharing and Communication Tools

The ability to provide detailed information from the field and to facilitate communication between relief organizations is a critical component of a collaborative system. Participating organizations often have only partial knowledge of the affected region and its needs. Compiling and effectively sharing information from all

organizations in the region can provide detailed information to participating NGOs, while reducing duplication and overinvestment in detection and assessment technology. For example, the OCHA established platform, ReliefWeb, actively searches the Internet for information relevant to humanitarian relief operations, such as NGOs' and governmental reports, news in the media and press releases. It then posts found documents and data on its website, as well as delivers important information directly to its members through e-mails, mobile phone and other channels. To ensure successful coordination, the relief organizations should be able to use a platform to easily report information from the field, their needs for logistical assistance and their logistical capabilities that they are willing to share. Subsequently, the platform could actively recommend coordination partners based on gathered information. The amount of information currently available on the existing web-based information sharing sites can be overwhelming, making it difficult for an NGO to find the desired information. Therefore, efficient processing of the available information and effective dissemination of the compiled data in a ready to use form is central to facilitating humanitarian coordination.

Another critical component of a successful system for facilitating humanitarian logistics coordination is its ability to establish communication between the donors and the affected region. In the interviews, relief agencies identified lack of knowledge of the real needs on the ground to be a major challenge in humanitarian relief efforts. Therefore, a platform facilitating logistical coordination has to allow assessment teams to report their findings and then aggregate the information gathered by various organizations. The platform also needs to track the supplies arriving to the affected region, ideally from the point of donation to the final distribution to the beneficiaries. For example, the inventory tracking platform, SUMA, allows multiple agencies to access the same inventory data and monitor flow of the relief goods as they change hands from one organization to the next. Additionally, coordination platforms should be able to report in real-time the updated demand and available inventory to the donors, so they can have better understanding of the real needs. Efficient communication will reduce redundancy and improve effectiveness of humanitarian relief operations. For example, UPS Trackpads are being used to keep track of the relief supplies as they are distributed to the individuals in Haiti.

4.5 Feedback Mechanisms to Facilitate Learning from Prior Experiences

As in any practice, learning from the successes and failures of ongoing and past humanitarian relief practices is critical to improving logistical coordination. Due to the diversity of the disaster relief environment and circumstances, even a successful coordination practice in one setting might not necessarily work in another situation. To address this, coordination facilitating system has to maintain detailed record of the collaboration participants, their actions, problems incurred during the coordination, and the outcomes. The platform can build an extensive database containing information such as prices paid for various supplies, transit times and quantities of distributed commodities, which would be helpful to future operations. Tracking different transactions would also help individual organizations to identify their needs for improvement.

5. Conclusion and Next Steps

This paper discusses logistical coordination in humanitarian relief, specifically identifying current challenges and recommending strategies to overcoming them. We use the review of published academic work, an extensive set of interviews with humanitarian organizations involved in relief efforts, and interviews with a number of commercial entities providing transportation services to humanitarian relief agencies to assess the current state of humanitarian logistics coordination. Based on these findings, we recommend strategies to address these obstacles and facilitate logistical coordination in humanitarian relief.

In the next phase of this ongoing project, we will expand our interview set as we refine recommended strategies for coordination, particularly in the areas of risk mitigation mechanisms and platform scalability. While our initial set of interviews consisted primarily of logistics coordinators and directors making executive decisions for their organization, we plan to interview more "boots on the ground" personnel that perform day-to-day relief operations. In addition, since one cannot directly implement coordination mechanisms from commercial sector to humanitarian logistical coordination, we need to continue working on the development of good metrics to measure and allocate joint costs, benefits and risks.

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