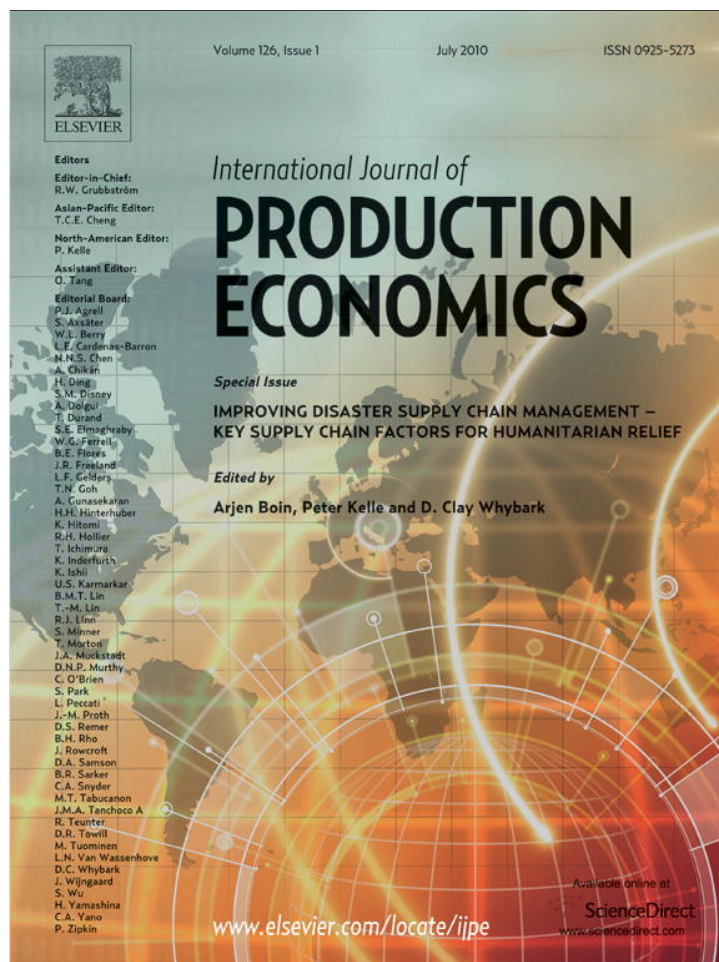


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All the best laid plans... conditions impeding proper emergency response

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ABSTRACT

Which conditions make it difficult to effectively respond to an emergency? The literature shows that even if emergency response plans are in place, the emergency response could still be hampered by a myriad of factors. What these factors are, however, remains unclear as authors provide different ideas on what can go wrong. Sometimes these ideas overlap, but sometimes they do not. In this article, we provide an overview of the factors impeding emergency response. We will illustrate each factor with examples drawn from the emergency responses in New Orleans following the Katrina hurricane and in Indonesia following the Tsunami.

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1. Introduction

Emergency logistics is an emerging field (Chang et al., 2007, pp. 738–739; cf. Özdamar et al., 2004; Sheu, 2007b; Yi and Özdamar, 2007; Whybark, 2007) revolving around the distribution of rescue resources to facilitate search and rescue operations, provide shelter and food, and enable locals to become self-sufficient again (Özdamar et al., 2004, p. 217; Chang et al., 2007, p. 737; Yi and Özdamar, 2007, p. 1178). In other words, emergency logistics focuses on the response phase of disaster management.

The mission of disaster management (or emergency management) is to protect and assist the civilian population in the event of a natural or man-made disaster. The process of disaster management consists of four phases: prevention/mitigation, preparedness, response, and recovery (National Governors' Association, 1978). The response phase (or emergency response) is the phase during which activities are focused on emergency relief in order to save lives and meet basic human needs. The length of this period varies from a few days to months or even years according to the circumstances.

The emergency response is a two-stage process, the first stage being the life-saving/sustaining response and the second one being the self-sufficiency response. The life-saving component consists of search and rescue operations, when, for instance, victims are buried in debris after an earthquake or trapped in floodwater. The life-sustaining component involves the provision of the five human needs, i.e. food, water, temporary shelter,

medical care, and protection (UNDAC, 2006, p. B 15). These two components constitute the first stage of the emergency response, which is considered effective when victims are rescued from life-threatening conditions and no longer have to worry about their own survival. At this point, they can take steps towards rebuilding their lives and restoring their livelihoods. In contrast, this stage is considered ineffective if all of the above needs are not met, which can result in the disaster's victims becoming the victims of a so-called second disaster (UNHCR, 2007, p. 32). Improper burial of corpses, for example, could result in an infectious disease killing the remaining survivors.

Regarding the second stage, the self-sufficiency response consists of reducing the affected populations' dependence on outside assistance to satisfy their basic needs. This process is a prerequisite to help disasters' victims restore pre-disaster living conditions and become autonomous again. This second stage of the emergency response is considered effective when victims no longer depend on outside assistance to survive. This perspective usually involves a long-term response strategy. Safe drinking water, for example, might require the repair of water supply structures. Relief operations therefore often embrace development activities.

As the above shows, emergency response is of vital importance and cannot be achieved without properly performing logistics operations; hence the importance of special issues such as this one to further our understanding of emergency logistics. However, no matter how good the preparation of emergency logistics operations, the execution of these plans may still fail because of the many difficulties inherent in emergency response. Coordination between organizations, for example, may not go that smoothly. In fact, the literature on crisis management and emergency logistics allude to this problem (Auf der Heide, 2006; Sheu, 2007a, p. 656).

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Too much can go wrong during the emergency response—not just in terms of coordination. However, information on what exactly can go wrong during the emergency response is scattered across a myriad of articles and books, leaving researchers at a loss. The aim of this paper is therefore twofold. First, to identify the conditions that could negatively affect the emergency response (see Appendix A for an overview). Second, since the literature can be quite vague about how to measure these variables, we will provide operationalizations of each variable, thereby providing those interested in emergency logistics with tangible variables.

To illustrate these variables, we will use two cases: the flooding of New Orleans following hurricane Katrina and the Tsunami in Indonesia. In August 2005, hurricane Katrina hit the states of Mississippi, Alabama, and Louisiana, and caused major breaches in the levees surrounding the city of New Orleans. The city was quickly flooded, causing the deaths of more than 1100 people and leaving many more in distress. On 26 December 2004, a magnitude 9 earthquake on the Richter scale off the coast of Indonesia triggered a Tsunami affecting 14 countries and killing more than 225,000 people.

These two events occurred in distinct settings and circumstances. On the one hand, the United States is one of the richest countries in the world,¹ with strong national institutions, considerable public infrastructures, significant emergency response agencies, and high levels of preparedness and experience in the field of hurricane management. One would expect that the above elements would facilitate the provision of emergency assistance in the wake of a long-anticipated natural disaster (Eikenberry et al., 2007, p. 165).

On the other hand, the countries affected by the South-East Asian Tsunami are among the poorest in the world.² There was no early warning system in that region, primarily because international expertise had wrongly assessed a Tsunami-related threat there. The authorities were not prepared for such a Tsunami; emergency management structures and contingency plans in the affected countries were weak or non-existent. These combined factors could lead one to predict that relief operations after a natural disaster of such a magnitude would unfold badly.

Yet in reality things were quite different. In the aftermath of the South-East Asian Tsunami, the basic needs of the affected populations were fulfilled rather effectively, given the extent of human casualties and material damage. During the initial response, the survivors received food, water, and emergency shelter; an effective system of rapid corpse burying avoided the emergence of a sanitarian crisis (Couldrey and Morris, 2005, p. 6). In contrast, the cries of hurricane Katrina's victims were heard by everybody around the world, but were not effectively responded to. US government, media, academics and affected communities all concur: the emergency response was ineffective—both at the life-saving/sustaining level and the self-sufficiency level. The US government, for instance, emphasized the “seeming inability of the ‘government’—local, State, and Federal—to respond effectively to the crisis” (US White House, 2006, p. 1). It acknowledged that emergency plans at all levels of government were “put to the ultimate test, and came up short” (US White House, 2006, p. 1; cf. Simo and Bies, 2007, p. 132; Eikenberry et al., 2007, p. 160; Waugh and Streib, 2006, p. 131; US House of Representatives, 2006, p. ix and 1; Kettl, 2005, p. 2). A significant amount of sources seem to confirm that the emergency response was better handled in the

wake of the Tsunami than after hurricane Katrina (Chua et al., 2007, p. 391; Brummitt, 2005).

To understand this discrepancy in emergency response, it is important to know which conditions could negatively affect the emergency response. We will use the emergency response in New Orleans—unanimously considered as the location where governmental response was the poorest (Derthick, 2007, p. 37)—and the emergency response in Indonesia—the country which sustained the most loss and damage in the wake of the Tsunami—to illustrate these conditions. In order to achieve this aim, we will first briefly describe the two disasters. Each condition is then introduced and illustrated with examples drawn from the two cases.

2. The two disasters

2.1. Katrina

On 23 August 2005, a tropical storm formed off the coast of the Bahamas and grew into a hurricane over the following week. On 25 August, the then category 1 hurricane made landfall in south Florida, and then continued moving further west, intensifying to a category 2 hurricane on Friday 26 August (US White House, 2006, pp. 22–23). On that day, the National Hurricane Center (NHC) released a forecast warning that the hurricane would make landfall near the city of New Orleans (US White House, 2006, p. 24). The governors of the states of Louisiana and Mississippi declared states of emergency for their respective states and preparation activities increased at the local, state, and federal levels, in order to support local responders (US White House, 2006, pp. 24 and 27).

On 27 August, Katrina strengthened to a category 3 hurricane, and the NHC warned that it was expected to become a category 4 hurricane. Louisiana's and Mississippi's officials issued evacuation orders for threatened areas—mandatory or voluntary depending on local governments. The mayor of New Orleans called for voluntary evacuation, but many residents did not want to evacuate, or could not do it because they did not, for example, own a vehicle (US White House, 2006, pp. 25–26; cf. Derthick, 2007, p. 38). President Bush signed a federal emergency declaration for the state of Louisiana on Saturday evening and for the states of Mississippi and Alabama on the following day (US White House, 2006, p. 27). These declarations were signed before landfall. They embodied the recognition that “Katrina had the potential to be particularly devastating” (US White House, 2006, p. 27) and sealed the assistance of the federal government.

On 28 August, Katrina rapidly developed from a category 4 to a category 5 hurricane (US White House, 2006, p. 28). The National Hurricane Center issued a warning that the levees in New Orleans could be overtopped (US White House, 2006, p. 28). Early that Sunday morning, President Bush urged Louisiana's governor to order mandatory evacuation of New Orleans and assured the governor that Federal government's support and resources were available to deal with the situation (US White House, 2006, p. 28). The city's mayor did eventually order mandatory evacuation, but by late afternoon evacuations were affected by the approaching storm and an estimated 70,000 people remained in the city (US White House, 2006, p. 29; cf. Derthick, 2007, p. 38). Shelter operations that had begun the previous day continued in the evening, and thousands of people were placed in shelters across several states. In New Orleans, the Superdome had been designated the day before as the shelter of last resort for residents with special needs, but it was now a shelter for the general population (US White House, 2006, pp. 26 and 29). By midnight,

¹ In terms of GDP per capita, the United States ranks 10. www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html (accessed on 21 June 2008). See also Col (2007, p. 120).

² <http://www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html> (accessed on 21 June 2008).

an estimated 10,000 people had sought refuge there (US White House, 2006, p. 29).

Katrina made landfall on Monday morning 29 August in Plaquemines Parish, Louisiana, where New Orleans sustained the most extensive damage. Levees were overtopped or breached. This resulted in the flooding of New Orleans (US White House, 2006, p. 34), leaving 80% of the city under as much as 20 ft of water (Derthick, 2007, p. 37; US White House, 2006, pp. 1–2, 36). Critical infrastructures such as power sources and lines, sewerage systems, and communication lines no longer functioned properly (US White House, 2006, p. 34). The resulting communication breakdown caused local, state, and federal officials to depend on conflicting reports and inaccurate information. In such conditions of uncertainty, their first response priority was search and rescue operations. These started as soon as it was safe for emergency responders to proceed (US White House, 2006, pp. 34–36). Local responders, as well as state and federal agencies such as the Coast Guard, FEMA Urban Search and Rescue Task Forces, and the Department of Defense rescued tens of thousands of victims (US White House, 2006, p. 38).

Meanwhile, the Superdome filled with people fleeing their flooded homes and with people deposited by search and rescue teams. However, on the morning of 30 August, the US Department of Health assessed this temporary shelter as uninhabitable (US White House, 2006, p. 69) because of lack of space, air conditioning, running water, and power and because cut off access to the Superdome prevented evacuation and supply operations (US White House, 2006, pp. 38–39). Buses for the evacuation of the Superdome began to arrive on the evening of Wednesday 31 August. By the morning of Friday 2 September, approximately 15,000 people had been evacuated, but between 2000 and 5000 were still present on 3 September. At that time, the situation stabilized there and at the Convention Centre (where people had gathered assuming that it would be a safe place to stay). Food, water, and medical supplies were finally available, and on Sunday 4 September both locations had been entirely evacuated (US White House, 2006, pp. 39–40).

2.2. South-East Asian Tsunami

Shortly before eight on Sunday morning 26 December 2004, a magnitude 9 earthquake on the Richter scale occurred in the Indian Ocean, approximately 250 km from Banda Aceh, the capital of the Aceh province in Indonesia (Bappenas and the International Donor Community, 2005, p. 5). This earthquake generated a series of Tsunami's which radiated throughout the Indian Ocean faster than 500 km/h (Telford and Cosgrave, 2006, p. 33) resulting in massive flooding in Indonesia, Thailand, Sri Lanka, India and Bangladesh. Overall, the Tsunami killed more than 225,000 people in 14 countries (Telford and Cosgrave, 2006, p. 35; cf. Couldrey and Morris, 2005, p. 6). In Aceh—one of the worst-hit areas—the Tsunami mainly consisted of mud and debris (Telford and Cosgrave, 2006, p. 36), instead of water. Also, the ratio of dead to injured victims was over 6:1 in Aceh, whereas in Sri Lanka, for example, it was 1.53:1 (Telford and Cosgrave, 2006, p. 36).

In terms of human casualties, the South-East Asian Tsunami was the second most devastating natural disaster that occurred in Asia in the last hundred years; the Tangshan earthquake which killed 246,000 people in China in 1976 being the worst. Its total economic cost was estimated at US\$ 9.9 billion (Telford and Cosgrave, 2006, p. 17). In Indonesia, it destroyed 141,000 houses, killed 167,540 people, and decimated physical infrastructures (Telford and Cosgrave, 2006, pp. 33 and 37). In Aceh, it killed 4% of the population (Scheper et al., 2006, p. 23) and caused an estimated US\$ 4.5 billion of economic cost (material damage and

losses), which represents almost the entire GDP of the province (Telford and Cosgrave, 2006, p. 17). Overall, the Tsunami severely damaged the livelihoods of millions by decimating communities, cutting off roads, destroying homes, hospitals, schools, and official facilities, and destroying fields and forests with salt water.

Such immense devastation attracted the world's attention because of the timing of the event, the significant number of Western tourists in the affected areas, the daily rising death toll, and the availability of numerous amateur footage of the disaster (Telford and Cosgrave, 2006, p. 36). The considerable media coverage triggered an unprecedented outburst of financial and material assistance, both from official and private sources; an estimated US\$ 13.5 billion in international aid was directed towards the affected countries (Telford and Cosgrave, 2006, p. 16). This meant that, for once, an international emergency response was not impeded by financial constraints (Telford and Cosgrave 2007, p. 1).

Since the Tsunami was a rapid-onset disaster (Telford and Cosgrave, 2006, pp. 41–42) and since no warning had been issued, local people and survivors were the ones doing the search and rescue operations (Telford and Cosgrave, 2006, p. 42). According to a research conducted by the Fritz Institute, 91% of the 500 Indonesian people interviewed reported that they had been rescued by private individuals (Fritz Institute, 2005, p. 3). Offices, schools, and homes quickly became temporary shelters; food was provided from local shops; other actors such as local officials, associations, and religious groups offered medicines, blankets, and transportation means. However, as local capacities were quickly overwhelmed, outside assistance was needed.

On the afternoon of 26 December, the Indonesian government activated the National Disaster Management Board (Bakornas); however since this Board had an ad hoc disaster management structure but no contingency plans, it was not given the major responsibility during the overall response (Scheper et al., 2006, pp. 21, 26). The Indonesian Vice-President requested foreign assistance on 27 December and decided to open the Aceh province to international agencies (Telford and Cosgrave, 2006, p. 44). Depending on the scale of devastations and on geographical position, it took between 1 and 10 days for external aid to reach the affected communities (Telford and Cosgrave, 2006, pp. 42 and 44). The Indonesian National Army, already present in the Aceh province because of martial law, took a dominant role during the emergency response in the province (Telford and Cosgrave, 2006, pp. 44–45; Scheper et al., 2006, p. 21, 26). A few days after the disaster, emergency responders included not only the affected communities, local governments, and the national army, but also foreign governments, UN agencies, and hundreds of local and international NGOs (de Ville de Goyet and Morinière, 2006, p. 22).

3. Conditions hampering effective emergency response

Considering the devastating effects disasters can have, it is particularly important to understand which factors can impede the emergency response. In this section, we will list these conditions and illustrate them with examples derived from the two cases. An overview is presented in the appendices of this article.

3.1. Logistical problems caused by the characteristics of natural disasters and the natural environment in which the disaster occurred

The first factor likely to influence the governmental emergency response is the inherent characteristics of a given natural disaster and the extent of its consequences. Major natural disasters have the potential to produce an enormous impact on populations and

infrastructures, thus creating considerable human casualties and massive destruction. This does not only mean that emergency systems will quickly be overwhelmed, but first and foremost, it implies that emergency personnel and resources might themselves have been destroyed or seriously damaged (Lagadec, 2004, p. 163; cf. Harrald, 2006, p. 258; Larson et al., 2005, pp. 19, 23; Keramitsoglou et al., 2004; Radke et al., 2000, pp. 16, 20). The consequences of these reduced capacities are twofold: on the one hand, there will be limited human capacity to process and dispatch the huge amount of information received from various actors (Drabek, 1985, p. 88); on the other hand, this lack of personnel and resources also limits the capacity to conduct search and rescue operations.

Such a situation can be further aggravated by the overall uncertainty reigning in the wake of a major natural disaster. Disrupted communication and transportation networks, saturated information flows, and increased relief demands might generate confusion among emergency responders on how to assign their resources as they do not know the number of victims, their health conditions, their precise location, and the available means to reach them (Larson et al., 2005, p. 22; Fiedrich et al., 2000, p. 41; Quarantelli, 1988, pp. 375–379). In such conditions, emergency responders will not receive the critical information they need in order to attend victims properly. In conclusion, if emergency responders are themselves victims of the disaster, if their material is damaged (buildings, vehicles), if the amount of deceased, injured, lost, or displaced victims is high, if roads and communication networks are destroyed, then the emergency response will be negatively affected because the emergency responders' capacities will be quickly overwhelmed.

The natural environment in which a natural disaster occurs might also bear an impact on the emergency response. The topographic conditions and the state of the affected region can seriously hinder the access to victims; search and rescue operations will be impeded if the terrain is mountainous or flooded or if roads are cut off (Larson et al., 2005, p. 18; Keramitsoglou et al., 2004; Radke et al., 2000).³ Weather conditions and time pressure will add to the equation and these combined elements will create logistical difficulties for the responders. For example, if the roads to reach victims have been destroyed and if a heavy storm does not allow for deployment by helicopter, then the emergency responders will not have the means to convey assistance to the victims. If victims are buried under rubble, time will then add extra pressure on responders, because victims will only be able to survive for a few days on their own. Therefore, even though sufficient aid resources (food, water, medicines) might be available, the structural channels to direct this aid towards the affected populations might well have been destroyed by the disaster.

The consequences of Katrina created difficult working conditions for emergency responders. Flooded streets not only obstructed access to the police and fire dispatch centers in New Orleans, but also prevented post-landfall evacuation for several days. These conditions impeded the missions of search and rescue teams and of state and local emergency responders such as medical teams, fire-fighters, and law enforcement officials. Indeed, these responders exposed themselves to threatening conditions to perform their missions (US White House, 2006, p. 37).

As for the South-East Asian Tsunami, the authorities of the affected countries had not anticipated this type of disaster, let alone one of that magnitude. In addition, the Tsunami was a rapid-

onset disaster. Consequently, the initial need for relief assistance was very high (Telford and Cosgrave, 2006, p. 41). The Aceh province sustained extensive damage: hundreds of villages remained isolated for several days because most roads, bridges, boats, telecommunication networks, and water and energy supplies had been destroyed or decimated. More than 110,000 people in Aceh and North Sumatra were killed and 600,000 victims were in need of assistance (Bappenas and the International Donor Community, 2005, p. 9). Rescue operations were therefore affected by the high numbers of victims, by the extensive material damage, and by the unexpectedness of the event.

In order to assess the impact of a natural disaster on the emergency response, it is thus important to take into account the characteristics of the disaster as well as the natural environment in which the disaster takes place. Factors which one can take into account when it comes to the characteristics of the disaster are:

1. The *scope* of the disaster since catastrophic events' consequences will overwhelm local and regional capacities. Additional resources from higher levels of government are required which, in turn, results in the need for increased coordination.
2. The *scale* of the disaster—which determines the complexity and difficulty of emergency response operations—can be measured by establishing
 - a. the number of deceased, injured, lost, and displaced victims;
 - b. the extent of material damage, such as the state of water and energy supply infrastructures, roads, buildings, and telecommunications;
 - c. the scale of the territory affected in term of expansion across local, regional, and even national borders.
3. It is also important to establish whether an area has dealt with similar disasters in the past since *previous occurrences* of a similar disaster should have resulted in better and more adequate emergency response activities.
4. Similarly the *announcement/anticipation* of a disaster should have helped emergency response agencies to be better prepared.
5. The *speed* of the unfolding events as well as the moment in *time* when the disaster occurs, influences emergency response since a sudden and progressively developing disaster or a disaster that strikes at the dead of night may catch victims and emergency response actors unawares.

Factors to be taken into account when looking at the natural environment in which a disaster occurs are:

1. *Topography* combined with *population density* (i.e. flat lands versus mountains where it will be difficult to get help to the victims and urban versus country where the infrastructure and resources may not be that good (cf. Doherty, 2004: 152)).
2. The extent to which the area (e.g., buildings, infrastructure) has been *destroyed* will affect emergency operations as well as how vulnerable victims are to the natural elements since they can no longer find any shelter.

3.2. Organization of the emergency response

A second factor which can ease or impede the governmental emergency response is the organization of the emergency response. The way in which the decision-making process is organized as well as the way in which the coordination between

³ An extensive academic field of research focuses on how Geographic Information Systems (GIS) can help improve the emergency response phase. See for example Keramitsoglou et al. (2004), Cutter (2003), Wood (2000), and Radke et al. (2000).

Table 1
The decision-making process.

Organization	Centralization	Decentralization
Characteristic	Decision-making power is concentrated at the top	Decision-making power is diffused throughout the organization
Advantage	Emergency leaders have a clear overall picture of the situation	Those making decisions are those having knowledge from operational level
Disadvantage	Local knowledge does not reach the top easily	Local emergency leaders lack incentives to prioritize the overall objective
Results	Improves coordination Impedes adaptability	Improves adaptability Impedes coordination

the various agencies involved is handled, bear a considerable impact on the emergency response.

3.2.1. Decision-making process

Within the literature on crisis management response, there are two distinctive ideas on what the best approach is on organizing the decision-making process: centralization or decentralization. The centralization thesis supports the view that the decision-making power should be concentrated in the hands of a limited number of top managers. This model fields the lasting concern of who is in charge (Wise, 2006, p. 310) and assures that those few leaders in control have a better picture of the situation as a whole. This, in turn, will enable them to ensure that the decisions they make are coordinated while being implemented. Since effective coordination requires that one decision-maker acts knowing what other actors have decided (Alonso et al., 2008, p. 161), it is imperative that the number of managers making critical decisions is limited so that information between them flows easily. In addition, since these few decision makers act to obtain the overall objective of the emergency response, division and opposition among the various agencies, departments, and cabinets will be reduced. This centralized strategy fits with public expectations: top governmental leaders are the ones holding the capacity and authority to make critical decisions under time pressure and they will be held responsible for their decisions (Dinan et al., 2006, p. 314).

A widespread assumption is that “the greater the threat, the more centralized will be the response” (McConnell, 2003, p. 395). However, the centralization thesis is largely criticized in the disaster management literature, as it is frequently blamed for impeding local knowledge to reach the top (Boin et al., 2005, p. 57). A centralized organization indeed implies that some information can be lost or distorted while traveling from local authorities to top decision-makers. Such a model also entails a lack of local knowledge, preventing decision-makers at the top to adapt their decisions to local conditions (Alonso et al., 2008, p. 161). These elements explain why in most emergencies, and especially the extensive ones, some degree of decentralization should inevitably occur (Dinan et al., 2006, p. 315). Let us therefore now turn to the decentralization thesis.

The decentralization thesis argues that critical decisions should be made at the local level in order to enable those responders closer to the impact (which also means those closer to the necessary information) to make informed decisions. This will positively affect the rapidity of the decision-making process and the adaptability of the response to an evolving situation (Dinan et al., 2006, p. 315).

This model however creates a coordination problem, because local managers might fail to grasp the importance of the overall situation and place too much emphasis on assessing the needs at the local level. The coordination between the various local actors will be impeded if these local actors comprise several dozens of organizations, because then effective actions and decisions depend on too much information and too little time to consider it thoroughly. As a result, local actors might disregard other

responding actors with the risk of duplicating their tasks and wasting resources. Besides, the decentralized organizational structure also raises the problem of diffused accountability as decision-makers are isolated and multiple. In terms of emergency response, this means that local actors do not have strong incentives to favor global outcomes since they are likely to be held accountable for their decisions by local authorities only.

In short, a centralized model creates losses in terms of adaptability during the emergency response, whereas a decentralized model results in coordination losses (Alonso et al., 2008, p. 161). Neither organizational model is exclusively suitable for every situation. That is why combination models have long been acknowledged as more appropriate (Wise, 2006, p. 313). Responding organizations should therefore appreciate the fact that the structures of emergency operation systems should be flexible enough to adapt to the temporary pressures exerted by disasters. This means that “structured planning and organization [are] only effective if the ability to improvise is preserved” (Harrald, 2006, p. 264). Therefore, a closed system of organization, which assumes the need for command, control, and a centralized decision-making process, will impede the emergency response in catastrophic disasters because such an organization does not leave sufficient room for the flexibility necessary to improvise and adapt in the face of changing conditions (Harrald, 2006, p. 264). Table 1 summarizes the main aspects of each thesis.

After the reorganization of the US governmental emergency management system in 2002, a hierarchical structure of command and control in the National Response Plan and the National Incident Management System was reinforced (Comfort, 2007, p. 190). National government assumed a more dominating role in the disaster response (Derthick, 2007, p. 44). It is argued that the reinforcement of this hierarchical structure of command and control did not consider the complexity and uncertainty that are inherent to major disasters, which is why this system failed during hurricane Katrina (Comfort, 2007, p. 190; Waugh and Streib, 2006, p. 136). The lack of a working command and control system was the result of inappropriate leadership and situational awareness; the latter being the result of ineffective communication between leading responders in the disaster area and decision-makers at all levels of government (Waugh and Streib, 2006, p. 136). This system failed because it required at the same time local knowledge and a global understanding of the situation—both lacking in decision-makers (Waugh and Streib, 2006, p. 136) (in order to avoid repetition, we describe coordination problems in Aceh in Section 3.5 when discussing another factor influencing emergency response).

In order to assess the level of centralization/decentralization of decision-making processes and the decision-making processes' effect on emergency response, the following factors need to be taken into account:

1. To what extent *authority is diffused and shared* throughout responding agencies and institutions since empirical evidence has demonstrated that all levels of government as well as all involved agencies should be integrated in the process of decision-making in times of crises (Weick, 1988, p. 312; cf.

- Lester and Krejci, 2007, p. 90)—if critical decisions are only made at the strategic level, essential information might lack, and decisions will be made without precise assessment of the situation.
2. It is imperative that those who are responsible for the decision-making process have a certain level of *competence* ('t Hart et al., 1993, p. 37; cf. Weick, 1988, p. 312), *knowledge* ('t Hart et al., 1993, p. 31), *training*, and *resources* at their disposal.
 3. The “*appropriateness*” of the decisions made since wrong decisions can have devastating effects when implemented or they might not be implemented at all if other actors perceive the decision as wrong. It is important to note here that non-decisions (not taking any decisions consciously or unconsciously) can have detrimental effects ('t Hart et al., 1993, p. 25).

3.2.2. Coordination

Another type of organizational factor is the coordination within and between organizations as a lack of coordination can obstruct governmental emergency response. Effective coordination—i.e. the degree to which various organizations align their actions in order to implement contingency plans in the most effective way (Boin et al., 2005, p. 67; cf. Quarantelli, 1988, pp. 381–384)—is very difficult to grasp because it depends on high levels of communication and collaboration. It is only through open dialogue (communication) and active involvement (collaboration) that diverse agencies and organizations will be able to assist each other and perform teamwork (Choi, 2008, p. 10). Such cooperation is in turn a major requirement for the involved organizations to coordinate their actions and therefore produce an effective emergency response.

To measure coordination, one has two options. First, to do an in-depth research by determining for each organization involved in the emergency response whether—to name just a few—it is willing to coordinate, what its view on coordination is, whether that view corresponds with the view of other organizations participating in the emergency response, and whether there is a proper flow of communication within and between the various organizations. The second option is to focus on key actors within the organizations who actively promote and pursue coordination efforts. They facilitate cooperation by establishing a common objective with these organizations, determining the priorities in emergency operations, and providing overall guidance on what each organization should do and the way it should do it (cf. Choi, 2008, p. 10). In this article we will use—for lack of a better word—the concept of leadership to capture these persons. When using the words leader and leadership, we refer to actors and actions that might overlap with the more traditional concept of crisis leaders and leadership, but that is not always the case. It is very well possible that the person we traditionally perceive as the crisis leader is assisted by someone whose task it is to focus on communication and cooperation to assure proper coordination. Who this person is may vary per organization. In some it will be a top level manager, in others a more junior person. However we would like to call them, these “emergency leaders” conduct a number of activities that—if improperly done—may severely affect the emergency response. In this article, it is these activities that we are interested in.

Effective leadership will enable the coordination of relief activities among the various actors involved in the emergency response through cooperation (Vaugh and Streib, 2006, p. 131). Governmental actors not only need to coordinate their efforts with other governmental agencies, but also with non-governmental actors such as local and international NGOs and civil society (Vaugh and Streib, 2006, p. 132; Smith and Dowell, 2000,

p. 1153). For emergency leaders, coordinating implies facilitating dialogue, defining common objectives and priorities, distributing precise duties and responsibilities, providing guidance on how to implement operations, and ensuring the rapid diffusion of all this information (Boin et al., 2005, pp. 56–58). These tasks can only be performed effectively if emergency leaders at every level of government facilitate communication and maintain strong links with all the involved actors simultaneously (Drabek, 1985, pp. 85–92; cf. Vaugh, 2003, pp. 373–385; Schneider, 1995; Schneider, 1992, pp. 135–145; Tierney, 1985, pp. 77–84).

These conclusions show the need for emergency leaders to be present at every level of government which, in turn, implies that the decision-making process should be decentralized to a certain degree in order to give managers at every level the capacity to be an effective link in the chain of leadership. Indeed, they need to be empowered with enough control and authority to fulfill their tasks and forward accurate information to emergency responders regarding what to do and how to do it (Lester and Krejci, 2007, p. 92). It means that a strictly centralized decision-making process, such as the traditional command and control model, is inappropriate to handle the emergency response in the wake of major natural disasters (Lester and Krejci, 2007, pp. 87–88; Quarantelli, 1988, p. 381).

During emergency response operations, lack of coordination will result in efforts being duplicated, responders not knowing what to do, resources being wasted, and victims' needs being wrongly assessed (UNDAC, 2006, p. B 2). On the other hand, if priorities are set, responsibilities and duties are clearly established, information diffused throughout all levels of government and across many responding organizations, these elements will strengthen emergency relief capacities because each actor will act in coordination with other actors. Each actor knows what to do and how to do it (Kettl, 2003, p. 258). Local responders will be empowered in their capacities, resources, and knowledge; regional authorities will act as an intermediary between local and national levels; and federal agencies will be able to provide adequate support, resources, and guidance whenever necessary.

The lack of leadership at the highest level of the emergency response structure is considered as one of the biggest factors hindering the governmental relief efforts in the wake of hurricane Katrina (Lester and Krejci, 2007, p. 86). Not only was leadership lacking at the federal level, but it was also not sufficiently diffused throughout the organizations and authorities responding to the disaster (Lester and Krejci, 2007, p. 86). As a result, local emergency response officials had difficulties establishing functioning incident command structures, making it impossible for them to guide and control local responders (US White House, 2006, p. 37). The emergency response was therefore hindered because several hundreds of organizations and volunteers were not able to work together in a flexible and collaborative way (Farazmand, 2007, p. 155).

The emergency response in Indonesia after the Tsunami was impeded by the incapacity of the central government to compensate for weak coordination structures at the local level which obstructed the national government's access to information and limited its capacity to effectively respond to the disaster (Bennett et al., 2006, p. 10). As a result, the Indonesian disaster management structure could not effectively coordinate the governmental activities with those performed by international actors. Besides, national authorities did not fully comprehend the mechanisms, structures, and policies regulating international aid institutions (Bennett et al., 2006, p. 40; Government of Indonesia and United Nations, 2005, p. 4), which further complicated the coordination between national and international responders. This lack of coordination resulted in gaps in the response, but also in duplications and overlaps (Telford and Cosgrave, 2006, p. 51).

The failure of the national government to compile and disseminate valuable information for those active on the ground prevented the creation of a big picture that could have facilitated the measurement of victims' needs and the prioritization of tasks (de Ville de Goyet and Marinière, 2006, p. 13).

In order to assess the coordination efforts in the aftermath of natural disasters, the following elements need to be taken into account which can negatively affect the emergency response:

1. Leaders responsible for providing overall guidance and coordinate activities are *not present at every level of government and in every agency*.
2. A *common objective* has not been identified between all the responding agencies and organizations.
3. The services provided by responders do not meet the *victims' needs*—which is usually the result of improper needs assessment—and renders the assistance inappropriate.
4. Efforts are duplicated, resources are used in an unproductive and ineffective way or are wasted, relief efforts are slow, impeded, or obstructed by internal or external circumstances because responders do *not adjust* their activities to *changing conditions*.
5. Emergency responders *do not know* how to proceed, i.e. which resources to bring along, how many victims to expect, what the health conditions of the victims will be, which victims to assist first, which transportation means to employ, or what operations to perform first.
6. *Roles and responsibilities* are not defined at every level of operations.
7. All the key actors involved in the emergency response have not been *integrated* in the above operations.

3.3. Policy

Another condition which can facilitate or hinder the governmental emergency response is the overall disaster management policies adopted by governments. As mentioned earlier, emergency response is the third phase of disaster management; the first phase of disaster management is mitigation/prevention, followed by preparedness. Each of these stages requires specific policies to be adopted and implemented. This implies that each stage of disaster management can be assigned more or less attention and resources. The way each of these stages is handled has an impact on the next stage because the stages are interdependent components of a dynamic process. For example, if more resources are allocated to mitigation and prevention, then fewer resources will be available for the preparedness stage. In turn, the level of attention given to preparedness will affect the unfolding of the emergency response. Such influence also exists between response and recovery processes. In this section, the influence of the preparedness stage on the emergency response will be examined by looking at contingency planning and training.

Besides the fact that planning can be lacking—with detrimental consequences for the emergency response phase (McConnell, 2003, p. 397)—planning can also be inadequate (Boin et al., 2005, p. 57). Adequate planning consists of planning which takes into account a wide range of natural disasters. However, since it is nearly impossible to accurately anticipate a natural disaster in terms of scope, extent, and consequences, the plan should be flexible enough so that it can be adapted to highly unexpected or improbable events (Comfort, 1999; Walker et al., 1994, p. 43; Kreps, 1991). But even if the plan is adequate, incorrect or untimely implementation can seriously hamper the emergency response (McConnell, 2003, p. 397).

Training could help to ensure proper implementation of the emergency response plans. Training helps to test the emergency response plans in a safe setting, it allows actors to become aware of the plans and the basic procedures and guidelines they entail, and helps responders to determine which equipment they should bring along (Drabek, 1985, p. 90; cf. Roberts, 1990, p. 165). However, if the training does not include important actors or presents a simulation which is much more benign than the real disaster—in short, if the training is inadequate (Drabek, 1985, p. 90)—the training will not facilitate the emergency response since it raises false expectations that everything is under control (cf. Roberts, 1990, p. 170). Additionally, research has demonstrated that the impact of training not only depends on the frequency of the trainings but more importantly on the “recency, quality, and comprehensiveness” of the training (Drabek, 1985, p. 90). Moreover, experience shows that even elaborated exercises, carried out shortly before a disaster, will never entirely match the severity or complexity of actual disasters. Simulation planning is therefore a delicate task as it must take into account the intrinsic tension between the most probable scenarios on the one hand and the uniqueness of each event on the other. This tension implies leaving enough room for improvisation, while at the same time defining comprehensible strategies to guide responders' actions. Still, when properly done, training will have a positive effect on emergency response; thus “well-thought and tested contingency plans dramatically increase the chances of an effective response” (McConnell, 2003, p. 397).

Katrina was the first large-scale test of the National Response Plan (NRP), created in 2004 to organize the federal response to all disasters. The test failed (Derthick, 2007, p. 43; Col, 2007, p. 121; Morris et al., 2007, p. 94). This failure resulted from the fact that although the NRP acknowledged the need for a greater proactive federal response in a catastrophic event, it did not provide details on how to actually execute such a proactive role (US White House, 2006, p. 14). Moreover, because of the hurricane's devastating impact, basically destroying local government and incapacitating state government (US White House, 2006, p. 42), local and state responders did not have the capacities to deploy the extra resources provided by the federal government. Besides, the federal government itself did not have sufficient resources to meet local and state requests (US White House, 2006, pp. 42–44).

Disaster management structures in Indonesia prior to the Tsunami were weak, unclear, and at times duplicative (Government of Indonesia and United Nations, 2005, pp. 2–3). No detailed contingency plans had been designed, which generated confusion in terms of roles and responsibilities of the various official components involved in the response process and in particular with regard to local agencies. This delayed and weakened the early actions of local authorities in the wake of the disaster. The existing legislation also failed to integrate the capacities of national and international non-governmental actors in the emergency response, making it difficult for these actors to coordinate their efforts (Government of Indonesia and United Nations, 2005, pp. 2–3).

In order to measure the influence of disaster management policies on relief operations, several aspects need to be considered. When it comes to establishing the effect of contingency planning on the emergency response, researchers need to determine whether the following factors are present:

1. The existence of national and local *contingency plans*.
2. To what extent contingency plans encompassed the *complexity of the actual disaster*.
3. The *integration* of all levels of government (i.e. all government agencies dealing with the emergency response) and all other responding actors into the contingency plans.

4. To what extent existing plans have been *implemented* following the guidelines and procedures established by disaster relief agencies.
5. Whether governors and mayors *activated the plans* by taking the necessary steps.
6. Whether the plans facilitated the provision of additional resources by federal agencies.

To assess the effects of training, the following elements need to be examined:

1. Whether existing contingency plans have been *tested* and if so, when, how often, under what conditions, including which actors, and also which aspects of the policy structures were modified as a result (lessons learned).
2. Whether emergency leaders have been *trained* to become more familiar with the plans and have precise notions of how to deal with catastrophic disasters in terms of emergency leadership and the conduct of relief operations.
3. Whether the *population has been integrated* in simulations.
4. Whether *local communities have been informed* of existing guidelines which they need to follow in case of an emergency.

3.4. Social and economic environment

Another factor which can impair governmental emergency response is the social and economic environment of the area affected by natural disasters. The socio-economic background of affected populations will bear an impact not only on the number of victims and the condition that they are in, but also on the specific environment in which search and rescue activities will occur.

Natural disasters hit populations regardless of their social status or economic conditions; the consequences of these natural disasters, however, do affect people differently according to their social and economic environment (Doherty, 2004). Empirical evidence demonstrates that “societies which suffer a fragile physical environment, weak economies and inadequate social and institutional structures are disproportionately likely to make a disaster out of a natural hazard” (Özdem, 2006, p. 399). Communities with, for instance, high levels of poverty and crime, loose family ties, limited business opportunities, deserted areas, or weak infrastructures, will be more affected by natural disasters because any of these factors reduces people’s capacities to respond to an emergency situation (Klinenberg, 2000, p. 91). Loose family ties, for example, probably affect individuals’ willingness to look for and assist relatives while high crime rates might result in citizens focusing on protecting their assets instead of helping others. In addition, victims as well as emergency responders will not have easy access to provisions due to extreme poverty and lack of stores in the economically depleted areas. The presence of just one of these factors could have a detrimental effect on the emergency response in the wake of a natural disaster (Lagadec, 2004, p. 168). Conversely, strong community links, resilient infrastructures, high population density, satisfying economic conditions, or significant commercial activity all have the potential to increase the community’s response and reduce the victims’ vulnerability to disaster consequences; thereby lowering the workload of official emergency responders and enhancing their capacities.

However, the affected population’s socio-economic conditions do not only influence the workload of official emergency responders, they also partly define the particular environment in which search and rescue activities will take place. Socio-economic conditions indeed shape the behavior of the victims themselves,

which in turn can affect the emergency response (Boin et al., 2005, p. 59). Victims might have to survive on their own in a hostile environment in which the rule of law does not prevail anymore resulting in chaotic conditions and anarchical behaviors.⁴

Lastly, it is worth mentioning that the socio-economic structure of affected populations can also influence political actors and, by extension, disaster management decision-makers. There might be more or less political pressure to act quickly, mobilize extensive resources, and attract media attention according to the socio-economic composition of the victims. In the field of crisis management, as in any other area of governmental activity, political will is a major factor in the process of resources allocation, both during the prevention/preparation phases and the emergency response (McConnell, 2003, p. 409).

Louisiana is, by any measure, a very poor state. Almost 20% of its population lives at or below the poverty level; more than 40% of adults are illiterate and/or have not completed high school. At the time Katrina struck, the majority of New Orleans’ residents were in the lower socio-economic class and most of those residents were African American (Jurkiewicz, 2007, p. 60; Stivers, 2007, p. 48). Stivers investigated the link between, on the one hand, the fact that in New Orleans those in need were disproportionately African American and, on the other hand, the frequent instances during relief operations when authorities at every level failed to take the necessary measures to effectively help the victims (Stivers, 2007, pp. 48–51). Her investigations seemed to reveal that this governmental failure to act and step outside the rules whenever necessary might have been generated by the socio-economic characteristics of affected populations (Stivers, 2007, p. 53). In Aceh, although a majority of the affected populations and of the province’s wider community were also poor, immediate relief efforts were more effective. The first element to explain such a difference is that victims were able to subsist several days on their own on available fruits and coconuts. Also, many residents inland which had not been affected by the Tsunami offered shelter to the survivors. The role of these host families has been described as critical, especially during the first week after the disaster (Telford and Cosgrave, 2006, p. 91). The fact that there were more unaffected people able to assist victims in Aceh than in New Orleans can certainly help explain the different outcomes of each event.

To assess the impact of the social and economic environment on the emergency response, two aspects need to be explored: the affected populations’ attributes in terms of socio-economic indicators because this will influence victims’ capacities to rely on their own means to overcome the consequences of the disaster; and the victims’ socio-economic position within the wider community because this position might influence the local or regional political actors’ emergency response.

Socio-economic attributes of the affected populations can be determined by looking at

1. The *financial conditions* of the majority of victims and their type of employment.
2. The *level of economic activity* in the affected areas.
3. The *social structures* in terms of solidarity institutions (faith-based organizations, citizens’ groups, social services) and family and community links.
4. The *level and type of crime* committed in the area.

⁴ It is important to note here, however, that the disaster myth is often exaggerated in the media—as happened during hurricane Katrina (Tierney et al., 2006; cf. Quarantelli, 1993, p. 70).

The affected populations' socio-economic position in the wider community can be established by determining to what extent the affected area is of socio-economic importance for key political actors. The level of importance can be assessed by looking at

1. Whether the area provides *economic activities vital* to other economic sectors in the country (e.g., energy suppliers).
2. Whether the area has *strong voting power*.

If areas score positively on one of these accounts, political actors will be more willing to divert resources to the emergency response.

3.5. An unusual over-abundance of financial resources

A last factor to be mentioned is the unusual occurrence of over-abundant financial resources. Since this factor is a case-based factor, we will use the case to thoroughly describe the effects of such an unusual over-abundance of financial resources in Aceh before concluding what elements to look out for when considering the impact of over-abundant financial resources on emergency response.

The Tsunami was not only a unique event due to the number of victims it made and the number of countries it simultaneously hit; it was also a unique event in terms of media coverage—which was massive and fuelled an unprecedented generosity worldwide, eventually amounting to an estimated US\$ 13.5 billion in international aid (Telford and Cosgrave, 2006, p. 16). The mass media was a powerful factor in the Western world in particular, since many victims originated from there (de Ville de Goyet and Morinière, 2006, p. 58; Telford and Cosgrave, 2006, p. 45). This immense flow of funds was the most important factor influencing the coordination of international activities in the field (de Ville de Goyet and Morinière, 2006, pp. 16, 58). Coordination was the main factor impeding the Tsunami's response by the aid community in Aceh. Coordination flaws consisted of several related components: the proliferation of responding actors, the marginalization of local agencies by international actors, and the delivery of assistance regardless of needs assessments.

3.5.1. Proliferation

An estimated 300 international NGOs arrived in Aceh during the first few weeks following the disaster (Scheper et al., 2006, p. 35). As a result, relief operations occurred in an environment where the communication of information was lacking and coordination was barely present (IFRC, 2005, p. 81). Proliferation hindered the quality of the response. It posed immense challenges for the government at all levels and OCHA (the UN Office for the Coordination of Humanitarian Affairs responsible for coordinating the provision of assistance) in trying to coordinate governmental and non-governmental operations. The numerous involved actors often generated a fragmented response characterized by duplications, confusion, and time-consuming coordination meetings (Telford and Cosgrave, 2006, p. 62; Bennett et al., 2006, p. 37). Besides, the proliferation of inexperienced NGOs which did not thoroughly apply international humanitarian principles threatened the work of other organizations (Telford and Cosgrave, 2006, p. 57). The arrival of these NGOs reduced the appropriateness of the response because they were largely unaware of the complex mechanisms governing international aid operations and the particularities of the local contexts in which they operated (Scheper et al., 2006, p. 35).

More money was raised through private sources than official ones, which explained the immense amount of funds available to INGOs (Bennett et al., 2006, p. 27). Proliferation therefore

generated competition between these organizations to find clients to spend the funds on (Bennett et al., 2006, p. 76). The fact that most organizations had no financial constraints increased their flexibility, but at the same time reduced their dependence on formal coordination structures (Telford and Cosgrave, 2006, p. 62). As a result, they had few incentives to coordinate their activities with local government or with other organizations (e.g., through UN partnerships) (Telford and Cosgrave, 2006, p. 62; Bennett et al., 2006, p. 48). On the contrary, there was a certain pressure emanating from donors to spend in a visible way which compelled many agencies to extend their mandates beyond their competencies (Bennett et al., 2006, p. 48; Christoplos, 2006, p. 11). The need to increase the agencies profile probably undermined the quality of the response.

3.5.2. Marginalization

The second consequence of unusual availability of funds is the marginalization of (governmental and non-governmental) local actors by the international aid community. As mentioned earlier, many community-based organizations and local NGOs in Aceh had played a crucial role during immediate relief activities because they were the only ones present there. However, during the later stages of relief efforts, these groups were marginalized by international organizations which arrived a few days or weeks after the disaster (Scheper et al., 2006, pp. 9–10). For example, international agencies would often poach staff from local organizations regardless of the consequences (Scheper et al., 2006, pp. 35–36). Such a process evidently reduced the human resources of local organizations that had already sustained severe human loss in the Tsunami (Scheper et al., 2006, p. 68; Bennett et al., 2006, p. 11, 51).

This issue was—and still is—a major problem of the Tsunami's response, because it undermined the effectiveness of international relief operations. Indeed, experience revealed that international efforts to assist local communities were most effective when based on already existing alliances with local actors (Scheper et al., 2006, pp. 35–36). Local actors had knowledge that was lacking to international agencies, but international agencies controlled the resources (Scheper et al., 2006, p. 37). These resources compelled them to provide more assistance than required instead of helping victims to provide for themselves by strengthening their capacities. Strengthening local capacities at an early stage of the response might have enabled INGOs to perform more effectively (Scheper et al., 2006, pp. 37–38). In contrast, the widespread failure of international actors to actively engage with local capacities negatively affected the emergency response in the long term (Scheper et al., 2006, p. 43). If local capacities are not strengthened, local communities will not successfully mitigate the risks of future disasters and dependence on external assistance will be sustained (Scheper et al., 2006, p. 44).

3.5.3. Needs assessment

Finally, the unprecedented media attention which led to enormous funding also hindered response operations because international agencies felt the resulting pressure to spend rapidly and visibly (Telford and Cosgrave, 2006, p. 93). This pressure led a majority of decision-makers on the ground to deliver assistance without basing it on needs assessments (de Ville de Goyet and Morinière, 2006, p. 38). They worried more about how their activities would appear back home (Christoplos, 2006, p. 11) than about the usefulness of their actions. This issue was largely blamed on the United Nations Disaster Assessment and Coordination (UNDAC) teams, which failed to appoint sufficient staff to meet the magnitude of relief efforts in terms of needs assessment (de Ville de Goyet and Morinière, 2006, p. 52). UNDAC was

consequently torn between its assessment and coordination functions (de Ville de Goyet and Morinière, 2006, p. 53). Many actors in Indonesia qualified UNDAC's performance as weak and questioned its impact because it did neither effectively analyze needs nor compile information (Telford and Cosgrave, 2006, p. 58; de Ville de Goyet and Morinière, 2006, p. 12). Without priorities set by UNDAC, aid organizations sometimes chose to spend their money based on how easy it was to spend it instead of basing it on the needs of the population (Christoplos, 2006, p. 23). Since the affected populations were rarely consulted, they did not receive what they needed when they needed it (Scheper et al., 2006, p. 30).

3.5.4. Coordination

All of the above elements hindered the coordination of the Tsunami's response. In a disaster response involving many national and international actors, OCHA usually coordinates the humanitarian response by ensuring that an overarching structure is established in order to facilitate the dissemination of information to all responding organizations (Eikenberry et al., 2007, p. 167). These organizations are therefore dependent upon OCHA to perform at their best, because OCHA is responsible for assessing needs and indicating which services should be provided where (Pipa, 2006, pp. 16–17). This system is designed to enhance coordination and partnerships between local groups and international actors (Pipa, 2006, pp. 16–17). However, this coordination role was not entirely effective during the Tsunami's response, because OCHA was not in a position of direct authority in relation to the other organizations (Telford and Cosgrave, 2006, pp. 62–63). This lack of influence was created by the high number of actors to be coordinated combined with their unwillingness to participate in common service delivery (Telford and Cosgrave, 2006, pp. 62–63). As a result, OCHA was unable to provide timely information and set priorities (Bennett et al., 2006, p. 76), ensure cohesion between international actors and government agencies (Bennett et al., 2006, p. 10), and offer an overview of the humanitarian response (de Ville de Goyet and Morinière, 2006, pp. 27, 53).

Weak coordination undermined the relationship between the international aid community and local actors. For example, UN agencies often bypassed government agencies (Government of Indonesia and United Nations, 2005, p. 3), which resulted in inadequate needs assessment because the government was the main source for official numbers of people in need (de Ville de Goyet and Morinière, 2006, p. 32). Such behavior also revealed the little consideration displayed by many international actors for the specific context in which they operated (Government of Indonesia and United Nations, 2005, p. 4). Many observers noted that by delivering immediate assistance items for too long, international actors impeded a swift transition to recovery. Indeed, their failure to timely engage with local actors by consulting them regarding their needs placed too much emphasis on their own assistance delivery. Excessive external aid over an extended period of time therefore only contributed to undermine local capacities (Scheper et al., 2006, pp. 10–11).

As the above shows, an over-abundance of financial resources can assure that enough resources can be directed to the affected areas. However, it can have devastating effects on the coordination between the various organizations involved in emergency response—effectively assuring that victims do not easily obtain independence in the long run. In order to assess to what extent abundant financial resources are hindering the emergency response, one has to look for

2. The number of newcomers compared to established (I)NGOs in the region.
3. The manner in which locals are hired (or poached) from local organizations.
4. The need of these organizations to present themselves in a certain fashion in order to please their financial backers.
5. Whether a proper needs assessment is made or not.
6. Whether organizations feel that they can ignore coordinating efforts by OCHA or any other coordinating organization.

4. Conclusion

The emergency response consists of two stages: the life-saving/sustaining response and the self-sufficiency response. The first stage of the emergency response is effective if victims are rescued from life-threatening conditions and no longer have to worry about their survival. In other words, they have been rescued and are now receiving the basic provisions of food, water, shelter, medical care, and protection. The second stage can be labelled effective when victims are no longer depended on outside help to survive.

In this article, we used two cases to illustrate possible conditions which can hamper the emergency response. The emergency response in New Orleans was rather ineffective. In contrast, the emergency response in Indonesia was more effective though not as efficient as could have been because, for example, the unusual over-abundance of finances made it more difficult for locals to become self-sufficient again. In a sense, the over-abundance of money was a mixed blessing. On the one hand, it helped to overcome emergency response problems such as inadequate planning and training. On the other hand, it increased already existing problems of coordination and unnecessarily prolonged the help to local victims. Another contrasting element that stands out is the coping capacities of locals. Most victims in New Orleans were poor (most better-off residents had already fled the area) which limited their coping capabilities. Although victims in Aceh were poor as well, they had access to fruits and coconuts which helped them cope with the immediate aftermath of the disaster as they could feed themselves and others.

In both cases, there were conditions negatively affecting the emergency response. Being able to deal with or overcome these conditions would immensely increase the effectiveness of the emergency response. Emergency logistics could take a number of these conditions into consideration when planning the emergency response. Geographic Information System (GIS) techniques, for instance, could help to navigate difficult terrain. Moreover, when planning emergency logistics, one should also allow for the possibility of local organizations, resources, and infrastructure being destroyed by the disaster (Sheu, 2007b, p. 688). Factors such as population density can easily be incorporated in emergency logistics planning. In addition, emergency logistics could help to overcome some of the conditions hampering emergency response by, for instance, clarifying a common objective, avoiding duplication of emergency efforts, defining roles and responsibilities of actors involved, and integrating key actors in the emergency response.

Emergency logistics by itself, however, cannot solve every problem mentioned in this article. Coordination, for example, can be improved with the help of logistics, but will continue to be a problem if managers of organizations do not purposefully push for proper coordination and cooperation. Still other factors, such as the decision whether or not to assist an area, are politically-

1. The number of organizations (NGOs and INGOs) involved in the emergency response.

motivated decisions based on the area's economic value and population or the need for organizations to be visible during their work in order to show their donors that their money is spent well. These actions remain outside the control of those responsible for emergency logistics. Nevertheless, some conditions listed in this article can be dealt with through emergency logistics, thereby increasing the effectiveness of the emergency response (cf. Perry, 2007). Moreover, since the conditions apply to government as well as non-governmental actors (see Appendix B), they can be used to

improve the logistics of disaster management both at the government and non-government level.

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Appendix A. Potential factors hampering effective emergency response

Factor consists of...	...and will affect the emergency response negatively if...
<i>Characteristics of natural disaster</i>	
Scope	
Number of deceased victims	If the number of dead victims is high compared to routine events
Number of injured victims	If the number of injured victims is high compared to routine events
Number of lost victims	If the number of lost victims is high compared to routine events
Number of displaced victims	If the number of displaced victims is high compared to routine events
Extent of material damage	
Access means	If they are (partially) destroyed
Telecommunications networks	If they are (partially) disrupted
Water supplies	If they are (partially) destroyed
Energy supplies	If they are (partially) destroyed
Affected territory	
Local level	If disaster affected several cities, counties, or districts
Regional level	If disaster affected several states or provinces
National level	If disaster affected several countries
Previous occurrences	
Frequency	If such a disaster is exceptional in its occurrence
Scope	If the disaster has a catastrophic nature, as opposed to 'routine'
Expectancy	If such a disaster, in nature or scope, was not expected
Anticipation (early-warning)	If neither the authorities nor the population have been warned about the imminence of such a disaster
Speed	If the event rapidly unfolds or rapidly progresses
Time of occurrence	If the event happens during the night
<i>Natural environment of natural disaster</i>	
Topography	If the terrain is difficult to access, such as mountainous areas
Density of population	If a lot of victims are concentrated in one area If victims are isolated and difficult to reach
Consequences of disaster	
Buildings	If buildings and houses are severely damaged or entirely destroyed
Streets	If streets and surroundings are flooded
Sanitation	If numerous corpses are lying around in the hot weather or in standing water If sewer networks are destroyed
<i>Organization of the emergency response</i>	
Decision-making process	
Dispersion of power	If power to make decisions is concentrated at the top, strategic level If decisions made are not feasible in terms of implementation
Capacities of decision-makers	If the people making the decisions are not the ones most competent to deal with the situation at hand If those most competent are not available or not willing to make decisions
Outcomes of decisions	If decisions result in unanticipated negative effects If decisions do not result in the expected positive effects If crucial decisions are not made If decisions made are not acted upon

Factor consists of...	...and will affect the emergency response negatively if...
Coordination	
Leadership	If leaders responsible for providing overall guidance and coordinate activities are not present at every level of government and in every agency
Common objective	If a common objective has not been identified between all the responding agencies and organizations
Needs assessment	If the services provided by responders do not meet the victims' needs, i.e. improper needs assessment
Use of human resources	If efforts are duplicated
Use of material resources	If resources are used in an unproductive and ineffective way; or are wasted
Adaptability	If responders are unable to adapt their activities to an evolving situation
Guidance and information	If emergency responders do not know how to proceed, i.e. what resources to bring along, what amount of victims to expect, which transportation means to use, in which health conditions the victims are
Priority-setting	If emergency responders do not know which victims to assist first or what operations to perform first
Roles and responsibilities	If roles and responsibilities are not defined at every level of operations
Integration	If all the actors involved in the emergency response, governmental and non-governmental, have not been integrated in the above operations
Policy	
Planning	
Contingency plans	If local and national contingency plans do not exist If contingency plans do not encompass the complexity of the actual disaster
Integration	If existing plans do not integrate all levels of government and responding actors
Emergency management structures	If the plans have not been implemented following the guidelines of disaster relief agencies
Emergency leaders	If official actors did not activate the plan by taking the necessary steps
Accuracy	If the plans do not facilitate the provision of additional resources by federal agencies
Training	
Exercises and simulations	If contingency plans have not been tested If contingency plans have been tested under different conditions or if lessons from past exercises have not been retained If emergency leaders have not been trained to be familiar with the plans If emergency leaders have not been properly trained to handle catastrophic disaster conditions If the population has not been integrated in exercises and simulations If local communities have not been informed of existing guidelines to follow in case of an emergency
Social and economic environment	
Socio-economic indicators of victims	
Financial conditions	If a majority of victims are poor
Employment	If a majority of victims rely on precarious employment
Economic activity	If the level of economic activity in the affected area is low
Social bonds	If social bonds in terms of solidarity institutions and family links are weak
Criminality	If the level of criminality is high and type of criminality is severe
Victims' place in the wider community	
Economic activity	If their economic activity is not of particular need for the region or the nation
Political weight	If the affected populations do not represent a concentration of influent voters
An unusual over-abundance of financial resources	
Funds available to emergency response agencies	
Proliferation	If funds available result in innumerable and unnecessary responding actors
Established/new agencies	If a country is overrun with new agencies that do not have long established ties with the local community, these new organizations may actually hinder the emergency response by poaching locals from established organizations and failing to integrate local activities within their own relief efforts
Image	If organizations have received a lot of funds they might be forced to act in a manner that shows their donors that they are acting but their actions are actually detrimental to the emergency response
External aid	If funds available to external responding actors do not compel them to empower local responders and populations to regain their independence in terms of basic needs or do not compel them to coordinate their efforts with other emergency agencies
Needs assessment	If funds available do not compel responding actors to assess the victims' needs before providing them assistance

Appendix B. Factors that negatively influenced the response

	Hurricane Katrina		South-East Asian Tsunami	
	Gov. level	Non-gov. level	Gov. level	Non-gov. level*
<i>Characteristics of natural disaster and natural environment</i>				
High numbers of deceased victims and of victims in need of rescue and care	×	×	×	×
Buildings, access means, water and energy supplies, telecommunications, and sanitation were heavily destroyed	×	×	×	×
Local responders sustained extensive damage in terms of human casualties and material loss	×	×	×	
Affected territory spread over several states or nations	×	×	×	
This type of disaster was exceptional in its occurrence			×	
This disaster had a catastrophic nature, as opposed to routine nature	×	×	×	
This disaster was not expected, therefore neither the authorities nor the populations had been warned			×	
The disaster unfolded rapidly			×	
<i>Organization of the emergency response</i>				
Crucial decisions were not made or delayed	×			
Decision-makers at the top did not adapt to local conditions	×			
Leadership was lacking at every level of government	×			
Key actors were unable and/or unwilling to communicate effectively	×			
Lack of situational awareness	×			
Inter-governmental coordination was lacking	×			
Coordination was ineffective among the various responding actors	×	×	×	
The command and control system failed	×			
Limited capacity to acquire critical information and disseminate appropriate needs assessment	×		×	
Responders on the ground lacked information to guide their operations	×		×	
SAR teams had to define their own priorities	×			
The NRP did not clearly define roles and responsibilities of each level of government	×			
FEMA and the Red Cross disagreed on their respective roles and responsibilities		×		
All the responding actors were not integrated in an overarching structure able to coordinate their actions	×	×	×	×
FEMA did not have a system to keep track of requests made by the Red Cross in terms of needs		×		
No coordinated structure existed to integrate the many charities to governmental activities		×		
Small charities and non-profits had to spend time and energy collecting funds		×		
<i>Policy</i>				
No precise contingency plans had been designed			×	
The plan did not guide federal actors to become more proactive	×			
The federal government did not have sufficient resources to meet state and local requests	×			
The plans did not anticipate post-disaster evacuation	×			
The federal government could not accept outside resources because the plans did not facilitate these resources' acceptance and distribution	×			
The Red Cross often failed to meet the victims' needs, because its response was poorly planned		×		
The governments' emergency structures failed to integrate the capacities of non-governmental actors	×		×	
Responding actors at all levels were not familiar with contingency plans	×			
The lessons learned after simulations and exercises had not been implemented	×			
Many non-governmental organizations had no prior experience of field operations		×		
<i>Social and economic conditions</i>				
Government leaders at all levels failed to advocate responders to do whatever was needed to save people	×			
The exaggerated and distorted reports by the media on violent and criminal acts hindered the effectiveness of relief efforts	×			
<i>Unexpected factors</i>				
The immense flow of funds hindered effective coordination among the responding actors, due to: the proliferation of responding actors				×
the marginalization of local actors by the international aid community				×
the delivery of assistance regardless of needs assessment				×

*Non-governmental actors in Aceh being mainly INGOs, their operations were not affected in the same way governmental operations were, because their number and resources enabled them to effectively overcome these hindering conditions. For example, the governmental response was hindered by the extent of the affected territory because government agencies did not have enough personnel and resources to meet all the needs. On the contrary, INGOs had enough human and material resources to meet all the demands from affected people.

References

- Alonso, R., Dessein, W., Matouschek, N., 2008. When does coordination require centralization? *American Economic Review* 98 (1), 145–179.
- Auf der Heide, E., 2006. The importance of evidence-based disaster planning. *Annals of Emergency Medicine* 47 (1), 34–49.
- Bappenas and the International Donor Community, 2005. Indonesia: Preliminary Damage and Loss Assessment. The World Bank Office, Jakarta.
- Bennett, J., Bertrand, W., Harkin, C., Samarasinghe, S., Wickramatillake, H., 2006. Coordination of International Humanitarian Assistance in Tsunami-Affected Countries. Tsunami Evaluation Coalition, London.
- Boin, A., 't Hart, P., Stern, E., Sundelius, B., 2005. *The Politics of Crisis Management: Public Leadership Under Pressure*. Cambridge University Press, Cambridge.
- Brummitt, C., 2005. Indonesia officials say Katrina aid may not have been sluggish. *The Baton Rouge Advocate*. 11 September.
- Chang, M., Tseng, Y., Chen, J., 2007. A scenario planning approach for the flood emergency logistics preparation problem under uncertainty. *Transportation Research. Part E, Logistics and Transportation Review* 43 (6), 737–754.
- Choi, S., 2008. Emergency management: implications from a strategic management perspective. *Journal of Homeland Security and Emergency Management* 5 (1), 1–21.
- Christoplos, I., 2006. Links Between Relief, Rehabilitation and Development in the Tsunami Response: A Synthesis of Initial Findings. Tsunami Evaluation Coalition, London.
- Chua, A., Kaynak, S., Foo, S., 2007. An analysis of the delayed response to hurricane Katrina through the lens of knowledge management. *Journal of the American Society for Information Science and Technology* 58 (3), 391–403.
- Col, J.-M., 2007. Managing disasters: the role of local government. *Public Administration Review* 67 (S1), 114–124.
- Comfort, L.K., 2007. Crisis management in hindsight: cognition, communication, coordination, and control. *Public Administration Review* 67 (S1), 189–197.
- Comfort, L.K., 1999. *Shared Risk: Complex Systems in Seismic Response*. Pergamon, Pittsburgh.
- Couldrey, M., Morris, T., 2005. Tsunami: learning from the humanitarian response. *Forced Migration Review, Special Issue*, July.
- Cutter, S.L., 2003. GI Science, disasters, and emergency management. *Transactions in GIS* 7 (4), 439–445.
- Derthick, M., 2007. Where federalism didn't fail. *Public Administration Review* 67 (S1), 36–47.
- de Ville de Goyet, C., Morinière, L.C., 2006. The Role of Needs Assessment in the Tsunami Response. Tsunami Evaluation Coalition, London.
- Dinan, W., Ford, A., McConnell, A., Pyper, R., 2006. Policy responses to crisis: the case of the UK firefighters' dispute. *Policy and Politics* 34 (2), 307–323.
- Doherty, G.W., 2004. Crises in rural America: critical incidents, trauma and disasters. *Traumatology* 10 (3), 145–164.
- Drabek, T.E., 1985. Managing the emergency response. *Public Administration Review* 45 (S1), 85–92.
- Eikenberry, A.M., Arroyave, V., Cooper, T., 2007. Administrative failure and the international NGO response to hurricane Katrina. *Public Administration Review* 67 (S1), 160–170.
- Farazmand, A., 2007. Learning from the Katrina crisis: a global and international perspective with implications for future crisis management. *Public Administration Review* 67 (S1), 149–159.
- Fiedrich, F., Gehbauer, F., Rickers, U., 2000. Optimized resource allocation for emergency response after earthquake disasters. *Safety Science* 35 (1), 41–57.
- Fritz Institute, 2005. Recipient Perceptions of Aid Effectiveness: Rescue, Relief, and Rehabilitation in Tsunami Affected Indonesia, India, and Sri Lanka. Fritz Institute, San Francisco.
- Government of Indonesia and United Nations, 2005. Post-tsunami lessons learned and best practices workshop: report and working groups output. Jakarta, Indonesia, 16–17 May.
- Harrald, J.R., 2006. Agility and discipline: critical success factors for disaster response. *The Annals of the American Academy of Political and Social Science* 604 (1), 256–272.
- IFRC, 2005. *World Disaster Report 2005: Focus on Information in Disasters*. International Federation of Red Cross and Red Crescent Societies, Geneva.
- Jurkiewicz, C., 2007. Louisiana's ethical culture and its effect on the administrative failures following Katrina. *Public Administration Review* 67 (S1), 57–63.
- Keramitsoglou, I., Kiranoudis, C.T., Haralambos, S., Sifakis, N., 2004. A multi-disciplinary decision support system for fire crisis management. *Environmental Management* 33 (2), 212–225.
- Kettl, D.F., 2003. Contingent coordination: practical and theoretical puzzles for homeland security. *American Review of Public Administration* 33 (3), 253–277.
- Kettl, D.F., 2005. The worst is yet to come: lessons from September 11 and Hurricane Katrina. University of Pennsylvania, Fels Institute of Government, Research Service Report No. 05-01.
- Klinenberg, E., 2000. *Heat Wave, A Social Autopsy of Disaster in Chicago*. University of Chicago Press, Chicago.
- Kreps, G.A., 1991. Organizing for emergency management. In: Drabek, T.E., Hoetmer, G.J. (Eds.), *Emergency Management: Principles and Practice for Local Governments*. International City Management Association, Washington, DC, pp. 30–54.
- Lagadee, P., 2004. Understanding the French 2003 heat wave experience: beyond the heat, a multi-layered challenge. *Journal of Contingencies and Crisis Management* 12 (4), 160–169.
- Larson, R.C., Metzger, M.D., Cahn, M.F., 2005. *Emergency Response for Homeland Security: Lessons Learned and the Need for Analysis* (revised on 11/17/2005). Center for Risk and Economic Analysis of Terrorism Events University of Southern California, Los Angeles.
- Lester, W., Krejci, D., 2007. Business 'not' as usual: the national incident management system, federalism, and leadership. *Public Administration Review* 67 (S1), 84–93.
- McConnell, A., 2003. Overview: crisis management, influences, responses and evaluation. *Parliamentary Affairs* 56 (3), 393–409.
- Morris, J.C., Morris, E.D., Jones, D.M., 2007. Reaching for the philosopher's stone: contingent coordination and the military's response to hurricane Katrina. *Public Administration Review* 67 (S1), 94–106.
- National Governors' Association, 1978. *Emergency Preparedness Project: Final Report*. National Governors' Association, Washington, DC.
- Özdamar, L., Ekinçi, E., Küçükyazıcı, B., 2004. Emergency logistics planning in natural disasters. *Annals of Operations Research* 129 (1–4), 217–245.
- Özderdem, A., 2006. The mountain tsunami: afterthoughts on the Kashmir earthquake. *Third World Quarterly* 27 (3), 397–419.
- Perry, M., 2007. Natural disaster management planning: a study of logistics managers responding to the Tsunami. *International Journal of Physical Distribution and Logistics Management* 37 (5), 409–433.
- Pipa, T., 2006. *Weathering the Storm: The Role of Local Nonprofits in the Hurricane Katrina Relief Effort*. The Aspen Institute, Washington, DC.
- Quarantelli, E.L., 1988. Disaster crisis management: a summary of research findings. *Journal of Management Studies* 25 (4), 373–385.
- Quarantelli, E.L., 1993. Community crises: an exploratory comparison of the characteristics and consequences of disasters and riots. *Journal of Contingencies and Crisis Management* 1 (2), 67–78.
- Radke, J., Cova, T., Sheridan, M.F., Troy, A., Lan, M., Johnson, R., 2000. Application challenges for geographic information science: implications for research, education, and policy for emergency preparedness and response. *URISA Journal* 12 (2), 15–30.
- Roberts, K.H., 1990. Some characteristics of one type of high reliability organization. *Organization Science* 1 (2), 160–177 Re-published in Smith, D., Elliot D. (Eds.), 2006. *Key Readings in Crisis Management*. Routledge, London, pp. 159–179.
- Scheper, B., Parakrama, A., Patel, S., 2006. Impact of the Tsunami Response on Local and National Capacities. Tsunami Evaluation Coalition, London.
- Schneider, S.K., 1992. Governmental responses to disasters: the conflict between bureaucratic procedures and emergent norms. *Public Administration Review* 52 (2), 135–145.
- Schneider, S.K., 1995. *Flirting with Disaster: Public Management in Crisis Situations*. M.E. Sharpe, Armonk.
- Sheu, J., 2007a. Challenges of emergency logistics management. *Transportation Research. Part E, Logistics and Transportation Review* 43 (6), 655–659.
- Sheu, J., 2007b. An emergency logistics distribution approach for quick response to urgent relief demand in disasters. *Transportation Research. Part E, Logistics and Transportation Review* 43 (6), 687–709.
- Simo, G., Bies, A.L., 2007. The role of nonprofits in disaster response: an expanded model of cross-sector collaboration. *Public Administration Review* 67 (S1), 125–142.
- Smith, W., Dowell, J., 2000. A case study of co-ordinative decision-making in disaster management. *Ergonomics* 43 (8), 1153–1166.
- Stivers, C., 2007. 'So poor and so black': hurricane Katrina, public administration, and the issue of race. *Public Administration Review* 67 (S1), 48–56.
- 't Hart, P., Rosenthal, U., Kouzmin, A., 1993. Crisis decision making: the centralization thesis revisited. *Administration and Society* 25 (1), 12–45.
- Telford, J., Cosgrave, J., 2006. *Joint Evaluation of the International Response to the Indian Ocean Tsunami: Synthesis Report*. Tsunami Evaluation Coalition, London.
- Telford, J., Cosgrave, J., 2007. The international humanitarian system and the 2004 Indian Ocean Earthquake and Tsunamis. *Disasters* 31 (1), 1–28.
- Tierney, K.J., 1985. Emergency medical preparedness and response in disasters: the need for interorganizational coordination. *Public Administration Review* 45 (S), 77–84.
- Tierney, K., Bevc, Ch., Kuligowski, E., 2006. Metaphors matter: disaster myths, media frames, and their consequences in hurricane Katrina. *The Annals of the American Academy of Political and Social Science* 604 (1), 57–81.
- UNDAC, 2006. *Handbook*. 2006 edition.
- UNHCR, 2007. *Handbook for Emergencies*. Second edition.
- US House of Representatives, 2006. *Select Bipartisan Committee to Investigate the Preparation for and Response to Hurricane Katrina: A Failure of Initiative*. Government Printing Office, Washington, DC.
- US White House, 2006. *The Federal Response to Hurricane Katrina: Lessons Learned*. Office of the Assistant to the President for Homeland Security and Counterterrorism, Washington, DC.
- Walker, A.H., Harrald, J.R., Ducey, D.L., Lacey, S.J., 1994. *Implementing an Effective Response Management System*. American Petroleum Institute, Washington, DC.
- Waugh Jr., W.L., 2003. Terrorism, homeland security and the national emergency management network. *Public Organization Review: A Global Journal* 3 (4), 373–385.
- Waugh Jr., W.L., Streib, G., 2006. Collaboration and leadership for effective emergency management. *Public Administration Review* 66 (S), 131–140.
- Weick, K.E., 1988. Enacted sense making in crisis situations. *Journal of Management Studies* 25 (4), 305–317.

- Whybark, D.C., 2007. Issues in managing disaster relief inventories. *International Journal of Production Economics* 108 (1–2), 228–235.
- Wise, C.R., 2006. Organizing for homeland security after Katrina: is adaptive management what's missing?. *Public Administration Review* 66 (3), 302–318.
- Wood, W.B., 2000. Complex emergency response planning and coordination: potential GIS applications. *Geopolitics* 5 (1), 19–36.
- Yi, W., Özdamar, L., 2007. A dynamic logistics coordination model for evacuation and support in disaster response activities. *European Journal of Operational Research* 179 (3), 1177–1193.

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