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CROSS-SECTORAL COORDINATION OF DISASTER RELIEF

Abstract

Coordinating organizational activity across different sectors is crucial in disaster management. We analyzed the response of 291 aid workers to the Haiti earthquake in 2010 and found that common incentives and a high degree of equality among aid organizations positively affected perceived network coordination. Large and public organizations were more likely to take leadership roles and high numbers of public organizations involved in the disaster response network led to improved network coordination. These results indicate the need for mechanisms that enable smaller and nonprofit organizations to participate in network coordination and leadership.

Keywords: Network coordination, disaster management, cross-sectoral networks, complex humanitarian emergencies.

INTRODUCTION: COORDINATING DISASTER RESPONSE

International responses to disasters, whether natural or manmade, require coordination between organizational actors that differ by sector, experience, nationality, and specialty (Kettl 2003; Mitchell 2006). Disaster response in developing countries requires particularly good coordination, as acute emergencies such as earthquakes, tsunamis, or epidemics occur on top of underlying chronic problems. The underlying chronic issues of corruption, lack of transparency, institutional incompetence, weak democratic traditions, etc. complicate recovery efforts in a variety of ways. Relief organizations in these settings must work together to address both the acute and chronic problems simultaneously.

Disaster networks usually include four critical actors: 1) public international organizations, e. g. UN (United Nations), EU (European Union), State Departments and ministries of defense, USAID (United States Agency for International Development), GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit); 2) international nonprofit organizations (NPOs), e. g. ICRC (International Community of the Red Cross), CARE, CRS (Catholic Relief Services), World Vision, MSF (Médecins sans Frontières); 3) host country government (at various levels) and 4) host country NPOs and civil society. The nature of the disaster determines the mix of these players and their relative importance or power. At times the international community is left to negotiate its own social order, in others hierarchical or centralized structures or mechanisms exist (Martin 2004). For example, nation building operations tend to

involve more multilateral public organizations while pure humanitarian activities might involve more international NPOs.

Calls for improved coordination of disaster networks are not new. Post-mortems on disasters and other complex humanitarian emergencies (CHEs) of all types, from earthquakes and floods to terrorist attacks and war, consistently identify the lack of coordinated responses as a prime culprit limiting overall effectiveness (Kettl 2003; Kapucu 2006; Comfort 2007). Coordination proves difficult as cross-sectoral networks are formed hastily and expected to perform well without previous practice or contractual agreements (Waugh and Streib 2006; Moynihan 2008). The literature on disaster and network management neither analyses the factors that facilitate good network coordination, nor informs on the effects of different organizational type and structure on coordination. To address this gap, we developed four hypotheses using a framework introduced by Faerman *et al.* (2001). The first goal of our study was to identify the factors that influence network coordination in disaster settings. A second goal was to analyze differences in network coordination across different types and sizes of aid organizations. Our findings are based on an analysis of a survey of 291 aid workers responding to the Haiti earthquake in 2010.

Our research also led us to conclude that there is no common understanding of what exactly constitutes cooperation, coordination, or collaboration. Keast *et al.* (2007) described each as a type of inter-organizational relationship with increasing levels of intensity of the linkages between organizations. Collaboration requires more organizational embeddedness than coordination; coordination requires more intensity than cooperation. Yet, some researchers and practitioners seem to use the terms interchangeable to describe and evaluate inter-organizational relationships after disaster (Drabek and McEntire 2002; Nylén 2007; Kilby 2008; Gazley 2010).

We suggest they are qualitatively different activities. To cooperate is to operate alongside other stakeholders, exchanging and sharing as appropriate to the setting; literally to “co-operate”. Coordination

requires more overt strategic thinking to align, organize, and differentiate participating organizations' activities between beneficiaries, tasks, regions, or tactics. Collaboration refers to activities that cross organizational boundaries, requiring both organizations involved to alter their own behaviors based on the others'. In the case of the organized but hastily formed response of aid organizations in a disaster setting, we refer to the term coordination, in particular, network coordination. We expect that a well coordinated network of aid organizations can improve the overall performance of organizations within the disaster response by helping organizations operate more efficiently, avoid overlap and duplication of service, and maximize specialization where possible. As such, this study stresses the factors affecting inter-organizational coordination during disasters.

DIMENSIONS INFLUENCING NETWORK COORDINATION

Jones *et al.* (1997) develop a 'theory of network governance' suggesting networks can be considered a better form of governance than market or hierarchy under conditions of uncertainty, complexity, information constraints, and asset specificity. Disasters by definition encompass turbulent and complex situations that require flexible decision making under uncertain conditions and information constraints. Thus, networks of aid organizations should be the appropriate form of coordination and governance to respond to disasters. However, such complex settings present additional network difficulties for organizations engaged in the management of a disaster.

Van Wart and Kapucu (2011) highlight the difference between crisis management and emergency management. Crisis management refers to the management of unforeseen events, while emergency management refers to the planned management of and for emergencies. The two subfields both contribute to our work, as international development agencies exist for and plan for emergencies routinely, yet the size, scope, and location of the actual disaster response typically requires crisis management skills. Thus

leaders and the disaster literature must embrace both - with the hopes that more emergency management planning will mitigate crisis management inadequacies.

From the interorganizational literature we derive four factors that affect network exchanges during crisis management: Predisposition to work with others, common incentives, leadership, and equality of involved players (Faerman *et al.* 2001). We expect that all of these factors have an impact on network coordination. We further expect the network coordination differs according to the size and sector an organization is active in, as well as the size of the network it operates in. Our research framework is shown in Figure 1.

[Figure 1 here]

Predisposition refers to the initial tendencies and feelings towards potential partners that favor or inhibit working together (Faerman *et al.* 2001). Players who may not have worked together previously, and many who have, must often come together under extreme pressure to solve incredibly complex problems, stretching institutional capacities to a limit (Noordegraaf and Newman 2011). However, not all disasters occur in places where such networks previously existed. The capacity of government, communities, and civil society in a host country and the predisposition or willingness for the international community to cooperate with these actors proves critical.

We cannot expect players involved in disaster relief to arrive in theater with a *tabula rasa*. For example, Partners in Health has a phenomenal reputation in Haiti. Government bureaucracies are notoriously slow. NPOs can act independently. Large organizations can be less flexible than smaller ones, who may be accused of minimal accountability. Therefore, we express the importance of predisposition in our first hypothesis:

Hypothesis 1: A high degree of positive predisposition among organizations engaged in network activities positively affects the perceived network coordination.

Incentives refer to the benefits received from partnering and the ongoing structuring of relationships (Faerman *et al.* 2001). Organizations may have incentives to work together as knowledge can be pooled and information shared to handle the disaster more effectively. Networks of action during disasters are generally understood as large scale systems that find synergies, economies of scale and scope, best practices, and lessons learned to avoid duplicates, inefficiencies, and waste while leveraging skills, experiences, and resources for optimal output (Smith *et al.* 1995; Najam 2000; Comfort *et al.* 2004; Shu and Furuta 2007; Thomson *et al.* 2008; Ödlund 2010). Networks provide exchange mechanisms – whether goods or service, best practices, personnel, or information, etc. These incentives help determine stakeholder involvement, especially when time, budgets, and personnel are severely limited. Our second hypothesis focuses on these incentives:

Hypothesis 2: Common incentives among organizations engaged in network activities positively affect the perceived network coordination.

Leadership serves as a constant complaint in chaotic development settings (Nolte and Boenigk 2011). Ideally, local government has the capacity to act as a lead organization and coordinate the disaster response. But often times they cannot, due to traditional shortcomings or incapacitation due to the actual disaster. Responders typically lament that no one is in charge, but question any organization that attempts to take charge. Regardless, some leadership efforts must take place. In Haiti, the UN very much served as a lead agency, despite the fact that the UN itself was decimated by the earthquake. We formulate our third research hypothesis to test the effect of leadership on network coordination:

Hypothesis 3: The presence of leadership organizations engaged in network activities positively affects the perceived network coordination.

Finally the level of equality among the numerous and varied players involved in disaster response represents an important measure of likely network success (Faerman *et al.* 2001). Equality refers to the embeddedness, similarity, and reciprocity enjoyed between organizations and how that might affect

perceptions of coordination overall in the network. A great variety of organizations involved in the same operations could worsen the disaster response (Comfort *et al.* 2001), as each organization will pursue its own goals and equality will be more difficult to achieve, e. g. in the area of decision making.

Organizations might be reluctant to cooperate if there is competition between them for donations, or each organization wants to be the “first” responder to gather the attention of the media (Martin and Miller 2003; Stephenson 2005). At times, nonprofit managers are reluctant to work with local government agencies since they feel that time and energy is lost in political discussions associated with aid distribution (Moore *et al.* 2003). Additionally, cultural differences between the host country/host country organizations and international organizations can affect the performance of the network (Ödlund 2010). Thus, a fourth hypothesis is derived:

Hypothesis 4: A high degree of equality among organizations engaged in network activities positively affects the perceived network coordination.

Analyzing these four key factors can help practitioners better understand what is meant by improved coordination. In other words, if these four factors contribute to improved inter-organizational exchanges, might they themselves be the target of improvements providing more direction than vague and generic calls to simply ‘coordinate more.

RESEARCH SETTING

Haiti shares the island Hispaniola with the Dominican Republic, located between the North American and Caribbean Plates, and thus is prone to earthquakes. It is the poorest country in the Americas and has very little earthquake-ready infrastructure. Haiti has a long history of chronic social, political, legal, and economic problems. Haiti struggled through several extraordinary disasters in 2010: A devastating earthquake, Hurricane Tomas, a Cholera epidemic, and election irregularities and violence. These acute

problems occurred on top of long recognized chronic problems like political instability, weak governance, corruption, and a remarkably poor physical and institutional infrastructure, making recovery efforts exceedingly difficult.

Acute disasters

In 2008 Hurricanes Fay, Gustav, Hanna, and Ike left a combined 800 dead and widespread destruction. On several occasions during interviews in Haiti preparing this research, aid workers actually referred to programs still addressing that previous crisis, two years later (longer term projects taking place in some of the harder hit parts of the country). So in many ways several acute crises did indeed intertwine to create an even more complex situation on the ground.

However, the 7.0 earthquake of January 12, 2010 was unprecedented, leaving 230,000-316,000 dead, (reports vary widely on this figure) and approximately 1.5 million internally displaced people. The destruction was widespread. The densely populated and poorly constructed capital, Port-au-Prince, was severely damaged. A year later approximately 800,000 internally displaced people still live in tents throughout the country.

Hurricane Tomas hit the battered country in November 2010, and while the country was spared a full on disaster (4 dead, massive flooding), it was reminded of its vulnerabilities. Huge numbers of Haitians living even more densely in tent cities with inadequate sanitation, lacking clean water, hungry, and unemployed created additional problems. Roughly at the same time, the initial stages of the Cholera epidemic were made known, causing great concern that what was initially isolated in rural villages could make its way to the dense tent cities and cause massive casualties. As of June, 2011, Cholera claimed nearly 5,500 lives from nearly 300,000 cases, straining the country's already inadequate and badly damaged health care system.

Chronic problems of governance and leadership

Haiti's history demonstrates some of the chronic underlying problems of governance and leadership. The Duvalier regimes from 1957-1971 and 1971-1986 are together accused of being responsible for some 40,000 political deaths. After Jean-Claude Duvalier was forced into exile in 1986, various military dictatorships ran the country until Aristide's first and brief presidency in 1991. Upon Aristide's exile, a military junta, provisional president and acting presidents held office until his 'reinstatement' in 93-94 where he was recognized, though still in exile. Aristide led the country until 1996, when René Préval took over until 2001. Aristide began his second short-lived presidency from 2001 until his exile in 2004. After a provisional presidency René Préval again held office from 2006-2011. In all, Haiti has seen some 19 changes in head of state in the 25 years since the Duvalier regime.

Regarding the most recent 2011 elections, irregularities in the November 2010 first round vote caused violent riots after the government's hand-picked successor secured a place in the run-off. Fraud and voting rights violations were widely reported. After much international community influence, the results were revised. In April, 2011, Michel Martelly defeated Mirlande Manigat in the run-off election. In addition, bizarrely, the country's exiled dictator, Duvalier, returned to the country amid chaos, rumor, accusations, and massive media attention. Former president Aristide also returned on the eve of the election, potentially contributing to the very low voter turnout after public statements to that effect to his supporters. It has been a relentless period of grief and difficulty for Haiti.

The new administration faces massive hurdles. Haiti requires substantial humanitarian assistance, including shelter, healthcare, food, water, and sanitation. Decentralization and related governmental reforms related to corruption and transparency, in addition to massive improvements in ministerial competence, are required to push the country ahead. Economic stagnation undermines any reform efforts. The country, with a population of about 9.5 million, sustained massive unemployment, 2 percent growth and 5 percent inflation *prior* to the earthquake making it the poorest country in the western hemisphere. Its 2010 GDP of 1200 USD actually represents a decline over the last three decades. Estimated growth rate for 2010 is -8 percent and upwards of two third of the population are currently unemployed.

The new government must also take control of its own future. A crucial step is to implement its reform program, as begun several years ago, the Programme-Cadre de Reforme de l'Etat: Modernisation Administrative et Decentralisation, 2007-2012 to improve civil service. Property dispute resolution mechanisms and accurate registries are essential, as is reforming the police and judicial system. The Haitian National Policy and MINUSTAH (UN Stabilization Mission in Haiti) must insure peaceful elections and a stable environment during the new government. Economic policies to encourage investment and business must be encouraged and obstacles removed. Housing and infrastructure reconstruction efforts will require major investments and face substantial obstacles. The rubble removal alone requires extraordinary manpower, time, and resources – not to mention road, telecommunications, water, and sewage systems. Schools and educational systems, as well as health care systems must return to normalcy after this disastrous year. All of these reforms address the underlying chronic problems that prevented more effective and efficient responses to the acute disasters of this past year (RAND Corporation 2010).

Coordination bodies

Two main official mechanisms exist to help coordinate activities. The UN and specifically the OCHA (Office for the Coordination of Humanitarian Affairs) is tasked to take leadership roles and coordinate tasks in disaster-affected countries (Kent 2004). The UN cluster system became the model of choice to centralize and coordinate activities in such settings. This is the primary vehicle through which members of the international community keep up with activities of other members. The clusters separated responders into 12 response arenas each with a lead agency responsible for initial coordination efforts. The clusters (and lead agency) are: Camp Coordination and Management (International Organization for Migration, IOM); Education (United Nations Children's Fund, UNICEF); Emergency Shelter and Non-Food Items (IOM); Food (World Food Programme, WFP); Logistics (WFP); Protection (Office of the High Commissioner for Human Rights, OHCHR); Water, Sanitation, and Hygiene (UNICEF); Agriculture (Food and Agriculture Organization, FAO); Early Recovery (United Nations Development

Programme, UNDP); Emergency Telecommunications (WFP), and Health (World Health Organization, WHO).

In addition, the establishment of the Interim Haiti Recovery Commission served as a centralizing mechanism. It provided an initial place where databases of projects were maintained, cataloged, and made searchable by donors, partners, implementers, and local agencies. It asked all responders to submit all projects through this mechanism for tracking purposes, but not all obliged in the chaos of response. One Response, a web portal, also served a similar function, centralizing electronic information, Google Groups, meeting minutes, reports, maps, and other activities for all the clusters, many of which also had their own, more specialized systems.

Alongside these official coordination mechanisms, several organizations formed their own networks, e. g. pre-defined networks of NPOs like Alliance Development Works (alliance of five German NPOs) or Alliance2015 (alliance of seven international NPOs), or networks that were established due to common cultural backgrounds, such as the coordination of German public and NPOs by the German embassy.

METHOD

In autumn, 2010, we distributed a survey to aid workers active in Haiti who were engaged in the UN cluster networks (n=291; 24% response) detailing their understanding of the four factors and their influence on network coordination. We tested our four factor model empirically using structural equation modeling. The results were further interpreted by mean comparison. We then followed up on the survey by conducting several in-depth face-to-face interviews in Port-au-Prince in January 2011.

Data collection and sample characteristics

The survey data is a subset of a larger online survey of aid workers that were active in the disaster response after the Haiti earthquake. This survey aimed at testing a process model to assess network

performance during disasters. In October and November 2010, 1,214 individuals that attended UN cluster meetings in Haiti were invited to participate in our online survey. By February 2011, 291 questionnaires were completed; a 24 percent response rate. Forty-two cases were excluded because too many items were left unanswered, leaving an effective sample size of 249. We applied the expectation-maximization (EM) algorithm to address the remaining missing values (Dempster *et al.* 1977) in our structural equation analysis.

Of the 249 questioned disaster respondents, 70.9 percent reported they worked for a nonprofit organization, 22.3 percent for a public organization, and 2.4 percent said they worked for a private organization during the Haiti earthquake response. A remaining 4.5 percent reported they worked for another type of organization, mostly stating “international organization” and it remained unclear, whether this organization was nonprofit, public, or private. With regard to organizational size, 44.9 percent of the respondents stated they worked for a large organization with more than 249 employees. 19.4 percent worked for a medium sized organization with 50 to 249 employees, 20.2 percent for a small organization with 11 to 49 employees. The remaining 15.4 percent of aid workers were active for a very small organization with 10 or less employees.

Measures used in the study

Dependent variable

Indicators to describe network coordination were derived from network and disaster management literature (Gazley 2008; Thomson *et al.* 2008). Coordination in our case refers to the perception of coordination on the part of those involved in the network. In general, by perceived coordination we refer to task and network management, clear understanding of roles and responsibilities (Thomson *et al.* 2008), effective meetings, and shared resources (Gazley 2008). The exchange or sharing of resources such as volunteer or workspace is vital in a disaster setting, as tasks can be fulfilled faster when organizations can receive scarce resources from other partners within the network. The indicators that explain network

coordination were measured on a seven-point Likert scale. For ease of interpretation, scale items were inverted, ranging from 1 = strongly disagree to 7 = strongly agree. Our conceptualization of network coordination is shown in Table 1.

[Table 1 here]

Independent variables

From our theoretical framework we derived four indicators that can explain network coordination. To assess the developed model we included questions to explain these four factors derived from interviews with disaster managers or previous literature, namely predisposition to cooperate (indicators derived from interviews), incentives (Heide and John 1992), leadership (Provan and Kenis 2008), and equality (Shaw 2003; Brass *et al.* 2004). Indicators to describe these factors were also inverted and measured on a seven-point Likert scale ranging from 1 = strongly disagree to 7 = strongly agree, leadership was measured on a three point scale, using a single indicator that differentiated between the degree of leadership, ranging from 1 = organization acting in a network without central command to 3 = organization acting as a lead organization. We consider a single item to assess leadership sufficient, as this construct consists of an object that is easily and uniformly imagined (Rossiter 2002). Whereas the lead organization network encompasses a highly centralized structure and goal consensus is of moderate importance, the shared governance form of organizations acting in a network without central command requires higher levels of goal consensus and trust among participating organizations (Provan and Kenis 2008). The four distinct factors were identified through exploratory factor analysis. All factors have significant Cronbach's alpha values exceeding the threshold value of .7 (Nunnally 1978). The distinct factors, its conceptualization, and factor loadings are shown in Table 2.

[Table 2 here]

Control variables

To assess unobserved heterogeneity among the aid workers from different organizations, we controlled for several attributes. First, we controlled for the size of the organizations, as large organizations might have better resources that enable them to participate and gain more from the network than smaller organizations. We distinguished between very small organizations (up to 10 employees), small organizations (11-49 employees), medium organizations (50-249 employees), and large organizations (more than 249 employees). Second, we included a dummy variable for type of organization to enable a comparison of public organizations and other, nonprofit and private organizations. These categorical variables were treated as continuous in the analysis, because a Bayesian estimation of the data yielded values close to our used maximum likelihood method. Finally, we used the size of the public and nonprofit network as a control variable, as organizations that operate in a larger network of organizations might be more likely to find network partners to fulfill common tasks than organizations that work together with only a small number of partners. For the following analysis, the actual number of networking public and nonprofit organizations that were mentioned by each respondent was used.

ANALYSIS: FACTORS FACILITATING COORDINATION

Measurement model

To identify the impact of our four factors (predisposition, incentives, leadership, and equality) on network coordination, confirmatory analysis was undertaken using AMOS 17.0. We used the maximum likelihood method to test the developed model. All variables used in the model were tested for multivariate normality. Most variables showed values of skewness and kurtosis between -2 and 2, therefore we concluded that these variables were approximately normally distributed. Several fit indices such as Comparative Fit Index (CFI), Incremental Fit Index (IFI), Normed Fit Index (NFI), and Relative Fit Index (RFI), alongside the Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) were used to assess the model fit. All fit indices except for RFI exceeded the

suggested value of .9, results for RMSEA and SRMR were below the threshold value of .08, thus the model fit can be considered satisfactory (Hair *et al.* 2010). The detailed results of the analysis are listed in Table 3. An analysis of the measurement model showed that all indicators used in the research model had significant positive factor loadings on the according factors.

[Table 3 here]

Structural model

Table 4 lists the means and standard deviations of the dependent and independent variables used in our research model. Overall, a high predisposition to cooperate can be identified. Common incentives were also reported, but to a lesser degree. The surveyed aid workers acted in different network structures, most of them reporting a leading role of its organization during the disaster relief. A certain degree of equality was reported among organizations, but it reached much lower values than predisposition. In general, a good degree of network coordination was reported by the aid workers in Haiti, but there was much room for improvement.

[Table 4 here]

To assess the structural model, we first calculated the effect of control variables on network coordination. Next, the four identified factors affecting network coordination were added and assessed by looking at standardized path coefficients and t-values. The control variables accounted for about 5 percent of the variance of network coordination.

[Table 5 here]

The analysis of the context variables increased the explained variance of network coordination to 69 percent, yielding positive path coefficients for all four variables. Common incentives and a high degree of equality had a positive impact on the coordination of networks. According to our hypotheses, hypothesis 1 was not supported by the data. A high degree of predisposition to work together with organizations

engaged in the disaster response did not affect the coordination of the network significantly. For incentives, a highly significant path coefficient of .41 was identified ($p < .001$), which was consistent with our hypothesis 2. Hypothesis 3, however, was not supported. No significant effect of leadership could be identified on network coordination. Our last hypothesis, hypothesis 4, was supported by our data: A high degree of equality among organizations engaged in the disaster response positively affected network coordination. A highly significant path coefficient ($p < .001$) of .39 was measured.

After the context was included, the results for the control variables slightly changed. Public organizations perceived a slightly worse network coordination than all other types of organizations (NPOs and private organizations). Regarding the control variable for organization size, a strong positive effect was measured, indicating better network coordination for larger organizations. Additionally, the size of the public network affected network coordination in that networks encompassing larger numbers of public partners reported better coordination. The opposite was found for size of the nonprofit network, where higher numbers of nonprofit partners involved led to a worsened perceived coordination of the network.

Mean comparison

To assess the impact of the control variables organization type, organization size, and size of the network on the independent variables of our model, we compared means of the different control groups and conducted t-tests. Significant differences between the groups regarding predisposition, incentives, leadership, and/or equality could be identified between public and nonprofit organizations, between very small organizations and all other sizes of organizations, as well as large organizations and all other sizes of organizations. For the size of the public and the nonprofit network, significant differences were also found. To estimate the effects for large and small public and nonprofit networks, we used the median to separate two groups. Networks that consisted of up to four public organizations were considered small, whereas the corresponding value was nine for nonprofit organizations. Networks with more than four

public organizations and/or more than nine nonprofits were considered large networks. The results of the mean comparison are presented in the Appendix.

The results show that public organizations had a significantly higher predisposition to cooperate ($p < .05$) than nonprofit organizations. The difference between public and nonprofit organizations with regard to leadership was also highly significant ($p < .001$) and public organizations also showed a higher degree of equality than nonprofit organizations ($p < .05$).

The analysis of organization size revealed that larger organizations had a significant higher likelihood to take leadership roles than very small organizations ($p < .001$). The means of very small and large organizations indicated better predisposition and common incentives to cooperate than small and medium organizations, but the t-tests showed no significant differences.

Organizations engaging in larger networks of public organizations had a significantly higher predisposition than organizations acting in a small network ($p < .05$) and were more likely to take leadership roles ($p < .001$). With regard to the size of the network of nonprofit organizations our results demonstrate that larger networks of nonprofit organizations had more common incentives than organizations engaged in small networks of nonprofit organizations ($p < .05$), were more likely to take leadership roles ($p < .001$), and experienced a higher degree of equality ($p < .05$).

DISCUSSION

Context variables

From the literature, we derived our first hypothesis and stated that a high degree of predisposition among organizations engaged in network activities would positively affect perceived network coordination. We did not find support for this hypothesis in our analysis. Two possible reasons can explain this finding. First, organizations in the complex environment of disasters might have no choice but to work together,

no matter if there is a common level of sympathy or openness among the different actors. Thus, the predisposition might not be important in this special setting of disasters. Second, the aid workers that were surveyed were all part of the larger network of the UN; therefore we did not include the experience of organizations that did not work in a network at all. All individuals surveyed had a certain level of predisposition to cooperate; otherwise they would not have been attending the UN cluster meetings.

Evidence from five follow-up interviews with public and nonprofit managers involved in the Haiti earthquake response that we conducted in Port-au-Prince in January 2011 suggested that predisposition to cooperate could be seen from a few additional perspectives. First, in general, players were predisposed to working with local counterparts, however often perceptions of significant obstacles prevented such partnerships. In addition, that predisposition to work together, with locals or other internationals, generally referred to cooperative activities, perhaps the lowest level of exchange. More coordinated or collaborative activities proved much more complex and thus predisposition to engage in them diminished simply because of the overwhelming effort required. Finally, there was some perception difference depending on tenure in country and when players arrived. One responder suggested, “Well they have been here since before the earthquake. They have a strong interest in rather long-term engagement. Sometimes they feel they have a very critical eye on those organizations that came after the quake.” In some ways this captures the difference between those responding to the acute disasters compared to those engaged in long term chronic development issues.

Hypothesis 2 was that common incentives among organizations engaged in network activities would positively affect the network coordination as perceived by relief workers. We did find statistical support for this hypothesis. Incentives, such as the perception that information will be shared among partnering organizations, had a strong effect on the degree of network coordination. During disasters, information barriers exist due to infrastructural damages and organizations that were not acquainted with each other before might work together on a joint task. Therefore, the presence of common incentives among the members of networking organizations is important to coordinate future tasks and resources.

In general, interviews supported our findings that stakeholders coordinated with players to achieve a tangible and positive outcome. Participants referred to avoiding task overlaps, finding synergies, sharing best practices and comparing notes on beneficiaries. They expressed limited tolerance for meetings for the sake of meeting. These players were largely outcome oriented, for example, “the development ministry and the foreign office have a history of bad relations because ... they think we have no competence, which in a way is true, most of us are not specialists.” Thus, perceiving little to gain, there was no incentive to work together. On the other hand, another first responder suggested, “If they know each other here and they know their work, they find each other and they link up, and we ... also try, if I see someone asking me [about a] program and I saw a NGO doing the same thing... I link them.”

Our third hypothesis suggested that the presence of leadership organizations engaged in network activities would positively affect the perceived network coordination. This hypothesis could not be confirmed for the whole group of surveyed aid workers. Several members of organizations that were fulfilling leadership tasks reported very good network coordination, as well as several members of organizations not engaged in leadership tasks. Thus, the degree of network coordination is not attributable to the strategic or operative base per se; it depends on the specific skills of the organizations and its members in the disaster context. Leadership and hierarchy seemed to go hand in hand to some extent since our work did not explore group dynamics or project management levels. Higher level coordination didn't resonate with those on the ground. For example, “The EU coordination is mostly done between the ambassadors, but it doesn't go into detail, it is mostly political, the EU commission as I understand it is hopelessly understaffed. [It] took me three months to get a project list from them.”

Our fourth hypothesis stated that a high degree of equality among organizations engaged in network activities would positively affect the perceived network coordination. We found support for this hypothesis. Aid workers of organizations who had equal power and who felt they could equally participate in decision making did report a better coordination within the network. This closely relates to common incentives, as organizations might be more engaged in network coordination if they felt they had

an influence on decision making. For example, a responder suggested, “I don’t see a big danger of any interference with anyone else. I know our bigger NGOs are very integrated in the system, they go to cluster (meetings); they meet with other NGOs. They have a lot of funding from other agencies. They have worked with EU and USAID, they have cooperation with them.”

Control variables

The analysis of our control variables yielded several significant effects of the four factors on network coordination. With regard to organization type, public organizations showed higher values than NPOs in predisposition, leadership, and equality. Public organizations are funded by the government; therefore they are not dependent on donations. This limits the competition among them and other players within the disaster network and thus can explain the higher predisposition of public organizations to work together with others. Public organizations such as the UN or embassies are usually active on the strategic, rather than the operative base and thus more likely to take leadership roles and act as coordination mechanisms. Even though values for equality should be similar among different organizations as most organizations acted in a network with the UN, public organizations felt there was higher equality among organizations than NPOs did. As public organizations are usually engaged in leadership roles, they are the ones that have a high influence on task coordination. Nonprofit organizations that have a smaller impact on decision making and task coordination are more likely to feel unequal to the others. Regarding perceived network coordination, public organizations expressed they experienced a worse coordination of the disaster response network than other organizations. This is contradictory to the results of the mean analysis, where public organizations reported higher values for all four independent variables. Public organizations seem to evaluate their performance more critically, resulting in slightly worse perceived network coordination.

The mean comparison of very small, small, medium, and large organizations revealed that large organizations were more likely to take leadership roles than smaller ones. A possible explanation is that

larger organizations are usually more experienced than small and medium organizations and have been active in a disaster response before. Often a position even exists specifically tasked with overseeing cooperative arrangements. The average years of engagement in disaster response activities for large organizations were 39 years, as compared to very small organizations with 13 years. From the structural equation analysis we found that the size of an organization also had a positive effect on network coordination; perceived network coordination increased with larger organizations. Larger organizations usually have more resources and financial assets than smaller organizations which makes it easier to attend coordination meetings and be active in different areas of the disaster response. It is also likely that larger organizations bring more resources to the network and therefore have a greater stake in network management and leadership.

As an example, a representative of a large, well-known disaster response agency initiated the following discussion, “I wanted to raise an issue my colleagues in the field are increasingly encountering. Although we’ve had an agreed cluster strategy prioritizing sheeting over tents in Port-au-Prince for some time now, the highly visible distribution of tents, particularly near the Logs base, have raised expectations amongst beneficiaries that there will be universal coverage of dome or tunnel tents, and this is raising equality issues.” This sort of policy level discussion seemed to emerge primarily from larger more established organizations. Small NPOs struggling to make ends meet tended to be much more focused on logistics and daily activities.

From the mean comparison of network size among the four factors we found that organizations acting in a network with more than four public organizations had a higher predisposition to cooperate with others and conducted more leadership tasks. We also found that incentives, leadership, and equality were higher in organizations active in large nonprofit networks with more than nine NPOs included. The structural equation analysis showed that the size of the public network positively affected perceived network coordination, while a higher number of nonprofit organizations involved led to a worsened perception of network coordination. Public organizations are usually engaged on the strategic base, thus more public

organizations can facilitate and enable better task coordination, whereas nonprofit organizations are usually conducting operative tasks and more nonprofit organizations involved might lead to a higher complexity of the network and hinder coordination.

CONCLUSIONS

This article sought to assess the factors most relevant for effective network coordination during disaster response. Based on the framework developed by Faerman *et al.* (2001), we analyzed the effect of predisposition, incentives, leadership, and equality on network coordination as perceived by disaster respondents. Our analysis showed that common incentives and high equality among network members had a strong impact on network coordination. We also compared the network coordination and the four factors among different types and sizes of organizations and sizes of the disaster network. Small organizations were more likely to face challenges during coordination than larger organizations, and very large and public organizations were more likely to take leadership roles within the network. Public organizations evaluated their network coordination more critically than other organizations.

Our results indicate the need for mechanisms that enable smaller organizations and NPOs to participate in network coordination and leadership. While NPOs perceived its network coordination slightly better than public organizations, the mean comparison revealed that means for all four independent variables were below those of public organizations and large numbers of NPOs involved in a disaster response network worsened the network coordination. Better interaction across sectors could be fostered by encouraging (smaller) nonprofit organizations to embrace strategic network coordination tasks despite the additional burdens it requires. A well coordinated network response can help to provide efficient disaster relief, as chaotic arenas within the networking organizations can be tamed and consensus achieved (Koppenjan 2008).

Our study has a number of limitations that provide opportunities for further research. First, our observations of aid workers are not independent. While all members that participated in cluster meetings and provided contact information were contacted, organizations that had a larger share in coordination activities, such as the UN mechanisms, had a larger share in the response to our survey, but by controlling for organization type and size, overall implications can be given. Also, we only analyzed the network around the UN clusters, therefore capturing organizations that already had a certain level of predisposition to cooperate. For the future, different networks should be assessed; e. g. predefined alliances or hastily formed networks that are limited to a certain disaster area.

Second, we are asking self reports, as this gives us some indication whether practitioners on the ground, well aware of the criticisms launched against them generally, are aware of the extent to which they are coordinated or not with those in their organizational field. In a future study, the opinion of the affected population should be considered to gain an impression of their perception of network coordination. However, while a limitation, this also presents a great opportunity for future research. We find that the definition and perceptions associated with the words “cooperation,” “coordination,” and “collaboration” may vary widely. Some respondents may be combining or misusing these terms. Others clearly articulate very different meanings for each term, evidenced in their activities. Researchers would do well to clarify these terms both theoretically, and professionally, anchored in grounded observation. Blanket calls to improve cooperation or to blame limited success on the lack of international community coordination are common in every major disaster. Future research should clarify the terms and differentiate between them in terms of best practices and core components. Our four factors provide a start.

And finally, this research is limited to the case of Haiti during an exceedingly complex period in Haiti’s development assistance history. Future research might target different regions within Haiti to understand different localized economic and cultural settings more directly. Additionally, comparing responses to the Haiti quake with earthquake responses in Chile, New Zealand, and Japan, which all occurred within approximately one year of each other under very different circumstances, could highlight the additional

complexities developing countries face in disaster recovery and response. Much of this story relates to the existence of deep underlying chronic issues, such as governmental incompetence. Such assertions are not, however, generally made about New Zealand and Japan, for example. In fact, a recent Brookings paper compared the Japanese and Haitian disasters under the title, “What a difference government makes.”

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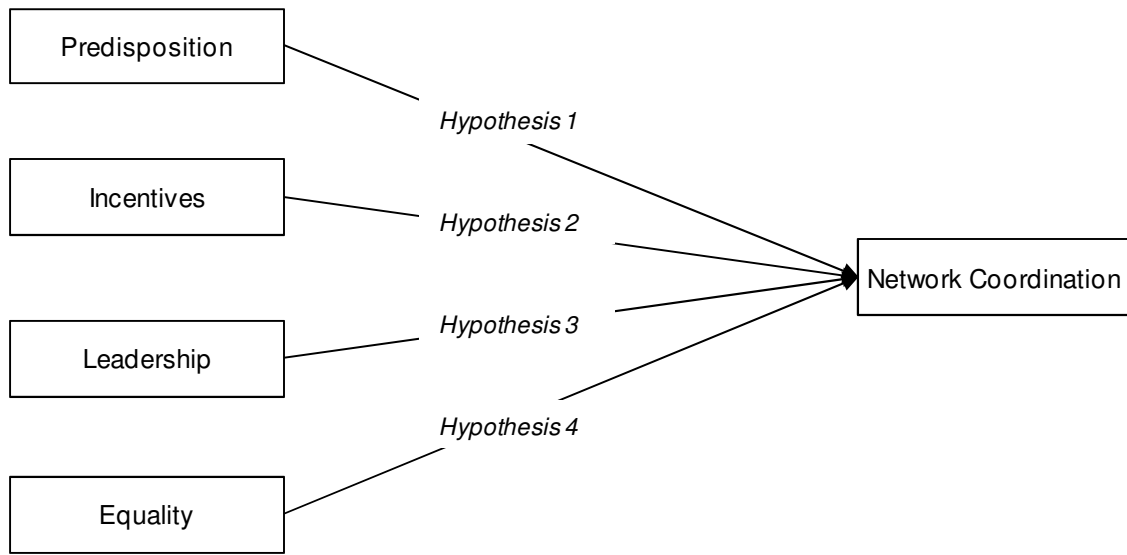


Figure 1: Research framework and hypotheses

Table 1: Conceptualization of network coordination

Network Coordination

Our organization's tasks were well coordinated with those of partner organizations.

We understood our organization's roles and responsibilities as a member of the network we formed with the other organizations.

Our meetings with partner organizations accomplished what was necessary for the collaboration to function well.

Our sharing of resources with other organizations (e.g., volunteers, workspace, staff) was well coordinated.

Table 2: Factor items and loadings

	Factor 1	Factor 2	Factor 3	Factor 4
	Predisposition	Incentives	Leadership	Equality
Predisposition ($\alpha=0.86$)				
We have positive feelings for the individuals involved in the disaster response that we collaborated with.	0.68	0.13	-0.08	0.20
Our organization was open toward collaborations with other organizations active in the disaster response in Haiti.	0.88	0.18	-0.02	0.19
We were open to join resources and engage in the disaster response with other organizations.	0.86	0.24	0.03	0.18
We took special measures (e.g., joined meetings, used personal networks) to facilitate collaborations with other organizations.	0.84	0.24	0.11	0.11
Incentives ($\alpha=0.85$)				
In our collaboration it was expected that any information that might help the other organizations would be provided to them.	0.20	0.82	0.00	0.22
It was expected that the partners would provide proprietary information if it could help the other partner.	0.25	0.78	0.17	0.27
It was expected that we kept each other informed about events or changes that may have affected the other organizations.	0.24	0.84	-0.01	0.18
Leadership (single item)				
What role did your organization take within the network of organizations active in the Haiti earthquake response?	0.00	0.08	0.98	0.10
Equality ($\alpha=0.83$)				
Our organization and the organizations we collaborated with equally participated in decision making.	0.14	0.17	0.07	0.83
Our organization and the organizations we collaborated with had the opportunity to influence our joint objectives and processes.	0.18	0.23	0.18	0.84
Our organization and the organizations we collaborated with had a strong mutual commitment to our joint goals and objectives.	0.27	0.26	-0.09	0.70

Table 3: Fit indices of the research model

Model fit	χ^2/df	CFI	NFI	IFI	RFI	RMSEA	SRMR
suggested value	≤ 5	$\geq .9$	$\geq .9$	$\geq .9$	$\geq .9$	$\leq .08$	$\leq .08$
actual value	2.44	.95	.91	.95	.89	.076	.059

Table 4: Means and standard deviations

<i>Independent variables</i>	scale	mean	SD
Predisposition	Organization showed predisposition to cooperate, 1=strongly disagree; 7=strongly agree.	6.17	1.13
Incentives	Organization had common understanding of issues and incentives, 1=strongly disagree; 7=strongly agree.	5.53	1.38
Leadership	Organization was acting in a network without central command (1), engaged in lead organization tasks (3).	2.10	0.88
Equality	Organization experienced mutuality within network of aid organizations, 1=strongly disagree; 7=strongly agree.	4.00	1.53
<i>Dependent variable</i>			
Network coordination	Network management was well coordinated, 1=strongly disagree; 7=strongly agree.	5.26	1.47

Table 5: Structural model results

	network coordination			
	step 1		step 2	
	<i>standardized path coefficient</i>	<i>t-value</i>	<i>standardized path coefficient</i>	<i>t-value</i>
<i>control variables</i>				
Organization type (0-other/1-public)	.12	1.72	-.06	1.21
Organization size	.17	2.47*	.18	3.78***
Size of public network	.09	1.34	.09	1.99*
Size of nonprofit network	-.01	0.19	-.11	2.34*
R ²	.05			
<i>context variables</i>				
Predisposition			.11	1.53
Incentives			.41	4.57***
Leadership			.09	1.90
Equality			.39	5.28***
R ²			.69	

* p < .05; significant at the .05 level (two-tailed); *** p < .001; significant at the .001 level (two-tailed).

Appendix 1

Mean comparison for control variables

Control variable	Expression of variable	Test variables	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	Sig. (2-tailed)
Organization type	1: public organization	predisposition	48	6.42	0.71	2.08	0.04
	0: nonprofit organization		148	6.10	0.98		
	1	issues & incentives	45	5.79	1.11	1.82	0.07
	0		141	5.41	1.25		
	1	leadership	53	2.79	0.49	9.92	0.00
	0		144	1.82	0.85		
	1	equality	55	5.61	0.98	2.62	0.01
	0		170	5.13	1.25		
Organization size	1: very small organizations (≤ 10 employees)	predisposition	33	6.27	1.11	0.65	0.52
	0: all other organizations		175	6.15	0.94		
	1	issues & incentives	31	5.59	1.51	0.39	0.69
	0		166	5.50	1.18		
	1	leadership	31	1.45	0.68	-5.54	0.00
	0		178	2.21	0.86		
	1	equality	37	4.67	1.67	-2.48	0.12
	0		204	5.38	1.09		
	1: large organizations (≥ 250 emp.)	predisposition	93	6.20	0.85	0.41	0.68
	0: all other organizations		115	6.14	1.05		
	1	issues & incentives	90	5.52	1.21	0.12	0.91
	0		107	5.50	1.26		
	1	leadership	95	2.44	0.77	5.53	0.00
	0		114	1.82	0.87		
	1	equality	109	5.42	1.07	1.86	0.07
	0		132	5.14	1.32		
Network size	1: public network ≥ 5 organizations	predisposition	128	6.30	0.79	2.29	0.02
	0: public network < 5 organizations		75	5.95	1.16		
	1	issues & incentives	118	5.63	1.12	1.72	0.09
	0		75	5.33	1.29		
	1	leadership	117	2.32	0.85	4.43	0.00
	0		86	1.79	0.83		
	1	equality	139	5.37	1.06	1.89	0.06
	0		95	5.05	1.39		
	1: nonprofit network ≥ 10 organizations	predisposition	123	6.27	0.90	1.82	0.07
	0: nonprofit network < 10 organizations		82	6.02	1.01		
	1	issues & incentives	116	5.67	1.14	2.03	0.04
	0		79	5.32	1.24		
	1	leadership	123	2.31	0.86	4.19	0.00
	0		83	1.81	0.82		
	1	equality	141	5.39	1.13	2.19	0.03
	0		96	5.04	1.29		