

**DETERMINANTS AND CONSEQUENCES OF COLLABORATIVE NETWORKING:  
EVIDENCE IN AN EMERGENCY MANAGEMENT CONTEXT**

by

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(Under the Direction of Laurence J. O'Toole, Jr.)

**ABSTRACT**

Public problems have become so complex that a single organization-driven solution is often infeasible. Recent studies in public administration have given attention to networks as an alternative means for accomplishing public tasks. Although quite a number of studies on network issues have been conducted, there are still many issues to be explicated. With an emphasis on collaborative networking in an emergency context, this study attempts to fill some of this gap. Using a Hurricane Rita context in 2005 and Texas school district data, three research themes are explored: consequences of collaborative networking, determinants of newly activated networking, and networking partner selection and its impact on collaboration success.

First, the effects of collaborative networking in preparation for emergencies on organizational performance in both emergency and post-emergency contexts are examined. Empirical results reveal that active networking speeds organizational recovery after Hurricane Rita and moderates negative shocks of Rita on organizations' core performance.

Second, this study investigates individual, organizational, and environmental factors that determine the activation of new networking, a subject that has not been established before.

Findings suggest that superintendents' salary is associated with the activation of new networking, while age shows an inverted U-shaped relationship with the activation of new networking. As for organizational factors, the study finds that organizational capacity is negatively associated with the activation of new networking. Lastly, environmental uncertainty and reliance on external organizations' resources are associated with the activation of new networking.

This study also presents four scenarios of networking partner selection and examines each scenario's effect on perceived success of collaboration. Results are that the not-intended-but-nonetheless-activated networking brings the most positive outcome and that the intended-and-activated networking results in the second most positive outcome. However, expected values reveal that managers may be better off by pursuing the intended-and-activated networking strategy.

This study contributes to public administration literature by exploring network issues left unanswered. However, this study has limitations. Using this study as a starting point, future research is expected to investigate networking in public administration for better understanding of how networking works and how it might be possible to solve complex public problems through networking.

INDEX WORDS: Collaborative networking, Organizational performance, Emergency management, Decision making, Collaboration success

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## **DEDICATION**

To my parents

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While writing the first sentence in the acknowledgment section of my dissertation, I reflected on what led me to where I am now as a soon-to-be Ph.D. in public administration. I do not remember the exact moment or momentum that motivated me to study public administration. However, I do remember that enthusiasm for studying public administration has been inside my heart throughout my studies. I also remember that when I got on the airplane to go to the United States to study public administration, I felt a sense of duty to use my forthcoming knowledge by contributing to our future society. Now, I take the first step for society although I question if I am already scholarly ready. I note here to promise myself that I will always remember my original enthusiasm and the sense of duty as a scholar of public administration.

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Sangyub Ryu

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## **CHAPTER 1**

### **INTRODUCTION**

Some argue that public problems have become so complex and uncertain, or what Rittel and Webber (1973) have called “wicked,” that the traditional problem-solving system relying on a single hierarchy has reached its limit (Weber and Khademian, 2008). Wicked problems lead scholars and practitioners of public administration to emphasize public managers’ networking outside their own organization to implement policies in settings where collaboration or coordination with hierarchically independent parties is a necessary condition for the success of policies (Meier and O’Toole 2003). Here, network means “a pattern of two or more units, in which not all major components are encompassed within a single hierarchical array” (Meier and O’Toole, 2003, 690; O’Toole, 1997), and managerial networking, which this study focuses on, means managers’ interaction with other parties outside their organizations in order to manage the environment –buffering the environmental shocks and/or exploiting the environmental opportunities (Meier and O’Toole 2003).

Increased interest and active research on network studies are found from various contexts such as Texas public schools (Hicklin 2004; Gonzalez Juenke 2005; Goerdel 2006; Meier and O’Toole 2001, 2003), British local authorities (Andrews et al. 2010; Walker, O’Toole, and Meier 2007; Walker et al. 2010), and U.S. law enforcement agencies (Nicholson-Crotty and O’Toole 2004). Findings from these studies empirically confirm that networking can help provide solutions for public problems. However, there are many research questions on networking yet to be answered (Agranoff and McGuire, 2001; Berry et al., 2004; Provan, Fish, and Sydow, 2007).

This study, specifically focusing on managers' collaborative networking in an emergency context, aims to explore some of the important issues that have been ignored or less often examined in the previous literature. By collaborative networking, this study means managers' effort to interact with governmental and non-governmental actors in order to achieve a public goods, services, or values with which a single governmental organization cannot provide fully and with which nongovernmental organizations are unable or unwilling to provide in the desired quantities (Rethemeyer and Hatmaker, 2007). Especially in an emergency context such as natural disasters, no public managers by themselves can fully handle the emergency and no non-public managers are able or willing to manage the emergency either. Accordingly, public managers collaboratively network with other public and non-public organizations to manage the emergency.

Three research questions in particular will be explored in this study: the consequences of networking by public managers in an emergency context, the determinants that lead public managers to initiate networking, and the impact of networking partner selection on collaboration success. First, this study supports the proposition that management matters for organizational performance. This study examines the natural disaster context to explore the positive impact of managers' networking in preparation for emergencies. A goal is to analyze whether this aspect of management assists the organization's recovery and also whether networking assists the organization's ability to perform its core functions. Using a collaboration and emergency planning survey in Texas school district, this study expects positive consequences from networking on organizational performance in an emergency and post-emergency context. Then, this study moves on to examine factors that motivate public managers to activate new networking that public managers did not engage in previously. After investigating the

consequences and determinants of networking, this study will finally examine how managers make decisions when they select networking partners. This study will provide four possible decision making scenarios regarding networking partner selection and test the effects of each scenario on collaboration success.

Three themes that this study aims to research are barely discussed in the previous literature.<sup>1</sup> By investigating the consequence and determinants of managers' networking and managers' decision making in network partner selection, this study is intended to contribute to the literature of networking studies, emergency management, and/or the combination of two. The rest of this chapter will review how scholars have defined and researched networking, and present the purpose and the significance of this study.

### 1.1. Definition of Network and Networking

Managing in a network has two dimensions: network as a structure and networking as a behavior (Berry et al. 2004; Meier and O'Toole 2003). The focus of this study is on networking. As managerial networking is defined earlier in this chapter, networking focuses on an individual's behaviors in a network. As a behavioral dimension, Agranoff and McGuire (2001) identify four networking behaviors: activation, framing, mobilizing, and synthesizing. Individuals in networks activate or deactivate networks to arrange or rearrange network structures through attracting potential partners or removing extant participants (Agranoff and McGuire 2001). Framing behaviors in networks are to create new visions or goals of a network, while mobilizing behaviors are to motivate network participants to have them committed to the joint undertaking (Agranoff and McGuire, 2001). Lastly, Agranoff and McGuire point synthesizing behaviors to

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<sup>1</sup> Although a number of previous studies empirically tested positive networking impacts on an organization's routine performance, few studies tested the networking-performance link in an emergency context.

fend off conflicts among network participants. Each of these behaviors is peoples' functioning in networks (Berry et al. 2004) Then, to understand networking more precisely, a definition of network should be followed.

Clear definitions of a network have not been settled, even if a number of researchers offer similar but not identical definitions (Jones, Hesterly, and Borgatti, 1997). For instance, O'Toole (1997) defines networks as "structures of interdependence involving multiple organizations, where one unit is not just the formal subunit or subordinate of the other in some larger hierarchical arrangement" (45). Dubini and Aldrich (1991) defines networks as "patterned relationships among individuals, groups, and organizations" (305) while Agranoff and McGuire (2001) defines as "multiorganizational arrangements for solving problems that cannot be achieved, or achieved easily, by single organizations" (296). In some cases, researchers have not used the term "network," even if they mean it (Provan, Fish, and Sydow, 2007). Provan and his colleagues (2007) find that some scholars prefer to discuss "partnerships, strategic alliances, interorganizational relationships, coalitions, cooperative arrangements, or collaborative agreements" (480). However, different ways of defining a network or different terms other than "network" do not deviate from the basic idea of "social interaction, relationships, connectedness, collaboration, collective action, trust and cooperation" (Provan, Fish, and Sydow, 2007, 481). Despite different definitions or different terms, Jones, Hesterly, and Borgatti (1997) find two key concepts around which most definitions and terms are clustered: (1) "patterns of interaction in exchange and relationships" and (2) "flows of resources between independent units" (914). The following quotation from Jones, Hesterly, and Borgatti (1997) explains networks more precisely:

Those scholars who emphasize the first concept [patterns of interaction] focus on lateral or horizontal patterns of exchange (Powell, 1990), long-term

recurrent exchanges that create interdependencies (Larson, 1992), informal interfirm collaborations (Kreiner and Schultz, 1993), and reciprocal lines of communication (Powell, 1990). Some highlight patterned relations among individuals, groups, and organizations (Dubini and Aldrich, 1991); strategic long-term relationships across markets (Gerlach and Lincoln, 1992); and collections of firms using an intermediate level of binding (Granovetter, 1994). Those who emphasize the second concept [flows of resources] focus on flows of resources (Powell, 1990) between nonhierarchical clusters of organizations made up of legally separate units (Alter and Hage, 1993; Miles and Snow, 1986, 1992; Perrow, 1992), and they underscore the independence of interacting units [Jones, Hesterly, and Borgatti, 1997, 914].

In some cases, mixed terms such as collaboration, network, or cooperation are used without clear definition, although some argue that those terms are different. For instance, Selden, Sowa, and Sandfort (2006) distinguish concepts of cooperation, coordination, collaboration, and service integration based on the intensity of the relationship. They argue that interorganizational cooperation is located on the one end of the continuum of collaborative service arrangement while service integration lies on the other end of the continuum. According to them, interorganizational cooperation is “supported by informal and personal relationships between management and staff of different organizations” (414). They use the term service integration when “two organizations work together to provide a new package of services to their mutual clients” (414). Coordination and collaboration are located between these two poles (Selden, Sowa, and Sandfort, 2006). Coordination is independent organizations’ effort to “calibrate their

actions” while collaboration is for organizations to “share exiting resources, authority, and rewards” (Selden, Sowa, and Sandfort, 2006. 414). However, these authors still admit that these concepts are frequently used interchangeably.

The current study does not aim to study the whole network structure but focuses on individual networking. Research on the whole structure is important to understand policy outcomes. However, not all participants in the network share the same goals; sometimes, each individual involved in the network may have his/her own priorities or goals that may be different from what the network is supposed to achieve (O’Leary and Bingham, 2009); thus, understanding an individual’s networking behavior is as important as understanding the whole network structure.

This study is not intended to add another definition of networking. Rather, based on Rethemeyer and Hatmaker’s (2007) definition of collaborative networks, this study focuses on collaborative networking in an emergency context, which is defined in the previous section.

This study admits that collaborative networking is not a distinct concept as compared to other definitions of networking. However, collaborative networking is a preferred concept in an emergency context, because it well explains behaviors of interdependent actors in the process of delivering emergency-related services. Such services may not be fully or sufficiently provided by a single public organization or non-governmental organization.

## 1.2. General Theory of Networking

According to Frederickson (1999), public administration studies have steadily emphasized “theories of cooperation, networking, governance, and institutional building and maintenance” (702). On the one hand, practitioners of public administration treat networking as key strategies

in public policy making and implementation (Agranoff, 2006; Agranoff and McGuire, 2003; Bardach, 1998; Kettl, 2006; Meier and O'Toole, 2003; O'Toole, 1997). For instance, Kettl (1993) points out that only a small portion of the national budget is appropriated for single-agency program operations. At state and local levels, a significant portion of the total budget is also made up of intergovernmental programs (O'Toole, 1997). Thus, public administrators' networking determines the success of public programs.

On the other hand, scholars theoretically explain why networking becomes so important in public administration. One approach that has been used focuses on transaction costs. In markets, the production processes of organizations include many transactions on the part of the owners of monetary and non-monetary resources, and these transactions inevitably generate costs (Coase, 1937). To eliminate or at least substantially reduce such transaction costs, Coase (1937) argues that organizations need to internalize some transactions with external agents in the market. By producing within organizations, economic agents reduce transaction costs and produce more efficiently (Moe, 1984).

However, at a certain point the ability to integrate activities or internalize external functions is limited. Organizations may not have enough capacity to deal with functions which require, for instance, highly advanced technologies. In this case, simply because organizations do not have such technologies, they have no choice but to enter into transactions with external agents who do. Moreover, internalizing functions once provided by external agents can be inefficient. In some cases, production through transactions with external agents can save money (Reh fuss, 1989). According to Jarillo (1988), a firm's activities include internal activity which generates internal costs (IC) and external activity (or subcontracting) that generates external costs (EC) composed of external price (EP, the price imposed by the supplier) and transaction

costs (TC). He contends that if TC for activities supplied to (or by) the firm are lowered to the point where EC is smaller than IC, then firms will not internalize external functions and will form networks (Jarillo, 1988). As he mentions in his article, his argument is supported if and only if EP, the price charged by the supplier, is smaller than IC, and networks can make EP lower than IC by delivering necessary goods more efficiently. As a result, networking with an external supplier in networks becomes an important management skill and/or strategy.

Related to transaction costs, resource dependence theory also explains the purpose of networking in terms of economic incentives. Since individual organizations do not have all the resources they need to accomplish their goals, they attempt to fulfill their shortcomings by depending on resources from external actors (Fleishman, 2009). Even if each organization prefers to secure its autonomy (Rogers and Whentten, 1982) and reliance on external actors' resources could threaten one's autonomy, one may still have to strategically develop networking with external organizations to obtain essential scarce resources (Fleishman, 2009). In this networked setting, the power comes from not only those who hold the essential resources that others do not have, but also from those who are engaged in networking with other resource-rich parties. This is because networking with capable partners is not only a way of supplementing needed resources on the part of the organization, but is additionally ensures survival by stabilizing itself against an uncertain future (Alter and Hage, 1993; Fleishman, 2009; Galaskiewicz, 1985).

As compared to research on networks in sociology or public policy, themes of networks have emerged in public management relatively recently (Berry et al. 2004). A good example is a series of O'Toole and Meier's studies that have explored managerial networking. They are interested in developing an autoregressive, non-linear, and contingent model to explain the



impact of public management on organizational performance (O'Toole and Meier, 1999). They argue that organizational performance is influenced by environmental shocks or resources. To protect the organization from environmental shocks and improve organizational performance, they contend that managers interact with environmental actors. Meanwhile, resources positively affect organizational performance, and managers network with external actors to exploit the benefits of resources (O'Toole and Meier, 1999). In summary, the O'Toole-Meier model suggests that managerial networking buffers environmental shocks and taps environmental opportunities in order to enhance organizational performance. Their series of research studies test their model and empirically support the positive impact of networking on organizational and program performance (see Meier and O'Toole, 2001, 2003, 2005, 2009; O'Toole and Meier, 1999, 2003, 2004a, 2004b, 2009).

In spite of active research on networks in public administration, there is a lot about networks that we do not know (Provan, Fish and Sydow, 2007). For instance, Agranoff and McGuire (2001) address seven basic operating questions that research on public network management left unanswered. This study does not aim to answer all seven questions that they raise, but one of themes in this study is particularly related to one of their questions: "the issue of network results or network productivity" (Agranoff and McGuire, 2001, 297). Agranoff and McGuire question if public management networks result in outcomes which otherwise would not have achieved. In order to understand the importance of networks, they assert that research on public network management should examine the distinctive contribution of networks as an indispensable means of problem solving. The present study investigates positive impacts of managers' networking on organizational performance in both emergency and post-emergency contexts. It is expected that findings for this study can support the proposition that networking

matters for some types of organizational performance and may facilitate actions which cannot be achieved without networking.

In addition to Agranoff and McGuire's (2001) "big" questions, Berry and her colleagues (2004) address some other heretofore unaddressed questions, and one of their points is also relevant to this study's quest. That is, Berry and her colleagues point out that a network is dynamic, and it can evolve over time as a product of certain activities. The evolution of networks can result in different outcomes, but the current literature lacks research on the evolution of networks (Berry et al. 2004). In order to study the evolution of networks, panel data on networks are essential. However, such data are rare.<sup>2</sup> Using post-hurricane surveys conducted in two different time periods, this study intends to fill this gap by investigating activation of new networking and by examining decision making on partner selection.

In summary, networking has become an important theme among practitioners as well as scholars of public administration, but there are still many unexplored issues about networking. By giving special attention to collaborative networking as a part of network management behavior, this study expects to contribute to network studies in public administration. The detailed purpose and significance of this study will be addressed in the next section.

### 1.3. Purpose and Significance of This Study

This study aims at investigating three themes: the consequences of networking by public managers in an emergency and post-emergency context, the determinants that lead public managers to initiate new networking that managers did not hold previously, and the impact of networking partner selection on collaboration success. Above all, an emergency and post-

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<sup>2</sup> In this sense, O'Toole and Meier's ongoing series of Texas school district surveys and emergency preparedness surveys in Texas school districts are valuable datasets that enable research on network evolution.

emergency context is an appropriate domain to study networking. First, organizations do not have full information as to whether or not they will experience a disaster. This is especially true if a disaster is not repetitive. Those who are in an area where rivers flood every summer may anticipate a flood every year; as a result, they may develop plans by internalizing some functions to prepare for the flood. However, some organizations may not experience such repetitive disasters. For them, it is inefficient to internalize a disaster preparedness function at transaction cost theory insists. Thus, they utilize external actors' disaster preparedness/response functions through networking. In some cases, the size of the disaster is not manageable by a single organization. Some disasters cause "massive destruction" and "loss of life," and threaten "social, ecological, and physical systems simultaneously" (Hicklin et al., 2009. 97). In such cases, government organizations at multiple levels, as well as profit- and non-profit organizations, are required to collaborate closely (Hicklin et al., 2009). Hicklin et al. (2009) argue that the failure of collaboration to respond to a massive disaster leads to enormous costs. Moreover, these days, no single organization is able to manage every type of disaster (Erickson, 1999). According to Erickson (1999), fire departments used to be the first responders to a disaster situation, but today, multiple organizations of various types create an extended partnership to take part in disaster management. Thus, how well managers deal with networking can influence organizational performance in an emergency management context. In fact, a few studies have addressed and emphasized issues of networking in an emergency context (for instance, Kapucu, Arslan, and Demiroz, 2010; McEntire, 2002; Waugh and Streib, 2006). Despite the emphasis on networking in an emergency context, only a few studies have conducted small-*N* case studies (Kapucu, 2005; Kiefer and Montjoy, 2006), and few studies have taken large-*N* approaches to the impact of networking. Thus, using a large sample of Texas school districts, this study first examines the

impact of superintendents' networking on organizational performance in an emergency and post-emergency context.

Once the impact of networking in an emergency and post-emergency context is studied, this study moves on to the next question: what factors motivate public managers to activate new networking that they did not hold previously? Scholars have theoretically explored factors such as transaction costs and resource dependence that motivate organizations and managers to collaborate, but few empirical studies have researched the determinants of activation of new networking. Furthermore, in an emergency context on which this study is based, explaining the determinants of new networking is the most basic question (Robinson, 2010). Previous studies have shown that networking with diverse independent partners leads to better performance of the participants in the network. However, adding additional partners does not always guarantee the desired objectives. In fact, transaction costs and opportunity costs decrease the net benefits of having more networking partners, and at a certain point, net benefits may become negative (Hicklin, O'Toole, and Meier, 2008). Moreover, networking with certain privileged external actors can result in outcomes in favor of the privileged actors. O'Toole and Meier (2004b) argue that external actors who get benefits from the network exert political pressure on public managers and co-opt them in order to influence public programs for their sake through networking. Thus, "more is better" does not always apply to collaborative networking behaviors. Rather, their networking is likely to be influenced by some factors, and this study will explore those determinants.

Lastly, this study will develop scenarios of networking partner selection and examine the impact of each scenario on collaboration success. Most research on networking focuses on already-established, ongoing activities. However, before managers act in this fashion, they need

to go through decision-making processes regarding with whom they want to network. Unfortunately, few have studied the process of decision making in networking partner selection. Understanding that decision-making process can help researchers and practitioners improve outcomes of collaboration. For this reason, this study will address four possible cases that decision makers can face when they select a networking partner and examine if networking partner selection drives a successful collaboration.

This study focuses on public organizations, especially in the emergency context, in which collaborative networking is inevitable. It is expected that studying the consequences and determinants of networking and the impact of networking partner selection may suggest how to manage collaborative networking in the public sector in order to successfully prepare for, respond to, and provide organizational recovery after the emergency.

## **CHAPTER 2**

### **LITERATURE REVIEW AND HYPOTHESES**

Chapter 2 has three sections, and each section reviews previous literature on consequences of networking, determinants of networking, and networking partner selection, respectively. At the end of each section, hypotheses will be derived from the literature review.

#### **2.1. Consequences of Collaborative Networking**

This section explores the impact of managers' networking in preparation for possible emergencies. The focus is on organizational performance both during an emergency and also in a post-emergency context. First, this study derives the hypothesis that managers' networking for the emergency preparedness can speed organizational recovery after the emergency from the literature on emergency management. Second, this study reviews literature on public management in a post-emergency context to hypothesize that networking for emergency preparedness can moderate the negative shocks of the emergency on organizational routine performance after an emergency.

##### **2.1.1. Networking and emergency recovery**

Some organization theories, including population-ecology theory, emphasize the environment surrounding the organization. They argue that the success or failure of an organization is not determined by management itself (or what managers do), but by other external events which managers cannot control (Rainey, 2009). In addition, they contend that public management is so constrained or controlled by its political environment that public managers have very little

discretion to influence organizational or program performance through their management (Rainey, 2009). In this regard, Kaufman (1981) described the extent of public manager's influence as "in inches, not miles" (135).

However, a number of ways in which managers influence outputs and outcomes of organizational or program performance have been proposed and tested. For instance, by emphasizing the management-performance links, O'Toole and Meier (1999) have developed a contingent model. Along with organizational processes or stabilizing elements including organizational structures or standard operating procedures, they emphasize managing both the organization (internal management) and the environment (managerial networking). Internal management includes goal setting, motivation, responsibility delegation, or other various internal management tasks (Meier and O'Toole, 2009). Managerial networking, on the other hand, includes a manager's effort to utilize any environmental opportunities that organizations can take advantage of and their efforts to buffer environmental threats that could negatively influence organizational performance (Meier and O'Toole, 2009).

Not only in a routine performance context but also in an emergency context, public management can play a significant role. For instance, in 1980, the state government of Washington detected signs of volcanic eruption at Mount St. Helens, but it was unable to anticipate when the event would happen. The state government activated its emergency plan by restricting entry to the volcanic zone. It was not an easy managerial decision for the governor because of political pressure from local business and residents. However, the volcano did erupt, and it turned out that the state government's good management in response to the signal of volcanic eruption saved lots of lives.<sup>3</sup> On the contrary, scholars as well as policy makers pointed out that the tragedies of 9/11 and Hurricane Katrina were partly due to management failure or

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<sup>3</sup> The example is from Perry and Lindell (2007)

lack of “imagination,” leadership, communication among governments and citizens, and so on (Canton, 2007; Perry and Lindell, 2007; Waugh and Streib, 2006). In other words, failure of public management in preparation for and response to the emergency can cause big losses.

Effective emergency management as a part of public management consists of four core phases: moderation, preparedness, response, and recovery. Moderation activities “try to eliminate the causes of a disaster ... by reducing the likelihood of its occurrence or limiting the magnitude of its negative effects” (Perry and Lindell, 2007. 5). Moderation activities aim at creating solutions to moderate long-term risks (Bumgarner, 2008). Establishing a building code or land use restrictions are parts of these activities (Perry and Lindell, 2007). Preparedness activities “protect lives and property when threats can’t be controlled or when only partial protection can be achieved” (Perry and Lindell, 2007. 6). This phase assumes the occurrence of a disaster, and alerts the potential disaster to the public and emergency management-relevant organizations and takes necessary actions for effective response (Perry and Lindell, 2007). Effective preparedness includes planning, warning, and public information and training activities (Mushkatel and Weschler, 1985). Response activities “are the actions of officials just before and during the disaster impact that protect public safety and minimize physical damage” (Perry and Lindell, 2007. 6). These activities may include “evacuation (although evacuation may also occur prior to the disaster), mobilization, emergency assistance for victims, and so forth” (Mushkatel and Weschler, 1985. 50). Response activities end when the situation after the emergency is stabilized (Perry and Lindell, 2007). Lastly, recovery activities “begin after disaster impact has been stabilized and seek to restore lost functions” (Perry and Lindell, 2007. 7). Each of these phases is important for effective emergency management, but they are not always



compartmentalized, and the boundaries of each phase are not clear (Bumgarner, 2008); rather, each phase is closely related, as shown in Figure 2-1.

As O'Toole and Meier (1999) argue, both internal management and networking may be important to manage organizations, but in an emergency context, some researchers have argued that internal management does not play as much of a role as networking. For instance, Waugh and Streib (2006) contend that internal management is expected to protect organizations in an emergency, but its effects are limited. They contend that organizations need carefully reviewed plans to respond to a disaster, but plans themselves rarely fit circumstances. In addition, the organization's hierarchy can interact with a disaster in order to reduce the impact of the disaster (O'Toole and Meier, 1999), but management for disaster preparedness needs to be conducted by collaborating with relevant external actors (Waugh and Streib, 2006). Waugh and Streib (2006) argue that "...collaborative networks are a fundamental component of any emergency response" (132). In networks, individual organizations are not superiors or subordinates of other organizations, and an individual organization cannot dominate the whole network. Rather, each organization should be in control of its own networking for emergency management. Thus, the degree to which one organization is active in networking may differ, and the variation of such degrees can lead to different outcomes. If networking with external actors can buffer one's organization from its environmental shocks (O'Toole and Meier, 1999), then it is expected that organizations with more networking with external actors prior to the emergency can reduce the hazard caused by the emergency and speed restoration of their normal function. To investigate this networking-performance link, this study will test two concepts of networking - (1) "patterns of interaction in exchange and relationships" and (2) "flows of resources between independent units" that Jones, Hesterly, and Borgatti identify (1997. 914). That is, this study will test how

managers' networking patterns and resource sharing influence organizational restoration after an emergency event.

Hypothesis 1: A manager's collaborative networking in preparation for the emergency may speed an organization's recovery after the emergency.

### **2.1.2. Networking and an organization's routine performance**

An emergency influences not only individuals within the organization but also the organization itself through the effects of physical damages on facilities or through delay/suspension of operational processes. The more seriously organizations are affected by the emergency, the more slowly organizations recover from the damage and resume their functions; thus, slow recovery or no recovery may negatively influence organizations' routine functions and, in the end, its performance. Meier, O'Toole and Hicklin (2010) made a similar argument. From Hurricane Katrina and Rita studies, they find that a natural disaster caused suspension of an organization's operations, which in turn resulted in negative organizational performance.

O'Toole and Meier (1999) developed a contingent model to explain organizational performance, and the negative impact of a natural disaster on organization's routine performance can be accounted for in their model. The O'Toole-Meier model starts with a basic system that current performance is a function of past performance and a series of external shocks.

Accounting for internal and network management expands their basic model. The purpose of internal management, which includes stabilizing and managing the organization, is to maintain the structure: to "establish goals, motivate employees, and delegate responsibilities, and perform myriad other internal-management tasks" (Meier and O'Toole, 2009, 5). Meier and O'Toole (2009) argue that internal management influences the translation process from the past to the present outcomes or outputs. Along with internal management, they contend that managing the

environment through stabilizing the organization and networking is an equally important function of management because it guides how the system interacts with its environment forces. According to them, networking functions to buffer harmful environmental shocks and to exploit beneficial environmental shocks.

If the O'Toole-Meier model holds, the delay of the restoration of an organization's normal function damaged by the emergency plays the role of a negative environmental shock to its routine performance. However, such a negative shock can be buffered or moderated by networking; thus, organizations with active networking in response to the emergency may find less negative impact of delayed restoration on their routine performance. The current study will adopt a modified O'Toole-Meier model in order to test the moderation role of networking in a negative relationship between delayed restoration and routine organizational performance.

Hypothesis 2-1: The length of school closure resulting from the emergency negatively influences academic performance.

Hypothesis 2-2: Collaborative networking in preparation for the emergency moderates the negative impact of school closure on academic performance.

## 2.2. Determinants of Newly Activated Collaborative Networking

The previous section hypothesizes that networking in preparation for emergencies may enhance organizational performance in both emergency and post-emergency contexts. If theory and empirical analyses support networking's positive role in organizational performance, then the next question becomes: what makes managers want to establish new networking ties with external organizations? Exploring determinants of new networking is as important a research subject as the consequences of existing networking, but only a few studies have explored the

determinants of newly activated collaborative networking (see Andrew et al. 2010; Fleishman 2009; Gazley 2008; Krueathep, Riccucci, and Suwanmala, 2010). The following section aims to address this question using individual, organizational, and environmental factors.

### 2.2.1. Literature

The extent to which managers in organizations collaborate with actors in their environment with whom they are interdependent varies even within organizations sharing similar missions.

Sometimes public laws, regulations, and financial programs specifically mandate that certain organizations should collaborate with other particular organizations (Gazley, 2008; Gillespie et al., 1993; Hall and O'Toole, 2000). Juvenile-justice programs, model cities programs,<sup>4</sup> many poverty programs, and health service programs are examples (Hall et al. 1977). However, even for mandated networking, the interpretation of statutes results in different levels of networking activation (Gillespie et al. 1993). For instance, the American National Red Cross (ANRC) is mandated to work with the community in response to disasters (Gillespie et al., 1992, cited in Gillespie et al., 1993), and the unclear definition of “work” and “community” can allow the ANRC to make limited but discretionary decisions on whether or not it collaborates with a certain organization. When the networking is voluntary, the determinants for activating new networking vary more. Various factors may explain such behavior: an organization may have a relatively stable and predictable environment in which it finds less necessity to buffer environmental shocks, or it may have less support from its external actors in the environment. Meier and O'Toole (2001) found that managerial networking is positively associated with environmental support, or a manager in charge of the organization may be less qualified to collaborate with external actors than other managers. Fleishman (2009) conducted an empirical study to explain the variance of different networking behaviors by sampling from four estuary

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<sup>4</sup> This program no longer operates.

partnerships. She found that unlike the prediction of exchange theory, resource dependence was not a significant motivation for an individual organization to participate in estuary partnerships. On the contrary, a politically motivated interest to obtain legitimacy and enhance the reputation of the estuary partnership, as well as sharing common goals or objectives, was positively correlated with one's participation in partnerships (Fleishman 2009).

Gazley (2008) studied the determinants of networking more systematically by proposing a theoretical framework of influences on collaborative tendencies. She argued that public managers' motivation to collaborate may depend on four kinds of influences: personal traits (such as political ideology or gender), training and education (such as professional education/training or tenure in office), environmental or regulatory factors (such as intergovernmental policies, incentives, opportunity/availability of partners, capacity, need or party affiliation), and experience (such as reputation of partner, results of past partnership, trust in partner, experience as/with volunteers). These are a combination of individual, organizational and environmental factors, and she argued that a research framework that incorporates "more than one perspective, unit, or level of analysis" will work better to understand the motivation of collaborative behaviors.

#### 2.2.2. Individual factors

Different networking behaviors - whether one networks with a certain party or not - cannot be explained without considering individuals' unique characteristics. As individual factors, this study examines the effects of managers' salary, gender, race, and age on the activation of new networking.

A manager's salary may be a good predictor to estimate the probability of the activation of new networking. A salary is determined by various factors. Managers of most public

organizations usually have a pay scale with upper and lower limits while other managers (e.g., superintendents in school districts) have a relatively broad pay scale. In either case, a manager's human-capital factors play a significant role when his/her pay is determined. As a manager accumulates human capital (more experience, more/better education, or more networking), he/she may earn more salary (Bartlett and Miller 1985). In other words, a manager's human capital is projected into his/her salary. Among human capital factors, Burt (2001) emphasizes one's networking behavior. Burt argues that managers with more human-capital are likely to be more attractive, more skilled, more intelligent, and somehow more connected. Thus, managers with more human capital may be better compensated, but at the same time, managers who earn higher salaries tend to be more active or more social, and they may be more likely to expand their networks. As a result, those who earn a higher salary are more likely to activate new networking in the following year.

Hypothesis 3-1: Managers who earn higher salaries are more likely to activate new networking.

Demographic origins such as race or gender are other potentially important predictors for the activation of new networking. Recently, scholars of public administration have paid special attention to representative bureaucracy. The idea of representative bureaucracy is to benefit the public that representative bureaucrats represent (Meier and O'Toole 2006). However, minority managers in public organizations still struggle with unfriendly working environments. For instance, Kanter (1977a, 1977b) contends that women who work alone or work in a place surrounded by a majority of men are more likely to have different, less favorable experiences than women working in a place where women are the majority. His argument applies to racial minorities as well (Miller, Lincoln, and Olson 1981). Under circumstances where minority

managers are structurally required to network with a majority that is cross-sex or cross-race, Ibarra (1993) argues that minorities have difficulty developing and holding relationships with heterogeneous majorities. Moreover, previous research finds that minorities show less attachment to their organizations and experience higher turnover/turnover-intention (Choi 2008; Tsui, Egan, and O'Reilly 1992). As a result, minority managers may have limited opportunities to develop new external networking. According to a recent study of school districts in 2010, nearly three-fourth of superintendents were male (although the portion of female superintendents is gradually growing) and more than 90 percent were white superintendents (Kowalski 2011). This study uses Texas school districts in 2005-06 as a sample, and Texas superintendents at that period were not exceptional. About 16 percent were non-white superintendents and about 18 percent of the total were female superintendents. Under white- and male- dominated school districts, female superintendents and/or nonwhite superintendents may have more limited opportunities to develop new networking.

Hypothesis 3-2: Managers of racial/gender minority are less likely to activate new networking

The association between age and networking is yet to be explored, and two opposite directions may be expected. On the one hand, networking with external organizations can threaten managers' autonomy (Rogers and Whentten, 1982), and senior managers who want to secure their established autonomy may find few incentives to engage in new networking. Moreover, senior managers have experience and knowledge to manage their organizations; thus, they do not have to rely on external organizations to get things done as compared to junior managers. On the other hand, obtaining political legitimacy and/or enhancing reputation plays a significant role in building new networking. In this sense, senior managers have an advantage

when compared to junior managers because seniors are likely to have political legitimacy or a reputation that networking partner candidates want to obtain through networking. Thus, senior managers may have more chances to build networking than junior managers. As a result, this study assumes a potential association between managers' age and the likelihood of the activation of new networking, but will leave the direction open.

Hypothesis 3-3: Managers' age may be associated with the activation of new networking.

### 2.2.3. Organizational Factors

One of the motivations that lead managers to network with external actors is to manage their environment (O'Toole and Meier 1999). In addition to networking, Meier and O'Toole (2009) argue that the environment can be managed through enhancing organizational stability techniques such as standard operating procedures, structural factors, or other characteristics of bureaucracy. If networking and organizational stability are two managerial options to manage an environment, managers with limited resources should strategically and economically choose strategies between networking with external actors and reinforcing their organizational capacity to stabilize their organizations. In other words, managers in organizations lacking internal capacity to manage their environment may want to develop external networking while managers in organizations abundant in organizational capacity may find less motivation to develop new networking.

Hypothesis 3-4: Managers in organizations with abundant internal capacity to buffer environmental shocks are less likely to activate new networking.

Studies that treat organizational size as a primary independent variable show diverse conclusions for the same issues. For instance, Caplow (1957) and Grusky (1961) argue that large organizations are likely to be more formalized and more complex than smaller organizations,



while Blau and Scott (1962) and Zelditch and Hopkins (1961) posit that organizational size may not be as critical an element as expected (Hall, Johnson, and Hass 1967). Some researchers suggest that a positive, disproportionate relationship between administrative components and organization size exists while others contend there is a negative relationship between the proportions of personnel engaged in administration and organization size (Hall, Johnson, and Hass 1967). Given contradictory arguments, organizational size may influence managers' behavior towards activating new networking in opposite directions. On the one hand, large organizations have more financial and personnel resources (Kimberly 1976) and more formalized structures to manage environmental shock than small organizations, and so managers in large organizations may find fewer incentives to develop new networking. On the other hand, organizational size may not be associated with an organization's resources or structure, and it does not affect managers' behavior towards activating new networking. This study will leave this question open and will test the relationship between organizational size and the likelihood of managers' activating new networking.

Hypothesis 3-5: Organizational size may be associated with the activation of new networking

#### 2.2.4. Environmental Factors

Environmental factors may also influence the activation of new networking. First, organizations' reliance on external actors' resources is one environmental factor that leads managers to activate new networking. The basic assumption of resource dependency theory is that individual organizations are unable to obtain necessary resources to manage their uncertain environment on their own and instead rely on inputs from the environment, which consists of a "collection of interacting organizations, groups, and persons" (Van de Ven, Emmett, and Koenig, 1975, 19,

cited in Fleishman, 2009). A single organization may have its own managerial strategies to operate and survive in response to an uncertain environment. Contingency theories argue that in unstable and uncertain environments, organizations manage their operations and improve their performance by adopting different organizational forms, such as decentralizing their structure to face different environments (Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Rainey, 2009). At a certain point, however, organizations with compartmentalized sub-units cannot manage their environment by themselves, simply because they do not have the resources to deal with their environment. In such cases, utilizing external actors' resources is a better strategy. Resource dependency theories suggest that organizations manage their structure in response to their environment and collaborate with external actors to obtain necessary resources such as goods, personnel, information or money in order to manage their uncertain environment (Rainey, 2009).

Meanwhile, resource dependency does not necessarily mean networking. It is quite possible for organizations to be dependent on external actors' resources without engaging in networking relationships which require participants' high commitment (Robinson and Gettis 2007). For instance, resource sharing as a result of a contract is a formal relationship between two organizations, and it is different from a voluntary networking relationship. However, those who share resources may find more necessity and incentive to expand their relationship through networking; as a result, those who share resources with a certain party are more likely to initiate networking with that party.

Hypothesis 3-6: As managers share resources with a certain organization's resources, they are more likely to activate new networking with that particular organization.

In addition to organizations' resource dependency, environmental uncertainty may also cause managers to develop new networking in order to respond to it. Note that external forces include some positive opportunities that facilitate organizational performance, such as the availability of necessary resources, and some negative shocks that worsen organizational performance, such as disasters. To protect and improve organizational performance, managerial networking can tap positive opportunities from the environment and/or buffer negative environmental shocks from the organization (O'Toole and Meier, 1999).

In response to organizational shocks, Kaufman (1985) suggests two different organizational reactions. On the one hand, Kaufman argues that organizations are likely to contract or reduce exchanges across boundaries in order to fulfill their needs internally. In this case, organizations may not collaborate to deal with external shocks. On the other hand, Kaufman argues that organizations collaborate with external actors in order to mutually deal with external shocks. Hicklin et al. (2009) support Kaufman's second argument: when organizations face unexpected shocks to their system, they are likely to network with external actors who hold resources to overcome such shocks. Despite two different organizational reactions to the environmental shocks, the literature on networking clearly contends that environmental shocks, especially those that are large-scale disruptions, encourage organizations to actively seek collaborative networking with external actors (Hicklin et al. 2009). For this reason, research on emergency management emphasizes the role of networking in managing unexpected shocks. Thus, when the organization expects a higher likelihood of experiencing such shocks, it will be more likely to seek networking with external actors.

Hypothesis 3-7: When managers perceive a high level of environmental uncertainty, they will be more likely to activate new networking to respond to it.

## 2.3. Impacts of Partner Selection on Collaboration Success

Previous parts of this chapter explore the consequences and determinants of networking. The following section focuses on managers' behaviors when they select networking partners. First, four scenarios of partner selection will be suggested. Then, the impacts of each scenario will be hypothesized.

### 2.3.1. Networking partner selection

Taking into account scarce resources, the theory of cost-benefit analysis argues that a rational decision maker "should take an action if, and only if, the extra benefits from taking the action are at least as great as the extra costs" (Frank and Bernanke, 2004. 4). To conduct a cost-benefit analysis, a decision maker takes four steps: 1) identifying relevant costs and benefits; 2) measuring costs and benefits; 3) comparing costs and benefits; and 4) making decisions (Nas, 1996).

A cost-benefit analysis applies to decision makers when they voluntarily select networking partners. As reviewed earlier, networking may bring benefits: better performance, reduced environmental shocks or resource augmentation. However, having additional networking partners is not always beneficial (Hicklin, O'Toole, and Meier, 2008) because networking generates transaction costs as well. As Agranoff and McGuire (2001) suggest, transaction costs for networking may include any costs resulting from operating networks: costs for the processes of activating/deactivating, framing, mobilizing, and synthesizing. Therefore, decision makers should take a careful approach to networking partner selection by conducting a cost-benefit assessment. Some scholars agree with the importance of networking partner selection (Bierly and Gallagher, 2007; Degraeve, Labro, and Roodhooft, 2000; Jarimo, Salkari, Bollhalter, 2006; Todeva and Knoke, 2005). For instance, Jarimo, Salkari, and Bollhalter (2006)

view the issue of networking partner selection as a matter of matching customers' needs with partner candidates' competencies. They assert that no one entity on its own decides networking partners. Establishing networking relationship between two entities is a function of mutual assessment. This means that when one selects one's networking partner, one should consider not only what one will get from the partner candidates but also what one can provide to them.

Fleishman (2009) supports this argument. From her interviews and surveys, she finds that one is mostly motivated to collaborate with others if those others bring some benefits such as access to useful information. Sharing similar goals and financial resources also motivates participation in collaboration (Fleishman, 2009). However, Fleishman finds that one's motivation to activate networking with beneficial partners does not guarantee the activation of networking. Her findings suggest that when activating networking, one has to consider what can be exchanged or shared first, and then strategically choose networking partners who are willing to accept an offer of networking.

Graddy and Chen (2009) make a similar argument about partner selection. They view collaboration as inherently risky relationships because interdependent relationships can be broken by the partner's behavior. Thus, decision makers have to conduct an assessment to select the most satisfactory collaboration partner. Graddy and Chen emphasize the assessment of the trade-off between the benefits of collaboration and the costs of a failure to collaborate. This suggests that one has to strategically select one's networking partners by assessing both the positive and negative outcomes that potential networking partner candidates will bring (Graddy and Chen, 2009). They assert that the exchange of resources that one does and does not possess, and the organizational legitimacy that returns associational advantages, are two broad categories that one expects from the collaboration. When comparing networking partner candidates who

will return similar benefits, one maximizes one's benefits by seeking those who generate lower transaction costs among networking partner candidates (Graddy and Chen, 2009). In order to do so, Graddy and Chen argue that it is essential to have information about potential networking partner candidates.

In summary, networking with an appropriate partner can lead to positive outcomes, but networking with an inappropriate/unhelpful partner can lead to the failure of individual organizations as well as networking itself. Thus, it is important to first check what the potential networking partner candidate will offer. It is also critical to check how the potential networking partner candidate can benefit in return. Only a careful assessment of the potential exchange will lead to the successful initiation and maintenance of networking. Therefore, strategic partner selection becomes a significant issue.

### 2.3.2. Scenarios of networking partner selection

In order to activate networking between two actors, both actors go through a decision making process. In this process, they evaluate expected benefits and risks that may result from the networking. They would activate networking only when both of them arrive at the conclusion that the benefits are expected to be greater than the risks from networking. Thus, to understand the activation of new networking, both sides' decision making has to be taken into account.

However, this study will narrow down the scope of decision-making to the focal actor's (an ego<sup>5</sup>) perspective. Even if networking requires mutual agreement, it is reasonable to assess a decision-making process in terms of an ego's perspective because, in reality, one with bounded rationality may need to make decisions by oneself without knowing the potential networking partner candidates' preferences or decisions.

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<sup>5</sup> In this study, an ego refers to a focal organization.

This study proposes four possible scenarios of networking partner selection based on whether or not one intends to activate the networking with a certain partner and whether or not that networking is actually activated later. To proceed with the explanation of each scenario, this study makes the following assumptions.

Assumption 1: A networking partner in each scenario is expected to bring benefits to the ego.

Whether or not networking with a certain candidate will bring benefits to the ego is not definite. To make sure, the ego has to make an assessment of expected costs and benefits. The ego may find that networking with some candidates will bring benefits but networking with some others will not. In other words, not all potential networking is always beneficial. However, this study assumes that the ego has already conducted an assessment to screen those candidates who will not return benefits. Thus, the ego has to decide whether it will attempt to activate networking with a certain candidate among those candidates who have potential benefits for the ego.

Assumption 2: The ego does not have full information about whether a networking candidate finds any benefits from networking with the ego.

This scenario is from an ego's perspective. The ego does not know how the networking candidate that the ego might deal with evaluates the ego. The ego may think that it can return something to the candidate through networking, but the candidate may or may not agree. On the contrary, the ego may think it cannot return what the candidate wants from networking, but the candidate may have different ideas. This study assumes that the ego typically makes a decision of whether or not the ego will attempt to activate networking with a particular candidate without knowing the intention of that candidate.

Assumption 3: The effects of networking with a certain networking candidate on organizational performance are the same regardless of how the networking is activated.

Networking can be activated by the ego's initiative or the candidate's initiative. In either case, this study assumes that the effects of networking on organizational performance are the same.

Assumption 4: There are only three transaction costs, and each scenario will generate transaction costs involving a combination of the following three types: transaction costs for 1) self-evaluation, 2) the attempt to activate networking, and 3) the process of activation.

Under the uncertain situation in which the ego does not know whether or not the networking candidate will find benefits from the ego, the ego should conduct an assessment. From the results of an assessment, the ego may or may not find itself sufficiently attractive enough for the candidate to accept the offer to activate networking. This assessment will generate transaction costs.

If the ego finds itself sufficiently attractive for the networking candidate, it will attempt to activate the networking by, for instance, contacting and persuading the candidate. Regardless of the results of the attempt, this process will generate transaction costs.

If the ego and the networking candidate mutually agree on the activation of networking, they have to pay transaction costs together to activate networking. This process may include setting goals, priorities or strategies.

Assumption 5: Transaction costs for a particular action are the same for all scenarios.



By Assumption 4, some scenarios may generate all three transactions and some may not. This study assumes that a particular action will generate the same transaction costs regardless of scenarios. For instance, if the ego conducts self-evaluation, the self-evaluation will generate the same transaction costs regardless of the following scenarios.

*Scenario I.* An ego determines that it could possibly benefit from networking with a certain networking candidate. At the same time, the ego assesses itself as an attractive networking partner for that candidate. Therefore, the ego attempts to activate networking with that candidate, and the ego's self-evaluation has been correct: the candidate finds some expected benefits from networking with the ego. As a result, the networking is activated. By Assumption 4, the ego will have to pay the following transaction costs in this scenario:

- 1) Transaction costs for self-evaluation,
- 2) Transaction costs for the attempt to activate networking, and
- 3) Transaction costs for the process of activation.

*Scenario II.* After self-evaluation, the ego is interested in networking with a certain partner candidate but perceives itself as insufficiently attractive for that candidate. Thus, the ego does not take actions to attempt to activate networking with that candidate. However, that candidate finds some expected benefits from networking with the ego; thus the candidate attempts to activate networking by contacting the ego. As a result, the networking is activated. In this scenario, unlike Scenario I, transaction costs for the attempt to activate networking is generated to and paid by the counterpart candidate. The ego only pays the following transaction costs:

- 1) Transaction costs for self-evaluation, and
- 2) Transaction costs for the process of activation.

*Scenario III.* The ego perceives itself sufficiently attractive for a certain networking candidate after self-evaluation; thus, the ego attempts to activate networking with that candidate. However, the candidate does not find benefits from networking with the ego. Activation of networking should be based on mutual agreement, and because the candidate does not agree with the networking with the ego, the ego fails to activate the networking. However, the ego will have to pay the following transaction costs:

- 1) Transaction costs for self-evaluation, and
- 2) Transaction costs for the attempt to activate networking .

*Scenario IV.* In this scenario, like Scenario III, no networking is activated. However, the reason is different from that found in Scenario III. An ego does not perceive itself sufficiently attractive for a certain networking candidate. At the same time, that candidate does not find the incentive to network with the ego either. As a result, no exchanges occur. In this scenario, the ego only pays the following transaction costs:

- 1) Transaction costs for self-evaluation

Table 2-1 shows each scenario of decision making in networking partner selection, and each scenario may have different outcomes. On the one hand, based on the previous literature (e.g., Meier and O'Toole, 2001, 2003, 2009; O'Toole and Meier, 2003, 2004a, 2004b, 2009) and Assumption 1, this study expects that the effects of networking on organizational performance will be positive. Thus, the effects of both Scenario I and Scenario II on organizational performance will be positive. However, transaction costs generated and paid are different between the two. The ego both in Scenario I and in Scenario II pays transaction costs for self-evaluation and the activation of networking. By Assumption 5, total transaction costs for these activities in Scenario I and Scenario II are same. However, the ego in Scenario I should pay

transaction costs for the attempt to activate networking. After all, the ego in Scenario I pays more transaction costs than the ego in Scenario II. Even if the ego in Scenario I and Scenario II have the same effects of networking (by Assumption 1), the ego in Scenario I pays more transaction costs than the ego in Scenario II; thus, the ego in Scenario II achieves more returns from networking with a certain networking candidate than the ego in Scenario I.

Hypothesis 4-1: The effect of activated networking with a certain candidate on an ego's organizational performance is highest if networking with a certain candidate is not activated by the ego (Scenario II).

Hypothesis 4-2: The impact of networking with a certain candidate is second highest, if the ego intends to activate networking with that candidate, and that networking later does occur (Scenario I).

On the other hand, organizations from Scenario III and Scenario IV have no networking effects but this can still have a negative impact on organizational performance due to generated transaction costs. The ego in both Scenario III and Scenario IV pays the transaction costs for self-evaluation, which should be the same by Assumption 5. However, the ego in Scenario III pays more transaction costs than the ego in Scenario IV via the cost in the attempt to activate networking. As a result, the impact of Scenario III may be worse than those of Scenario IV.

Thus, this study hypothesizes as follows:

Hypothesis 4-3: The impact of networking with a certain candidate on an ego's organizational performance is lowest if the ego intends to activate networking with that candidate, which does not then occur (Scenario III).

Hypothesis 4-4: The impact of networking with a certain candidate is second lowest, if networking, which the ego does not intend to activate, does not occur (Scenario IV).

Tests of hypotheses above allow this study to examine which scenario brings the highest marginal effects and which scenario brings the lowest marginal effects. For better understanding of decision making in networking partner selection, it is worthwhile to consider the expected values of each scenario, because benefits and potential chances of the occurrence of each scenario may suggest different strategies that what will be found from the test of hypotheses above. For instance, as hypothesized, even if benefits from Scenario II are higher than benefits from Scenario I, the expected value of Scenario II could be lower than that of Scenario I if the possibility that Scenario II occurs is substantially lower than the possibility that Scenario I occurs. If so, the best strategy for an ego will be to actively attempt to activate networking with beneficial candidates (Scenario I). In order to examine strategies with given scenarios, this study will compare the expected value of each scenario based on each scenario's marginal effects and its chance of occurrence.

## 2.4. Summary

Chapter 2 develops three research questions. First, this study expects that managers' collaborative networking in preparation for the emergency may speed the organization's recovery after the emergency and may moderate the negative impacts of the emergency shock on an organization's routine performance. Second, this study examines what makes managers to activate networking with external actors with whom managers have not networked before. Lastly, this study suggests four possible scenarios of networking partner selection and examines

impacts of each scenario on organizational performance. The following chapter will describe data that will be analyzed to address the research questions in this study.

Table 2-1. Decision-Making Scenario

		Intended Collaboration	
		Yes	No
Activated Collaboration	Yes	Scenario I	Scenario II
	No	Scenario III	Scenario IV

Figure 2-1. Fundamentals of Emergency Management<sup>6</sup>



<sup>6</sup> Adopted from the website of Division of Emergency Management, Arizona State Government (at <http://www.dem.azdema.gov/operations/mitigation/mitigation.html>). Accessed on December 25, 2010.

## **CHAPTER 3**

### **DATA**

This study analyzes data from Texas school districts before and after Hurricane Rita hit Texas in 2005. First, this chapter describes the unit of analysis of the study. Then, brief information about Hurricane Rita will be delivered. Lastly, details regarding the data will be explained.

#### **3.1. Unit of Analysis**

The unit of analysis in this study is superintendents of school districts in Texas. As an executive of the school district, a superintendent is expected to successfully manage complex issues of budget, personnel, information technologies, product accountability, and competition (Hoyle et al. 2005). Particularly, superintendents' management skills are critical to students' academic achievement, which many school boards regard as a primary mission (Byrd, Drews, and Johnson, 2006). Superintendents' management style may not be directly correlated with students' achievement (Byrd, 2001), but superintendents' management decisions influence the behavior of principals and teachers, which, in turn, directly affects students' learning and achievement (Byrd, Drews, and Johnson, 2006; Cuban, 1984; Hoyle et al., 2005; Meier and O'Toole, 2001, 2002). Thus, the investigation of superintendents' networking style is critical to understand the success of school districts. By studying superintendents' behaviors, this study aims to understand an aspect of top managers' management style and thereby find implications for public administration in general.



Further, understanding school districts is important in public administration. As independent local governments, school districts are not subordinate to other units such as cities<sup>7</sup>; they have their own power to tax and set a budget; they have their own elected board; and they have their own bonding authority by a vote of the residents (Meier and O'Toole 2001). In Texas, where this study focuses, approximately half of the cost of education is paid by the state government, but state government's oversight is generally restricted to matters of accountability such as testing, attendance, time in class, number of courses, and so forth (Meier and O'Toole, 2001). Moreover, Texas has a relatively decentralized education system in which the local school districts have their own authority to determine the curriculum and make personnel decisions, within certain broad limits (Meier and O'Toole, 2001). In addition, more than half of state and local government employees nationwide are working in the area of education and libraries (Kettl and Fesler, 2009). As a result, school districts constitute a significant part of public administration.

This study particularly focuses on Texas. Some may question the external validity of studies of a single state because characteristics of states vary across the nation. Nonetheless, studies of a single state make a valuable contribution. According to Nicholson-Crotty and Meier (2002), scholars have to examine not only "what happens across states, but also what happens within them" (412-413). They further argue that studies of a single state are valuable "when the researcher wishes to generalize to a unit of analysis other than the states themselves, when conditions in a given state provide a unique opportunity for the most rigorous test of a hypothesis, and when the measurement advantages of a single-state study outweigh the costs of limited generalization" (411).

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<sup>7</sup> In some jurisdictions, public education is provided as a department or a unit of the general-purpose local government. However, all of the data in this study are school districts that are independent governments.

In summary, studying superintendents in school districts is important in public management in terms of responsibility that superintendents take as top managers, since managing schools and school districts constitutes a significant portion of state and local public administration. Moreover, because of the impact of Hurricane Rita, Texas provides a unique opportunity that allows researchers to study networking in the context of emergency. However, findings from this study have to be applied carefully when extrapolating even to similar types of organizations, even if superintendents and school districts are one of the most common forms of public organization in the United States. This is because, in contrast to other public organizations, school districts are highly professionalized and highly decentralized, with generally a lot of discretion given at the street level (classroom) and to the local bureaucrats (teachers).

### 3.2. Background of Hurricane Rita<sup>8</sup>

Hurricane Rita, which was recorded as “the most intense tropical cyclone ever observed in the Gulf of Mexico,” hit near the Texas and Louisiana border on September 24, 2005 (Meier, O’Toole, and Hicklin, 2010. 984). On the Saffir-Simpson Hurricane Scale, Rita was recorded as a Category 5 hurricane. When Rita made landfall, its strength weakened to a Category 3 hurricane near the Texas and Louisiana border. According to National Hurricane Center,<sup>9</sup> a Category 3 hurricane can result in the destruction of older mobile homes, metal buildings, unreinforced masonry buildings (built prior to 1994), poorly constructed frame homes, and severe damages to most newer mobile homes. It can also cause fatal injury or death to people

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<sup>8</sup> The explanation about Hurricane Rita in the first paragraph is drawn from Knabb et al. (2006).

<sup>9</sup> The Saffir-Simpson Hurricane Wind Scale. National Hurricane Center. 30 March. 2011

<<http://www.nhc.noaa.gov/sshws.shtml>>

and livestock due to flying and falling debris.<sup>10</sup> Many coastal communities in southwest Louisiana and in east Texas to Alabama were heavily damaged by the storm surge, wind, rain, and tornadoes that Rita produced. The hurricane resulted in seven fatalities and \$10 billion in property damage (Meier, O'Toole, and Hicklin, 2010). Table 3-1 shows the location of Hurricane Rita (the center) and its wind force characteristics over time. Rita stayed over school districts located in the very southeast of Texas for about 16 hours. During its passage, Rita was weakened from Category 3 to Category 1, and it turned into a tropical storm when it passed the border of Texas and Louisiana. As the strength changed, the size and force of wind changed. Figure 3-1 describes the track of the hurricane and the size and the reach of its wind forces. The red, light green and light blue lines are the maximum reach of winds at more than 74 miles per hour, more than 58 miles per hour, and more than 39 miles per hour, respectively. According to the Beaufort Wind Scale, when the wind speed is faster than 73 miles per hour, the winds are categorized as hurricane force winds and it can cause extreme destruction/devastation and large waves over 14 meters.<sup>11</sup> Tropical storm force winds have wind speeds of about 55 to 72 miles per hour, which can result in breaking or uprooting trees, extensive widespread damages, or large waves from 6 to 14 meters.<sup>12</sup> Winds of 39 to 54 miles per hour are gales that can result in high waves (up to 6 meters) and slight damage to buildings.<sup>13</sup>

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<sup>10</sup> The Saffir-Simpson Hurricane Wind Scale. National Hurricane Center. 30 March. 2011  
<<http://www.nhc.noaa.gov/sshws.shtml>>

<sup>11</sup> Beaufort Wind Scale. 30 March 2011. <<http://www.marine waypoints.com/marine/wind.shtml>>

<sup>12</sup> Beaufort Wind Scale. 30 March 2011. <<http://www.marine waypoints.com/marine/wind.shtml>>

<sup>13</sup> Beaufort Wind Scale. 30 March 2011. <<http://www.marine waypoints.com/marine/wind.shtml>>

### 3.3. Data Sources by Research Questions

This study utilizes two sets of surveys, Texas school district resource data, and geographic information about Hurricane Rita in order to set and test four models.<sup>14</sup> Surveys were conducted in different time periods, and Figure 3-2 shows the time line designated when each survey was conducted.

#### 3.3.1. Consequences of networking

##### 3.3.1.1. Networking and emergency recovery

The first part of Chapter 4 tests how superintendents' networking styles, including regular meetings and resource sharing, influence the speed/delay of organizational recovery after Hurricane Rita. This research question will be tested using the first post-hurricane survey, "Emergency Preparedness and the Impact of Hurricanes Katrina and Rita on Texas School Districts." It was coordinated by researchers at Texas A&M University and the University of Texas at Dallas. Collecting information from superintendents of Texas school districts was initiated right after Hurricanes Katrina and Rita (the initial survey was conducted in November, 2005 and finished by early 2006). Hurricane Katrina mostly impacted the Gulf of Mexico (late August and early September of 2005), and Hurricane Rita, which impacted similar areas, followed right after Hurricane Katrina (late September of 2005). Few Texas school districts were directly hit by hurricanes, but they had to quickly respond to them when they had to manage evacuees (Hicklin, et al., 2009). Right after Hurricanes Katrina and Rita, superintendents were asked about the impact of the hurricanes on their school districts, such as the number of days that the district canceled classes or the number of evacuees from elsewhere

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<sup>14</sup> I gratefully acknowledge Dr. Alicia Hicklin, Dr. Kenneth Meier, Dr. Laurence O'Toole, and Dr. Scott Robinson for permission of using the data from the two post-hurricane surveys. I also thank officials at the Texas Education Agency for kind responses to data request. Lastly, I appreciate Sea Island Software Inc. for their provision of Hurricane Rita's GIS data.

who enrolled in their districts. The survey also asked for details of the pattern of collaboration in response, as well as the extent of emergency preparedness. 720 of the superintendents responded to the first post-hurricane survey (response rate: 58 percent). Because the survey was conducted after the hurricanes, superintendents had to recall their management style. Therefore, their retrospective answers could be biased. However, by collecting survey data right after the hurricanes, the survey designer attempted to reduce such retrospective bias. Moreover, this study will examine possible endogeneity problems due to severe levels of hurricane damages influencing the variation of superintendents' networking style. In addition to the first post-hurricane survey data, this study utilizes financial resources and demographic information related to the school districts from the Texas Education Agency website.<sup>15</sup> Lastly, this study will utilize geographic information about Hurricane Rita. Data from Sea Island Software, Inc.<sup>16</sup> show the passage of Hurricane Rita and different hurricane wind categories. Using these data, this study will examine the endogeneity problem as well as control for the different levels of severity of Hurricane Rita in different places.

#### 3.3.1.2. Networking and an organization's routine performance

The second part of Chapter 4 tests how networking in response to the hurricane might buffer negative impacts of hurricane damages on educational performance by students, which is a routine district assessment. To examine this question, this study will use the first post-hurricane survey as used in the first model.

Likewise, for this latter analysis, Texas school district resource data are drawn from the same website of the Texas Education Agency as mentioned earlier. From these data, each

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<sup>15</sup> Academic Excellence Indicator System. 2011. Texas Education Agency. May 11, 2011.  
<<http://ritter.tea.state.tx.us/perfreport/aeis/>>

<sup>16</sup> More information about this company is available at [hurricanemapping.com](http://hurricanemapping.com)

district's resource information, including number/percentage of central administrative staff, total expenditure, or fund balance, is used.

### 3.3.2. Determinants of newly activated networking and networking partner selection

Chapter 5 will seek to explain the activation of new networking in these districts. Chapter 6 will test the impact of networking partner selection on collaboration success. Both chapters will use the first post-hurricane data as utilized in the previous model.

In addition, the second post-hurricane survey, "Emergency Preparedness in Texas' School Districts in 2007," will be used. The second post-hurricane survey was conducted in early 2007 in Texas school districts. It was responded to by 595 superintendents (response rate: 48 percent). The second post-hurricane survey includes 20 questions that measured their emergency preparedness, coordination, and disaster planning with particular attention on districts' collaboration with local school districts, government, and non-government organizations in preparing for the emergency.

Lastly, upon request of the researcher, data on superintendents' demographic information and Texas school districts' financial resources were provided by officials at the Texas Education Agency.

Table 3-1. Hurricane Rita Passage and Its Characteristics

Central Time Zone	Latitude	Longitude	Fwd. Spd. (mph)	Max. Wind (mph)	Pressure (MB)	Status
09/23/05 10 PM	29.1 N	93.2 W	12	120	931	Category 3
09/24/05 0 AM	29.2 N	93.5 W	12	120	934	Category 3
09/24/05 2 AM	29.6 N	93.7 W	12	120	937	Category 3
09/24/05 4 AM	29.9 N	93.9 W	12	120	937	Category 3
09/24/05 7 AM	30.4 N	94.2 W	12	100	950	Category 2
09/24/05 10 AM	31.0 N	94.3 W	12	75	960	Category 1
09/24/05 1 PM	31.6 N	94.2 W	12	65	975	Tropical Storm
09/24/05 4 PM	32.1 N	94.0 W	12	50	980	Tropical Storm
09/24/05 7 PM	32.5 N	94.0 W	12	40	983	Tropical Storm
09/24/05 10 PM	33.0 N	93.9 W	10	35	985	Tropical Storm
09/25/05 4 AM	34.2 N	92.8 W	20	20	991	Tropical Storm

Figure 3-1. The Track of Hurricane Rita and the Size and the Reach of Rita's Wind Forces

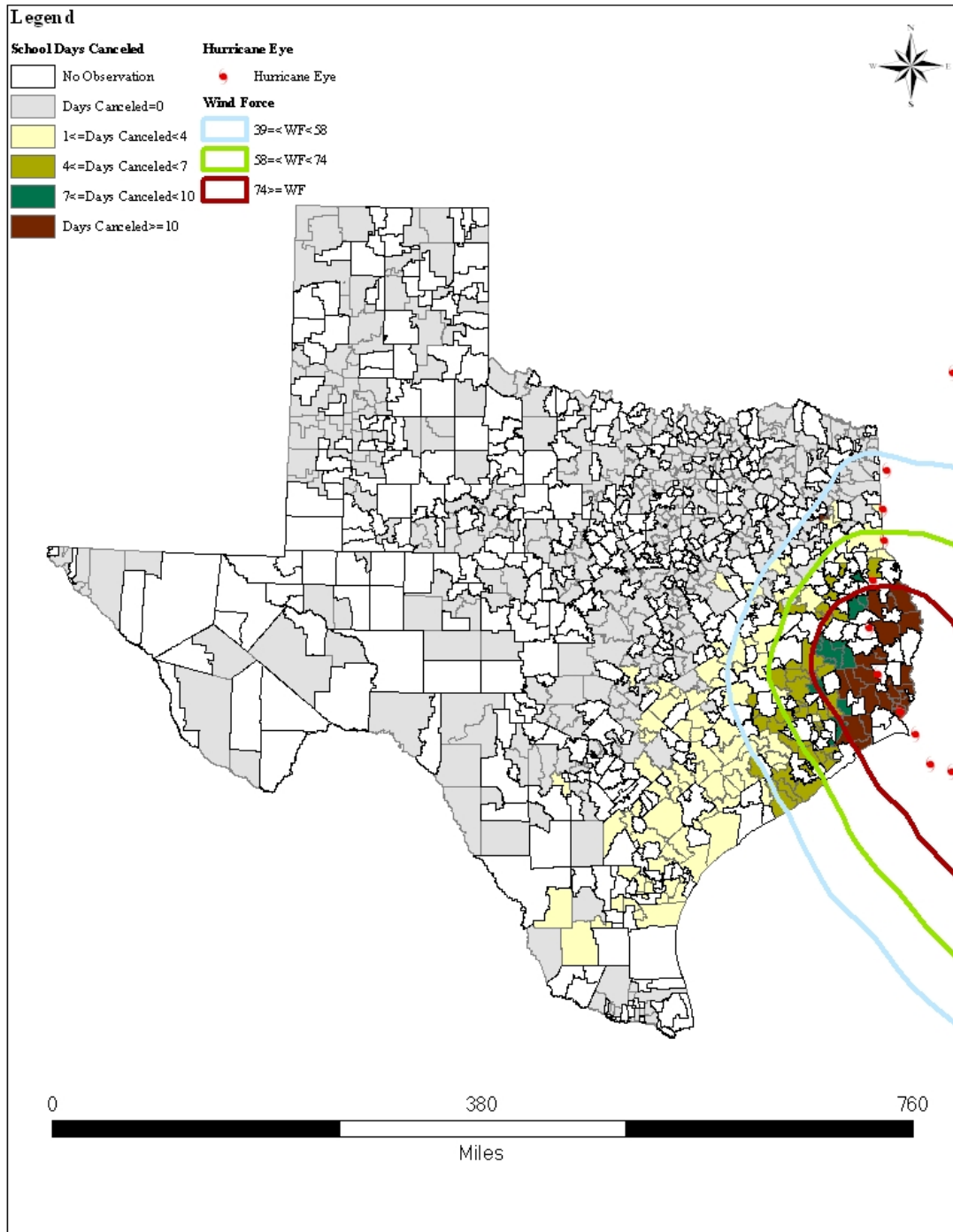
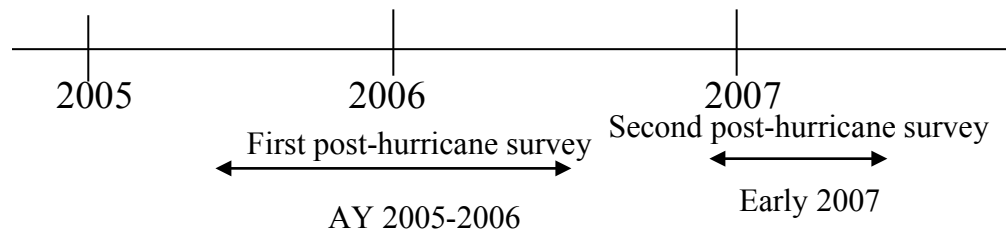




Figure 3-2. Academic Year (AY) and Surveys Conducted



## **CHAPTER 4**

### **RESULTS: CONSEQUENCES OF COLLABORATIVE NETWORKING**

This chapter examines how networking influences organizational performance in an emergency context and in a post-emergency context. The background of the first part of this chapter is an emergency context. In September 2005, Hurricane Rita made landfall in east Texas, and some school districts canceled classes until their districts recovered from damages caused by the hurricane. Prior to this unpredictable event, many superintendents had held networking — regularly scheduled meetings and resource-sharing—with emergency-relevant external organizations in order to prepare for a possible emergency. The first part of this chapter examines if superintendents' pre-existing networking in preparation for an emergency influenced the speed of emergency recovery by estimating the days of school closure.

The second part of this chapter examines the effect of networking in preparation for the emergency on organizations' routine performance after Hurricane Rita. The background of this part is that class cancellation due to Hurricane Rita in September 2005 might have immediately influenced students' learning and their test performance in Academic Year 2005-2006. The second part of this chapter examines if class cancellation negatively affected students' test performance and how networking in preparation for the emergency might have moderated that negative impact.

The first part will test the following hypothesis:

Hypothesis 1-1: A manager's collaborative networking in preparation for an emergency speeds an organization's recovery after the emergency.

The following section will elaborate an empirical model, method, and analytic results for the first hypothesis.

#### 4.1. Impact of Collaborative Networking on the Speed/Delay of Organizational Recovery

##### 4.1.1. An Empirical Model

Organizational “performance” as meant in this model refers to organizational recovery from an emergency. As the emergency management literature suggests, this study models organizational recovery as a function of emergency management –preparedness and response– along with environmental constraints and resources. As a result, to explain the variation in rapidity of organizational recovery from the hurricane, the following initial empirical model will be employed:

$$Y_{day} = \beta_1 X_{ep} + \beta_2 X_{es} + \beta_3 X_{rs} + \varepsilon$$

where

$Y_{day}$  represents the speed of organizational recovery from damages caused by emergency,

$X_{ep}$  is a vector of managerial efforts to prepare for/respond to the emergency,

$X_{es}$  is a vector of environmental shocks, and

$X_{rs}$  is a vector of resources.

$\varepsilon$  is an error term.

$\beta_1$  through  $\beta_3$  are estimable parameters.

##### 4.1.1.1. Dependent Variable

The speed of organizational recovery is measured by the number of days that districts closed their schools to evacuate for Hurricane Rita or because of the damage caused by Hurricane Rita. These data are available from the first post-hurricane survey. Organizational recovery is the act

of restoring organizational functions which are lost due to an emergency (Perry and Lindell, 2007). If school districts close their schools due to damages caused by an emergency, their recovery will include restoration of the schools' normal function prior to the emergency, and one of the indicators of recovery in school districts can be the speed of re-opening schools after the emergency. Controlling for other conditions, a speedier re-opening of schools closed due to the hurricane represents better organizational recovery.

Hurricane Rita hit the east Texas area as well as some parts of Louisiana, and some school districts in Texas were affected by the hurricane as well. About 400,000 Texas students were displaced, and some schools were closed temporarily or used to serve as shelters for displaced students and their family (Texas Education Agency, 2005). A total of 243 school districts were closed for an average of 6 days, and some school districts closed for more than 5 weeks (Meier, O'Toole, and Hicklin, 2010). Along with hurricane information, Figure 4-1 displays information on days of school closure for the districts. Some superintendents did not respond to the survey, and districts in white represent those missing observations. The grey districts are those that did not cancel classes due to Hurricane Rita. Among those districts that canceled classes, this study categorizes them by days of class cancellation. If the duration of a district's class cancellation was between 1 day and 3 days, it is colored yellow in the map. If the duration of a district's class cancellation was between 4 days and 6 days, the district is colored in olive green. Districts in dark green are those that canceled classes between 7 days and 9 days, and districts in brown canceled classes for more than 10 days. As the map shows, most districts in west Texas did not cancel classes. This raises a sampling issue; not all districts were affected by the hurricane directly or indirectly. Therefore, this study will establish the boundary that can

separate affected districts from unaffected districts. This chapter will examine affected districts only.

Schools may close after a hurricane for safety or logistical reasons, but superintendents have strong incentives to resume their classes fast because they are responsible for students getting back to their core tasks. The Texas Education Agency (TEA) told districts impacted by the hurricane that they could reduce their school year by as many as 10 days, but districts which closed more than 10 days due to the hurricane had to make up missing classes before the spring semester could begin (Texas Education Agency, 2005). However, superintendents could experience difficulty in scheduling make-up classes, especially when the curriculum was already set. Moreover, missing classes could negatively affect students' learning and further cause students' poor academic performance (Meier, O'Toole and Hicklin, 2010). Therefore, minimizing class cancellation by re-opening schools as soon as possible with districts' safety guaranteed were the important issues for superintendents when districts faced the emergency. Because the dependent variable is the days of school closure due to Hurricane Rita, more days of school closure mean slower recovery, and any negative effects of explanatory variables represent faster recovery.

#### 4.1.1.2. Independent Variable

Mushkatel and Weschler (1985) suggest that emergency preparedness consists of planning, warning, and public information, and training. They are "the activities closest to the onset of a disaster which minimize[s] disaster damage and enhances disaster response operations" (National Governors' Association, 1978, 237, cited in Mushkatel and Weschler, 1985).

Networking is an independent variable of interest in this model. Emergencies like hurricanes occur unexpectedly. Few actors hold enough resources to prepare for it by themselves. For most

organizations, it may be more efficient and effective to prepare for the emergency by networking with emergency-relevant external actors in advance. Thus, networking is one of the critical emergency preparedness activities.

In spite of attention to networking, scholars have not yet developed a consensus on the most appropriate measure of networking (Robinson and Gettis, 2007). At the behavioral level, a series of O'Toole and Meier's studies has focused on the frequency of interaction with various groups. Using a composite factor analysis, they have attempted to find a single underlying factor that explains managerial networking style (Meier and O'Toole, 2005). To measure an individual organization's networking, Provan and Milward (1995) measure a core agency's centrality by measuring how many participants in the network were directly linked to the core agency. However, Robinson and Gettis (2007) argue that current approaches to the measurement of networking may be limited at capturing "true" networking.

This study will utilize two networking measures: numbers of regular meeting partners and resource sharing. Prior to Hurricanes Katrina and Rita, superintendents voluntarily had held regular meetings with key groups in their environment in order to prepare for a potential emergency. To measure the intensiveness of managers' networking style, this study will count superintendents' regular meeting partners. Holding regularly scheduled meetings is an act of intensive networking that requires a relatively high threshold for the participants. According to Robinson and Gettis (2007), initiating and maintaining a regular meeting schedule requires high motivation and commitment, especially since busy managers have lots of obligations. The first post-hurricane survey asked whether superintendents held regularly scheduled meetings with each of the relevant external actors in order to respond to the emergency (police, fire department, and first responders; government relief and welfare organizations; nonprofit and relief

organizations; local/community/religious organizations; other school districts; business organizations; see Appendix III-1 for the question item).

This survey item has some issues of concern. The survey asked whether superintendents held regularly scheduled meetings with six, most emergency-relevant, organizations in preparation for hurricanes, but precise information about the contents or qualities of these meetings is not available. Moreover, although having regular meetings requires high commitment, the survey did not ask how often superintendents had such regular meetings. This means that a regular meeting could be held once every week, every month, or even every year. Depending on the frequency of regular meetings, their impact could be different, but this study cannot capture this aspect of regular meetings due to survey limitations. However, it is assumed that as Robinson and Gettis (2007) argue, regularly scheduled meetings require participants' high motivation and commitment so that participants may make use of regularly scheduled meetings to prepare for an emergency.

To supplement the measure of networking, this study will also measure networking by examining superintendents' efforts to share resources with the same key external organizations. Previous literature finds that identifying and assembling resources is critical for better emergency management (Bumgarner, 2008; Perry and Lindell, 2007). Most organizations have limited resources, and in a time of emergency they find resources particularly scarce; thus, resources including money, personnel, equipment, and supplies should be identified and assembled prior to the emergency (Bumgarner, 2008). Using data from TEA, this study controls for financial resources such as operating expenditure and transportation expenditure (more details will be described later). However, financial data from the TEA do not capture districts' resource sharing among emergency-relevant external organizations.

A resource-sharing measure will be derived from the first post-hurricane survey. The survey asked whether superintendents share money, information, goods or personnel with those external actors (police, fire department, and first responders; government relief and welfare organizations; nonprofit and relief organizations; local/community/religious organizations; other school districts; business organizations; see Appendix III-2). First, this study counts the number of external actors that superintendents share resources with; thus, each of four resource variables ranges from 0 (non-sharing) to 6 (sharing with all those six external actors). Then, a factor analysis is conducted to produce a factor score which may represent managerial efforts to share resources in order to prepare for the emergency. Those four summed variables were loaded on one factor with an eigenvalue of 1.362.<sup>17</sup>

#### 4.1.1.3. Control Variables

For better emergency preparedness, an emergency operations plan needs to be developed for “the activation and coordination of response organizations” (Bumgarner, 2008; Perry and Lindell, 2007. 6). Some scholars may be skeptical about the role of emergency plans under emergency situations because plans may not fit real emergency circumstances (Tierney, Lindell, and Perry, 2001; Waugh and Streib, 2006), but other scholars argue that an emergency operations plan must be well designed and should provide basic information about how the disaster response process in the community operates, what the jurisdiction’s risks and needs are expected to be, or how particular emergencies will be managed (Bumgarner, 2008). To assess the quality of the emergency operations plan, the first post-hurricane survey asked superintendents to evaluate the

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<sup>17</sup> A factor score is a better measure to capture managers’ effort to share resources than the summation of each variable. Variables used for generating resource sharing have two dimensions – what resources superintendents shared and with whom superintendents shared resources. Because of these dimensions, a one unit change of a summed variable is hard to interpret. Resource sharing measured by a factor analysis operationalizes a latent variable that captures superintendents’ resource sharing activities with external actors regardless of with whom and what they shared. Thus, a one unit change of a factor score for resource sharing is a better and easier measure to interpret as compared to the summed variable.



quality of their existing disaster/emergency plan with a 4-point scale (from poor to excellent; see Appendix III-4). The current study utilizes this survey item to control for the effects of the emergency operations plan on organizational recovery.

Emergency response is as important as emergency preparedness. According to Bumgarner (2008), emergency response is immediate activities of the government or other organizations before, during, or after the occurrence of an emergency. Timely responses to an emergency may minimize the negative impact of an emergency on organizations and speed recovery. The first post-hurricane survey asked when the district recently activated their emergency plan (4-point Likert scale from past 6 months to more than 2 years; see III-6 ). Using this variable, the present study generated an emergency response variable with a value of 1 if school districts had activated emergency plan within 6 months from the time being asked; otherwise, the emergency response variable was coded as 0.<sup>18</sup>

Control variables described above are parts of emergency management that may facilitate organizational recovery. The following control variables tap environmental shocks and also resources aside from emergency management. By controlling for environmental shocks and resources, this model seeks to isolate the effects of networking on organizational recovery.

Students' economic information is a good indicator of a district's financial and non-financial support from the community. School districts with community support may be able to adequately manage the emergency. Generally speaking, districts with more economically disadvantaged students, i.e., low-income students, may find limited financial and/or non-financial support from their community. As a result, districts with low-income students may be more vulnerable to emergency shocks. For this reason, this study controls for the percentage of

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<sup>18</sup> School districts in the sample are those influenced by Hurricane Rita. Thus, if they appropriately responded to the hurricane, they should have a record of emergency plan activation within last 6 months from the time being asked.

low-income students in academic year 2004-5. The percentage of low-income students refers to the percentage of students who are eligible for free or reduced-price lunch or eligible for other public assistance. School districts with more low-income students may delay reopening their classes.

In order to respond to the emergency and recover from the hurricane damages, the financial status of the district and districts' size may be critical. Above all, districts should be able to provide students with transportation services. A hurricane's damages may keep districts from adequately providing transportation services, but districts with more expenditure on transportation per pupil may overcome obstacles to operate transportation services faster than other districts. Thus, this study controls for a district's expenditure on transportation per pupil in 2004-5.

For the same reason, total operating expenditure per pupil in 2004-5, which excludes transportation expenditure, is controlled. Controlling for other aspects, a higher expenditure for operations may lead to faster recovery from the hurricane damages as compared to districts with lower operating expenditure.

Lastly, the numbers of students in 2004-5 are controlled to measure the size of the school district. It may be reasonable to believe that as compared to small districts, bigger districts may have more monetary or non-monetary resources/supports from the communities that can be utilized to respond to the emergency.

This study controls for the superintendent's tenure at the district. According to O'Toole and Meier (1999), environmental shocks can negatively influence the organization's outcome, but its negative link can be buffered by organizational stability. Especially, as a part of organizational stability, superintendent's tenure (see O'Toole and Meier, 2003) may be

associated with buffering emergency shocks and resuming classes faster. Based on the TEA database, this study controls for a categorical variable that is coded as 1 if a superintendent held her position for one year, as 2 if for two years, as 3 for three years and as 4 for more than three years.

No objective measures of hurricane severity are available. The survey asked superintendents to rate the degree of damages by the hurricanes, but their perception could be biased. In order to control for the most unbiased hurricane severity, this study utilizes two indicators that might capture the severity of hurricane most accurately: hurricane wind force categories and the district's location from the coast. Hurricanes have strong winds, and the force of winds is a main cause of damages. Depending on districts' distance and location from the center of the hurricane, the wind forces vary; thus, based on geographic information and hurricane wind force information, this study codes wind forces into four categories: coded as 1 if districts were under Hurricane Rita's wind force less than 39 mph; coded as 2 if districts are under the Hurricane Rita's wind force between 39 and 58 mph; coded as 3 if districts are under the Hurricane Rita's wind force between 58 and 74 mph; and coded as 4 if districts are under the Hurricane Rita's wind force more than 74 mph.

Along with the hurricane wind forces, districts' distance from the coast is another important factor to take into account. According to Kleinschmidt (1951), the thermodynamic disequilibrium that occurs between the tropical atmosphere and oceans is the energy source of hurricanes (cited in Emanuel, 1991). Because of this reason, a number of hurricanes are formed in the Gulf of Mexico every year and make landfall near southern and southeastern states. Once the hurricane makes landfall, it loses its energy from the ocean and gradually ceases to exist. Figures 4-2 and 4-3 display hurricanes formed within the Gulf of Mexico and their tracks in 2004

and 2005. Relying on this information, it may be reasonable to control for districts' location and their distance from the coast as a measure of the hurricane severity. The distance variable is coded as 4 if a district is located within 50 miles from the coast; coded as 3 if located between 50 miles and 100 miles from the coast; coded as 2 if located between 100 miles and 150 miles from the coast; and coded as 1 if located farther than 150 miles from the coast.

In summary, Hurricane Rita hit a number of districts, but objective indicators that capture the severity of Hurricane Rita are not available. Districts' distance from the coast as well as from the center of hurricanes may explain the variation of the degree of hurricane damages. Thus, this study will take distances from the center of Hurricane Rita and the coast into account.

Descriptive statistics and correlation matrix for variables in Model 1 are summarized in Appendix IV.

#### 4.1.2. Method

The dependent variable in this model is days of school closure, and it is a count variable. To estimate the count variable, this study finds that a Poisson regression model is more preferred over a negative binomial regression model or a zero-inflated Poisson regression model.

A negative binomial regression model may be employed if the cases of the dependent variable are over-dispersed. However, the analysis finds that days of school closure are not over-dispersed.<sup>19</sup> Thus, a Poisson regression model is preferred over a negative binomial regression model.

A zero-inflated Poisson regression may be used to estimate a count variable if the count variable has any possibility to be a zero, and a Poisson regression model is preferred if the count variable has a positive chance to be greater than zero. In fact, depending on the level of severity

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<sup>19</sup> Long and Freese (2006) suggest an overdispersion test using log-likelihood ratio of a Poisson regression model and a negative binomial regression model. This study used STATA version 11 to conduct an overdispersion test and found that the dependent variable was not over-dispersed.

of the emergency, some districts may not cancel their classes. However, this study samples those districts affected by the hurricane and drops other districts that were not influenced by the hurricane. Thus, districts had positive possibilities to cancel their classes. Moreover, the Vuong closeness test for model selection between a zero-inflated Poisson regression and a Poisson regression finds that a Poisson regression model is more preferred.<sup>20</sup> As a result, this study will estimate days of school closure using a Poisson regression model.

Cameron and Trivedi (2009) argue that the distribution of the count variable does not perfectly follow the Poisson distribution. To control for the violation of the distribution assumption that the variance is equal to the mean, they suggest using robust standard errors for the parameter estimates. Thus, this study will estimate robust standard errors.

#### 4.1.3. The Samples

As described in Figure 4-1, Hurricane Rita did not affect most school districts in west Texas. This study aims to test the association between networking and the speed/delay of recovery, and districts unaffected by the hurricane may be an inappropriate sample for this analysis. Therefore, it is necessary to set the boundary that distinguishes areas affected and unaffected by the hurricane and to drop unaffected districts out of the analysis. Sampling will be done through the hurricane wind force categories.

The reach and the strength of a hurricane's wind forces can determine the hurricane severity. The website "HurricaneMapping.com" run by Sea Island Software, Inc. provides geographic information about Hurricane Rita. The information includes three layers of hurricane wind forces: the districts covered by the wind 1) above 74 mph of wind speed; 2) between 58 mph and 74 mph of wind speed; and 3) between 39 mph and 58 mph of wind speed. School

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<sup>20</sup> The null hypothesis for Vuong closeness test is that a Poisson regression is preferred over a zero-inflated Poisson regression. The z-statistics for a one-tailed Vuong's test is .540; thus, it fails to reject the null hypothesis that a Poisson regression is preferred over a zero-inflated Poisson regression.

districts located closer to the hurricane's center were under more severe wind forces. To include school districts that were marginally affected by Hurricane Rita, this study draws a hypothetical line as shown in Figure 4-4. School districts between the light blue line and the light green are those districted impacted by the hurricane wind forces between 39 mph and 58 mph. This study measures the distance between the light blue line and the light green line, and based on this distance, a hypothetical line (a dark blue line) apart from the light blue line is drawn. Districts in this area are affected by the hurricane wind forces below 39 mph.

The sample for testing Hypothesis 1 includes all school districts affected by the hurricane wind forces at 1) faster than 74 mph, 2) between 58 and 74 mph, 3) between 39-58 mph, and 4) less than 39 mph.

#### 4.1.4. Endogeneity Test

Testing the first hypothesis using the first post-hurricane survey may have an endogeneity problem. The first post-hurricane survey was conducted after Hurricane Katrina and Hurricane Rita. To measure networking, this study utilizes superintendents' collaborative efforts such as whether or not they held regularly scheduled meetings with six emergency-relevant parties and whether or not they shared money, information, personnel, or goods with those parties. Since the survey was conducted after Hurricane Katrina and Rita, there is a possibility that superintendents developed newly scheduled meetings or shared resources after the hurricanes and before the time being surveyed. If the severity of hurricanes motivated superintendents to develop new networking, an endogeneity problem can be present. This study treats this possible problem by arguing that regularly scheduled meetings or sharing resources are types of networking that require participants' high commitment and dedication, and because the survey was conducted right after these hurricanes, respondents would not have enough time to develop such

networking. Also, the survey asked how long superintendents collaborated with six given parties, and any responses indicating “since Katrina” were dropped from the target sample.

An additional strategy to statistically test for the potential endogeneity problem is to conduct mean tests for the average days of school closure, the average number of regular meeting partners as well as the average level of resource-sharing between coastal districts and inland districts. If no endogeneity issues are present, the expected result will be to find more days of school closure for coastal districts<sup>21</sup> and to confirm no differences in number of regular meeting partners and the level of resource-sharing between coastal and inland districts.<sup>22</sup>

Table 4-1 shows results for one tailed t-test of days of school closure between coastal districts and inland districts. Comparison 1-1 in the table compares days of school closure between districts located less than 50 miles from the coast (coastal districts) and districts between 50 miles and 100 miles from the coast (inland districts). Comparison 1-2 compares days of school closure between districts located less than 100 miles from the coast (coastal districts) and districts between 100 miles and 200 miles from the coast (inland districts). Comparison 1-3 in the table compares days of school closure between districts located less than 200 miles from the coast (coastal districts) and districts between 200 miles and 400 miles from the coast (inland districts). Comparison 1-1 shows that coastal districts canceled classes longer than inland districts by 1.885 days, and the difference is statistically significant at the 95 percent confidence interval (t-statistics corresponding to one-tailed t-test = 1.743). Similar results showing that coastal districts closed schools longer than inland districts are found in Comparison 1-2 and Comparison 1-3 of Table 4-1. Comparison 1-2 shows that coastal districts located less than 100 miles from the coast closed schools more than 3 days longer (the difference is 3.416)

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<sup>21</sup> To test differences in days of school closure, a one-tailed t-test will be employed.

<sup>22</sup> To test differences in numbers of regular meeting partners and the level of resource-sharing, two-tailed t-tests will be employed.

than inland districts between 100 miles and 200 miles from the coast, and the difference is statistically significant (t-statistics corresponding to one-tailed t-test = 5.612). Lastly, in Comparison 1-3, the difference of 2.886 days of school closure is found between coastal districts and inland districts (t-statistics corresponding to one-tailed t-test = 8.612); statistically, coastal districts closed their schools longer at the 95 percent confidence interval. In summary, all one-tailed t-test results reject the null hypothesis that coastal districts closed their schools as long as or less than inland districts did at the 95 percent confidence interval; coastal districts were more affected by Hurricane Rita than inland districts.

Comparison 2-1 in Table 4-2 compares means of numbers of regular meeting partners and the average levels of resource sharing between coastal districts (<50 miles) and inland districts (50-100 miles), respectively. T-statistics for the mean differences of numbers of regular meeting partners (t-statistics=1.004) and levels of resource sharing (t-statistics=.053) show that there are no statistically significant differences between coastal districts and inland districts.

Same results are found in Comparison 2-2 and Comparison 2-3 in Table 4-2. In Comparison 2-2, it is found that there are no statistical differences in numbers of regular meeting partners (t-statistics = .975) and in the level of resource sharing (t-statistics = -1.028) between coastal districts (<100 miles) and inland districts (100-200 miles). Comparison 2-3 also shows that coastal districts (<200 miles) have statistically no different numbers of regular meeting partners (t-statistics = -.379) and same levels of resource sharing (t-statistics = 1.560) as compared to inland district (200-400 miles) at 95 percent of confidence interval.

In summary, this study finds that the closer school districts are located to the coast, the more days they closed schools due to Hurricane Rita. However, this study also finds that school districts had no statistically significant differences in numbers of regular meeting partners and



the level of resource sharing regardless of districts' location from the coast. These findings relieve a possible concern of endogeneity that the severity of the hurricane caused superintendents to develop more networking before the time that the survey was conducted.

#### 4.1.5. Analytic Results

The first part of this chapter examines if superintendents' preexisting networking activities in preparation for the emergency enhance districts' recovery after the emergency. The expected result is that more numbers of regular meeting partners and/or higher levels of resource-sharing efforts in preparation for the emergency reduce the number of days of school closure due to the hurricane.

Table 4-3 presents the estimation of days of school closure analyzed by Poisson regression. First, Model 1-1 finds that higher hurricane wind forces and districts' location closer to the coast resulted in longer school closure. Given that hurricane wind forces were classified into four categories in this analysis, a one category increase in hurricane wind forces increases the expected days of school closure by a factor of 2.208, holding all others constant. Districts' location from the coast causes similar negative results. Reminding that districts' location from the coast were categorized in four regions in this study, the expected days of school closure increases by a factor of 1.554 as school districts are located closer to the coast by one given category. It implies that hurricane wind forces and the distance from the coast are decent measures of the severity of Hurricane Rita.

Given that the severity of the hurricane delays organizational recovery, it is found that collaborative networking in preparation for emergencies can speed organizational recovery. When the severity of hurricane is controlled, statistical findings reveal that the number of regular meeting partners reduced days of school closure. For instance, in Model 1-2 in which the

severity of Hurricane Rita is controlled, the days of school closure were reduced by a factor of .896 when they have another regular meeting partner. Similar impacts are found in Model 1-3 in which all other control variables are included. The results in Model 1-3 show that superintendents with one more regular meeting partner reduced the expected days of school closure by a factor of .912. These findings support that collaborative networking in preparation for an emergency helps organizational recovery after an emergency. However, as stated earlier in the literature review, this measure has an issue of concern. That is, the current survey dataset does not provide sufficient information about how regular meetings actually functioned in an emergency context. Simply put, a statistically significant association between the number of regular meeting partners and organizational recovery does not completely explain just what about such regular meetings might reduce the effect of such unexpected negative shocks. Nonetheless, there are plausible reasons why such sessions might help. For example, superintendents and their regular meeting partners might assign roles to play for the various organizations in case of emergencies, and they might well continuously assess their preparation progresses during their regular meetings. They could share information about possible scenarios of expected emergencies, clarify communication patterns, and develop emergency response protocols. In short, it is reasonable to expect that regular meetings can help superintendents prepare for emergencies, and superintendents may be better prepared by holding regular meetings with various types of emergency-relevant external organizations.

To supplement the analysis based upon the general data regarding regular meetings, this study uses an additional measure: the level of resource sharing between school districts and these external partners. The results appear in Model 1-2 and Model 1-3. When the severity of Hurricane Rita is controlled in Model 1-2, it is found that a one unit increase in resource sharing

leads to decrease in the expected days of school closure by a factor of .887. Same positive impacts of resource sharing on reopening schools are found in Model 1-3 where all control variables are included. A one unit change in resource-sharing efforts decreases the expected days of school closure by a factor of .873. In summary, collaborative networking in preparation for emergencies, as measured by both the number of regular meeting partners and the level of resource sharing, is found to speed of organizational recovery after the emergency.

In addition to networking measures, good qualities of emergency plans are found significant in Model 1-3, although the statistical power of this variable is not very strong. Some scholars argue that emergency plans may have limited functions because they do not fit real emergency situations. However, well-designed emergency plans can reduce a number of uncertainties, which managers and subordinates of the organization would otherwise have to deal with while in an urgent situation. Thus, developing good quality emergency plans may be a good predictor for fast organizational recovery.

Model 1-3 shows that some districts' environmental factors including the percentage of low-income students, expenditure on transportation, and the number of students are statistically significant at the 90 percent confidence interval. However, the magnitude of each variable is very low, and their odds-ratios close to 1.000 indicate that they do not influence days of school closure.

In summary, the hurricane wind category and districts' location from the coast are two major factors that influence days of school closure due to the hurricane. Controlling for these measures of the severity of the hurricane, the analysis finds that districts reduced the days of school closure due to the hurricane when superintendents had more regular meeting partners and were more involved in resource-sharing in preparation for the emergency. Also, having a good

quality emergency plan plays a significant role in reducing the number of days of school closure. These findings confirm the argument that management matters in an emergency context.

#### 4.1.6. Summary

The present study in this sub-section investigates how managers' networking in preparation for the emergency influences organizational recovery after the emergency. Model 1-1 through Model 1-3 sample all school districts impacted by Hurricane Rita. It is found that hurricane wind forces and distance from the coast influence the delay of school closure. However, managers' networking can accelerate the speed of school re-opening. The result shows that holding more regular meetings as well as active resource sharing with key environmental actors can lead to fewer days of school closure.

One cannot keep hurricanes from happening. However, networking in preparation for emergency management prior to a hurricane can minimize the negative effects of the emergency and hasten organizational recovery. The following estimation will examine whether emergency management networking can moderate the negative effects of the emergency on routine organizational performance.

#### 4.2. The Moderating Role of Collaborative Networking in the Environmental Shock-Performance Link

The second part of this chapter estimates another type of organizational performance: the overall students' test performance in school districts. In the first part of this chapter, this study examined how networking in preparation for an emergency influenced an organization's recovery from the hurricane. The following estimation examines how much delayed recovery from the hurricane negatively influences academic performance and whether networking in

preparation for the emergency moderates the negative impact of the hurricane on academic performance. In summary, this chapter tests the following hypotheses:

Hypothesis 2-1: The length of school closure resulting from the emergency negatively influences academic performance.

Hypothesis 2-2: Collaborative networking in preparation for the emergency moderates the negative impact of school closure on academic performance.

#### 4.2.1. Empirical Models

The following introduces an empirical model that modifies the O'Toole-Meier model (O'Toole and Meier, 1999) to test Hypothesis 2-1 (the negative impact of school closure on test performance) and Hypothesis 2-2 (networking's moderating role). O'Toole and Meier (1999) develop a contingent model as follows:

$$O_t = \beta_1(S + M_1)O_{t-1} + \beta_2(X_t / S)(M_2) + \varepsilon_t$$

where

$O$  denotes some measures of organizational performance,

$S$  is some measure of stability including structural, procedural, or other factors that support consistent production,

$M_1$  is management's effort to stabilize the organization through addition to hierarchy/structure as well as regular operations,

$M_2$  is managerial effort to buffer the environmental shocks and/or exploit resources from the environments, some portion of which may be collaborative,

$X$  is an environmental shock which can be divided into resources and constraints associated with the environment,

$\varepsilon$  is an error term,

the subscripts of  $t$  and  $t-1$  denotes time periods, and

$\beta_1$  and  $\beta_2$  are estimable parameters (O'Toole and Meier, 1999; Meier, O'Toole, and Hicklin, 2010).

O'Toole and Meier (1999) argue that current organizational performance is mostly influenced by past organizational performance because of inertial characteristics and environmental factors. They suggest that organizational stability and other managerial efforts to manage the organizational stability can moderate the impact of an organization's past performance. Also, they contend that organizational stability and external management including manager's networking can buffer the negative environmental shocks as well as exploit opportunities such as resources from the environment. The focus of this study is on networking's moderating role in the negative relationship between environmental shocks and the organization's performance. Therefore, this study modifies the O'Toole-Meier model as follows:

$$O_t = \beta_1 O_{t-1} + \beta_2 X_{dc} + \beta_3 M_2 + \beta_4 (X_{dc} \times M_2) + \beta_5 X_t + \varepsilon_t$$

where

$O$  is some measure of organizational outcomes,

$X_{dc}$  is the environmental shock (days of school closure),

$M_2$  is networking,

$X$  is a vector of environmental forces other than school days closed,

$\varepsilon$  is an error term,

the subscripts  $t$  and  $t-1$  denote time period, and

$\beta_1$  through  $\beta_5$  are estimable parameters.

This study includes an interaction term using days of school closure and networking in order to test networking's moderating role. To test Hypothesis 2-1 that examines the negative

impact of environmental shocks on organizational performance, this study will give special attention to the statistical significance and the direction of beta coefficients corresponding to the days of school closure ( $X_{dc}$ ). Regarding hypothesis 2-2 that examines networking's moderating role, this study will focus on the beta coefficient for the interaction term between days of school closure and collaboration ( $X_{dc} \times M_2$ ). The following will detail how variables are measured.

#### 4.2.1.1. Dependent Variable

As the current organization's outcomes, this study will utilize district's overall pass rates of the Texas Assessment of Knowledge and Skills (TAKS). The TAKS is a state-required, annual standardized test consisting of reading, writing, English language arts (ELA), mathematics, science, and social studies from grades 3 to 11 (Keng, McClarty, and Davis, 2008: 208).

According to Meier and O'Toole (2003), the TAKS measures how much students achieve the basic academic skills as they move to upper grades. Although the pass rates of the TAKS may not entirely capture students' academic achievement, they do assess whether students obtain the basic academic knowledge from grade to grade, and the local community as well as school districts cares about the TAKS results; thus, superintendents focus their management on its results (Meier and O'Toole, 2003). This study is interested in districts' performance after Hurricane Rita, which hit in September 2005. Thus, the TAKS pass rates in 2006 will be used as a dependent variable.

#### 4.2.1.2. Independent Variables

This study is interested in how environmental constraints negatively influence organizational performance and how managers' networking buffers such constraints to reduce negative effects. The environmental constraint is operationalized by the number of days that classes were canceled due to Hurricane Rita (see Appendix II-1). The logic is that missing classes due to the

delayed school re-opening resulted from the hurricane may negatively affect students' learning and thus their TAKS pass rates.<sup>23</sup>

The impact of canceled classes on students' test performance has to be carefully examined because only a few days of school closure may have caused a trivial impact on their performance. The Texas Education Agency asked school districts to make up classes if classes had been canceled more than 10 days due to Hurricane Rita (Texas Education Agency, 2005). In other words, the TEA treated the 10<sup>th</sup> day as a threshold. According to Meier, O'Toole, and Hicklin (2010), 243 districts canceled their class for about 1 week (5.14 days), but only a few districts canceled their classes more than 2 weeks. As a result, they set the 6<sup>th</sup> day as a threshold and examined the threshold effects on test performance.<sup>24</sup> This study first replicates Meier, O'Toole and Hicklin's variable of days of school closure. From the raw days of school closure, this study transforms any days of school closure fewer than 6 into a value of zero. If the raw variable of days of school closure is equal to or greater than 6, the transformed variable has the same value of the raw variable. For instance, the transformed variable has a value of 0 if days of school closure for a particular district were 3 and has a value of 8 if a particular district canceled classes for 8 days.

Although Meier, O'Toole and Hicklin (2010) find their measure of days of school closure negatively influence student performance, the current study raises one question: is the 6<sup>th</sup> day an appropriate cut-off to estimate the negative influence of environmental shock on organizational performance? As Meier, O'Toole, and Hicklin argue, only a few days of school closure may

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<sup>23</sup> This analysis uses the same variable, days of school closure, which is used as a dependent variable in the previous section, as an independent variable. In a time of emergency, the duration of school closure due to the hurricane indicates the speed of recovery from the hurricane; the shorter the time that districts canceled classes, the faster the districts recovered from the hurricane's damages. After the emergency when schools restore their functions, they adjust their schedules to catch up the missing classes; thus, the duration of school closure negatively influences districts' performance.

<sup>24</sup> Using this variable, Meier, O'Toole, and Hicklin find that missing classes negatively influenced students' performance.



cause a trivial result, but some level will lead to significant impacts. If their cut-off is appropriate, the TEA's recommendation of no make-up policy for districts that canceled classes fewer than 10 days could be an inappropriate decision. In order to check if the 6<sup>th</sup> day is an appropriate cutoff, this study generates three dichotomous variables; 1) the first dichotomous variable has a value of one if there were no cancellation; 2) the second dichotomous variable has a value of one if days closed were between one day and five days; 3) and the third dichotomous variable has a value of one if days closed were 6 days or more. The strategy to determine the 6<sup>th</sup> day as an appropriate cutoff is to find the third dichotomous variable representing school closure more than 6 days to be statistically significant and the second dichotomous variable denoting school closure between 1 day and 5 days statistically insignificant. Using the first dichotomous variable as a baseline, the current study puts an interaction term between the third dummy variable and the networking variable.

In this model,  $M_2$  denotes superintendents' networking in response to the emergency. Although this study tests the impact of networking by following the O'Toole-Meier model (1999), the way Meier and O'Toole (2001, 2005) measure networking is different from how this study measures networking. They investigate how much superintendents interact (on a six-point Likert scale from daily to never) with a few key environmental players, and conduct a factor analysis to capture managers' effort to manage the environment through networking. However, they admit that their measure is limited to capture the full set of superintendents' interaction in the network of other key environmental players (Meier and O'Toole, 2005). Rather, the current study counts the number of key environmental actors with whom a superintendent holds regularly scheduled meetings (police, fire department, and first responders; government relief and welfare organizations; nonprofit and relief organizations; local/community/religious

organizations; other school districts; business organizations; see Appendix III-1). Even if the networking measure in this study is different from the managerial networking measure that Meier and O'Toole measure, the basic idea that managers interact with key environmental players to manage environments remains the same.

If networking buffers the negative impact of emergency shocks on organizational outcomes, networking may play a moderating role in the negative relationship between the number of school closing days and the district's outcome (student's TAKS score performance). To capture the moderating role, this model will use an interaction term by multiplying the number of regular meeting partners with school closing days.

#### 4.2.1.3. Control Variables

Along with school closing as an environmental shock, this study will control for some other environmental resources and constraints ( $X_t$ ) that may influence students' TAKS performance.

They include the following variables:

- Students' race
- Students' economic status
- Class size
- Teacher's salary
- Instructional expenditures per pupil
- Teacher experience
- Hiring more teachers after the hurricane
- Purchasing textbooks for displaced students
- Lagged TAKS pass rates (TAKS pass rates in 2005)

According to Meier and O'Toole (2001), non-white students (including black students and Latino students) as well as low-income students tend to find less educational resources in their homes. Thus, school districts find more difficulty in educating them than others. As a result, districts with a higher percentage of those students deal with greater task difficulty (environmental constraints). While environmental constraints may negatively influence students' performance, the literature on education finds that resources are likely to affect higher student performance (Evans, Murray and Schwab 1997; Wenglinsky 1997 both cited in Meier and O'Toole, 2001). Better teachers are resources to promote student performance; thus, as a proxy of better teachers, teacher salaries and teaching experience will be controlled. For providing better education, small class size could be a resource (or large class size could be a constraint); thus, student-teacher ratio will be controlled.

Emergency responses also influence organizational routine performance. Once the organization is affected by the emergency, good emergency responses may help organization enhancing their routine performance. Thus, this study controls for how superintendents responded to Hurricane Rita by accounting for whether or not superintendents hired more teachers and whether or not they purchased textbooks for displaced students.

Lastly, the lagged TAKS pass rate is controlled as the O'Toole-Meier model suggests. The descriptive statistics for variables in this model are summarized in Appendix V.

#### 4.2.2. Method

Using the O'Toole-Meier model (1999), this study employs two different statistical methodologies. The first statistical methodology is to employ an ordinary least squares regression by partially replicating Meier, O'Toole, and Hicklin's (2010) model that investigated how managerial capacity (the percentage of central office administration) moderated the negative impacts of environmental shocks (days closed due to the hurricane) on organizational

performance (students' educational performance). Since their study uses the same dataset that this study utilizes, it is reasonable to partially replicate their study.

The second model questions if estimators from Meier, O'Toole, and Hicklin's (2010) model are unbiased. One of the assumptions for an ordinary least squares model is that all explanatory variables are exogenous; otherwise, the estimators are biased and inconsistent (Wooldridge, 2006). This study suspects that there are two endogenous variables: days of school closure and lagged performance. As the first part of this chapter finds, the severity of the hurricane -hurricane wind categories and districts location from the coast- statistically and significantly explains the variation of days of school closure. However, testing for endogeneity of a single explanatory variable suggested by Wooldridge (p. 532-533) does not find an endogeneity problem for days of school closure.<sup>25</sup>

The lagged performance is another suspicious endogenous variable. Generally, using a lagged dependent variable as an independent variable violates the basic assumption of the ordinary least squares regression in that an explanatory variable cannot be correlated with the error term (Kelly, 2002). In fact, the endogeneity check finds that lagged TAKS pass rates are endogenous. To account for the endogeneity problem, the second statistical methodology employs the two-stage least squares regression using six student characteristics and district resources (percentage black, Latino, and low-income students; teacher's salaries, class size, and instructional funding) as instrumental variables for the lagged TAKS pass rates (Wooldridge, 2006).<sup>26</sup>

#### 4.2.3. Analytic Results: the OLS Model

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<sup>25</sup> For the endogeneity check, hurricane wind forces and districts' location from the coast were used as instrumental variables

<sup>26</sup> Meier and O'Toole (2002) used these six variables as instrumental variables to account for endogeneity for lagged performance. The current study finds that these six instrumental variables explain the linear regression of lagged TAKS pass rates by 50 percent (R-squared: .502).

The result for the OLS model is shown in Table 4-4. From the result, it is found that the partial effects of days of school closure on TAKS pass rates depend on the number of regular meeting partners. When superintendents had no regular meeting partners, one more day of school closure after the sixth day due to Hurricane Rita in 2005 reduced 3.08 percent of the TAKS pass rate in 2006. However, the negative impacts of school closure decrease as the number of regular meeting partners increases and the size of impacts of school closure change from negative to positive as superintendents had more than 3 regular meeting partners. Although regular meeting does not show a direct impact on the TAKS pass rate, the statistical insignificance of regular meeting in this model makes sense because this study does not expect managers' regular meeting to manage the emergency to directly influence students' test performance. However, managers' interaction with external actors to manage the emergency does reduce the negative impacts of Hurricane Rita on students' performance.

It is expected that students' background (race, economic status, number of displaced students) as well as districts' resources (class size, teacher's salary/experience, financial resource) influence test performance. The findings show that districts with higher percentages of white students and the higher lagged TAKS pass rates turn out to statistically positively influence students' performance. In addition, higher class sizes reduce students' educational performance. The unexpected finding is the negative impacts of instructional expenditure per pupil. In general, a positive relationship between spending on instruction and students' achievement is expected (Hedges, Laine, and Greenwald, 1994), but some researchers question such relationship. For instance, Hanushek (1997) reviewed 377 studies that explored effects of key resources on student performance, and he found that only 27 percent of previous studies reported positive relationship between expenditure per pupil and student performance. According to his review, 7 percent of

studies even found that expenditure per pupil harmed student achievement. Based on review of previous empirical research, Hanushek (1996) concludes that “no strong or systematic relationship exists between spending and student performance” (56). This study does not aim to explore a relationship between instructional expenditure per pupil and students’ test performance. However, based on education literature, the negative finding between spending on instruction per pupil and students’ test performance in this analysis may be plausible, and future research may want to investigate this controversial relationship.

#### 4.2.4. Analytic Results: the Two-Stage Least Squares Model

Table 4-5 presents results of two-stage least squares analyses with two dummy variables for days of school closure: days of school closure between 1 and 5 days and for more than 5 days. In all models, no school closure is a base line. Model 1 in the table finds that school closure due to the hurricane in 2005 does not statistically influence 2006 TAKS pass rates. The same insignificant effect of school closure is found in Model 2 where numbers of regular meeting partners are controlled. These findings do not support the hypothesis that missing classes for more than 5 days directly harms students’ performance.

However, in Model 3 where the interaction term between the number of regular meeting partners and days of school closure for more than 5 days is controlled, the interaction term is found positive and statistically significant. Also, days of school closure for more than 5 days are found negative and statistically significant. The following equation is the partial effect of days of school closure for more than 5 days on 2006 TAKS pass rates:

$$\frac{\partial(\text{TAKS Pass Rates in 2006})}{\partial(\text{Days of School Closure for 6 Days or More})} = -4.397 + 2.121 \times (\# \text{ of Regular Meeting Partners}) \quad \text{-----} \quad (1)$$

Equation (1) implies that districts without any regular meeting in preparation for the emergency experienced a decrease of TAKS pass rates by 4.4 percent as they closed schools for

more than 5 days due to Hurricane Rita in 2005. Although districts with school closure for more than 5 days have negative partial effects on TAKS pass rates, its negative effects decrease as superintendents held regular meetings. Finally, the negative partial effects turn positive as superintendents held regular meeting with more than 2 external organizations in preparation for the emergency. This finding supports the hypothesis that collaborative networking in preparation for the emergency moderates the negative impact of school closure on academic performance.

In summary, findings from Model 1 through Model 3 do not directly support the hypothesis that longer school closure due to the hurricane negatively influence students' test performance. However, the partial effects of days of school closure for more than 5 days on TAKS pass rates depend on the number of superintendents' regular meeting partners in preparation for the emergency.

All three models consistently find that organizational performance is autoregressive; after controlling for instrumental variables, higher lagged TAKS pass rates positively influence the current districts' TAKS pass rate. Unlike the expectation, students' characteristics do not explain the variation of TAKS pass rates in 2006 except the percentage of economically disadvantaged students. In fact, the percentage of economically disadvantaged students is found to positively influence the current TAKS pass rate. This finding is unexpected. Generally, districts find higher task difficulties when they have higher percentage of socially and economically disadvantaged students; as a result, the percentage of low-income students who are eligible for free or reduced-price school lunch is negatively correlated with TAKS pass rates (Hicklin, O'Toole and Meier, 2007). However, the models consistently find the positive impacts

of low-income students, and it is not definite at this point what factor(s) causes such a positive association.

#### 4.2.5. Summary

In Chapter 4.2., this study explores the consequences of networking in preparation for the emergency in organizational routine performance: TAKS pass rates. The first part of Chapter 4.2. partially replicates Meier, O'Toole and Hicklin's (2010) model in which the 6<sup>th</sup> day of school closure is set as a threshold and finds that more days of school closure negatively influenced TAKS pass rates in the following year and networking in preparation for the emergency weakly but statistically significantly moderates the negative causation between days of school closure and TAKS pass rates. The second part of Chapter 4.2. questions if the 6<sup>th</sup> day is the right threshold. It also questions if estimators from the first part of Chapter 4.2. are consistent and unbiased. To answer these questions, the analysis in the second part employs multiple dichotomous variables to denote days of school closure and instrumental variables. First, it turns out that the lagged performance variable is endogenous; thus, students' characteristics are controlled as instrumental variables. Secondly, the 6<sup>th</sup> day of school closure due to the hurricane does not directly influence TAKS pass rates. However, it is found that its association depends on the level of superintendents' regular meeting in preparation for the emergency. That is, when superintendents held regular meeting with no or only a few external organizations, the partial effects of days of school closure lasting more than 5 days decrease TAKS pass rates. However, the negative association is moderated and in the end the association turns positive if superintendents held regular meetings with more than 2 external organizations. Although holding regular meeting with more partners is found to moderate the negative impacts of school closure in organizational performance, the limitation of this study is that the quality of regular meetings



is not controlled. One may argue that regularly meeting with one good quality external organization may be better than regular meetings with multiple low quality external organizations. However, the number of regular meeting partners represents one dimension of a superintendent's active networking, and at least this study find that managers' active networking can moderate the negative impacts of environmental shock on organizational performance.

Table 4-1. Mean Tests of Days of School Closure between Coastal Districts and Inland Districts

Comparison 1-1	Coast (0-50)		Inland (50-100)		Difference	T-Stat
	Obs	Mean (Std.Dev.)	Obs	Mean (Std.Dev.)		
	57	5.228 (5.883)	35	3.343 (3.18)	1.885	1.743
<hr/>						
Comparison 1-2	Coast (0-100)		Inland (100-200)		Difference	T-Stat
	Obs	Mean (Std.Dev.)	Obs	Mean (Std.Dev.)		
	92	4.511 (5.091)	84	1.095 (2.383)	3.416	5.612
<hr/>						
Comparison 1-3	Coast (0-200)		Inland (200-400)		Difference	T-Stat
	Obs	Mean (Std.Dev.)	Obs	Mean (Std.Dev.)		
	175	2.891 (4.381)	171	0.006 (.076)	2.886	8.612
<hr/>						

Table 4-2. Mean Tests of Networking between Coastal and Inland Districts

		Coastal District		Inland District		Difference	T-statistics
		Obs.	Mean (Std. Dev.)	Obs.	Mean (Std. Dev.)		
Location		<50 miles		50-100 miles			
Comparison 2-1	Regular Meeting Partners	56	1.946 (1.42)	33	1.667 (.957)	0.28	1.004
	Resource-sharing	55	0.045 (.855)	33	0.035 (.832)	0.01	0.053
Location		<100 miles		100-200 miles			
Comparison 2-2	Regular Meeting Partners	89	1.843 (1.269)	76	1.632 (1.513)	0.211	0.975
	Resource-sharing	88	0.041 (.841)	78	0.197 (1.104)	-0.156	-1.028
Location		<200 miles		200-400 miles			
Comparison 2-3	Regular Meeting Partners	164	1.744 (1.391)	151	1.808 (1.611)	-0.064	-0.379
	Resource-sharing	165	0.118 (.975)	157	-0.029 (.681)	0.147	1.56

Table 4-3. Poisson Regression of Days of School Closure

Dependent Variable: Days of School Closure	(Model 1-1)		(Model 1-2)		(Model 1-3)	
	Beta Coefficient	Odds Ratio	Beta Coefficient	Odds Ratio	Beta Coefficient	Odds Ratio
Number of Regular Meeting Partners			-0.110** (0.049)	0.896	-0.092** (0.042)	0.912
Resource Sharing (factor score)			-0.120** (0.047)	0.887	-0.135*** (0.041)	0.873
Quality of Emergency Plan					-0.146* (0.079)	0.864
Recent Activation of Emergency Plan					0.117 (0.109)	1.124
% Low-income Students					0.008** (0.004)	1.009
Expenditure on Transportation per Pupil					-0.001* (0.001)	0.999
Total Operating Expenditure per Pupil (except Transportation; in thousand)					-0.064 (0.070)	0.938
Number of Students (in thousand)					-0.007* (0.004)	0.993
Superintendent's Tenure					-0.004 (0.048)	0.996
Hurricane Wind Category	0.792*** (0.072)	2.208	0.800*** (0.062)	2.225	0.785*** (0.062)	2.193
Districts from the Coast	0.441*** (0.069)	1.554	0.506*** (0.071)	1.659	0.511*** (0.063)	1.667
Constant	-1.448*** (0.246)		-1.443*** (0.227)		-0.666 (0.598)	
Pseudo R-squared	0.570		0.590		0.604	
Observations	102		102		102	

Robust standard errors in parentheses; \*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 4-4. Moderating Effects of Collaboration on District's Performance Using the OLS Regression

Dependent Variable = TAKS Pass Rate	
Independent Variables	Slope
Days Closed (=0 if less than 6 days)	-0.308*** (0.100)
Collaboration (number of regular meeting partners)	-0.400 (0.428)
Days Closed x Collaboration	0.082* (0.046)
% White Students	0.068** (0.032)
Economically Disadvantaged Students	0.053 (0.050)
Class Size	-0.994** (0.483)
Teacher's Salary (in hundred)	0.037 (0.024)
Instructional Expenditures per Pupil (in thousand)	-2.569** (1.156)
Teacher's Experience	0.110 (0.286)
More Teachers Hired	1.564 (1.700)
Purchased Textbooks	-0.253 (1.227)
TAKS Pass Rate in 2005	0.805*** (0.071)
Constant	21.110* (12.619)
Observations	74
R-squared	0.885

Standard errors in parentheses; \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Table 4-5 Moderating Effects of Collaboration on District's Performance Using the 2-  
Stage Least Square Regression

	Model 1	Model 2	Model 3
	Dependent Variables: TAKS Pass Rates in 2006		
Independent Variables	Slope	Slope	Slope
Days of School Closure (1-5 days)	1.718 (2.129)	1.635 (2.108)	1.626 (1.766)
Days of School Closure (6 days or more)	0.175 (1.878)	-0.434 (1.791)	-4.397** (1.750)
Collaboration (number of regular meeting partners)		0.706 (0.514)	-0.562 (0.494)
Collaboration x Days of School Closure (6 days or more)			2.121*** (0.812)
% White Students (05-06) (X10)	-0.045 (0.503)	-0.003 (0.494)	0.289 (0.382)
Economically Disadvantaged Students	0.176* (0.090)	0.190** (0.095)	0.170** (0.077)
Class Size (05-06)	-0.990 (0.630)	-1.007 (0.626)	-0.834 (0.519)
Teacher's Salary (05-06)	0.005 (0.033)	0.006 (0.033)	0.019 (0.027)
Instructional Expenditure per Pupil (05-06, in thousand)	-0.229 (1.792)	-0.022 (1.848)	-0.145 (1.542)
Teacher's Experience (05-06)	-0.542 (0.492)	-0.451 (0.473)	-0.264 (0.373)
More Teachers Hired	-1.855 (2.629)	-2.318 (2.765)	-0.529 (2.099)
Textbook Purchased for Displaced Students	1.604 (1.790)	1.529 (1.772)	0.613 (1.401)
TAKS Pass Rate in 2005	1.334*** (0.261)	1.346*** (0.271)	1.200*** (0.199)
Constant	-4.831 (21.016)	-9.353 (22.586)	-8.451 (19.055)
Observations	74	74	74
R-squared	0.770	0.774	0.844

Instrumental Variables: % whit students, % economically disadvantaged students, class size, teacher's salary, instructional expenditure per pupil, teacher's experience; all in 2004-05 data

Standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Figure 4-1. Track of Hurricane Rita and Its Wind Forces

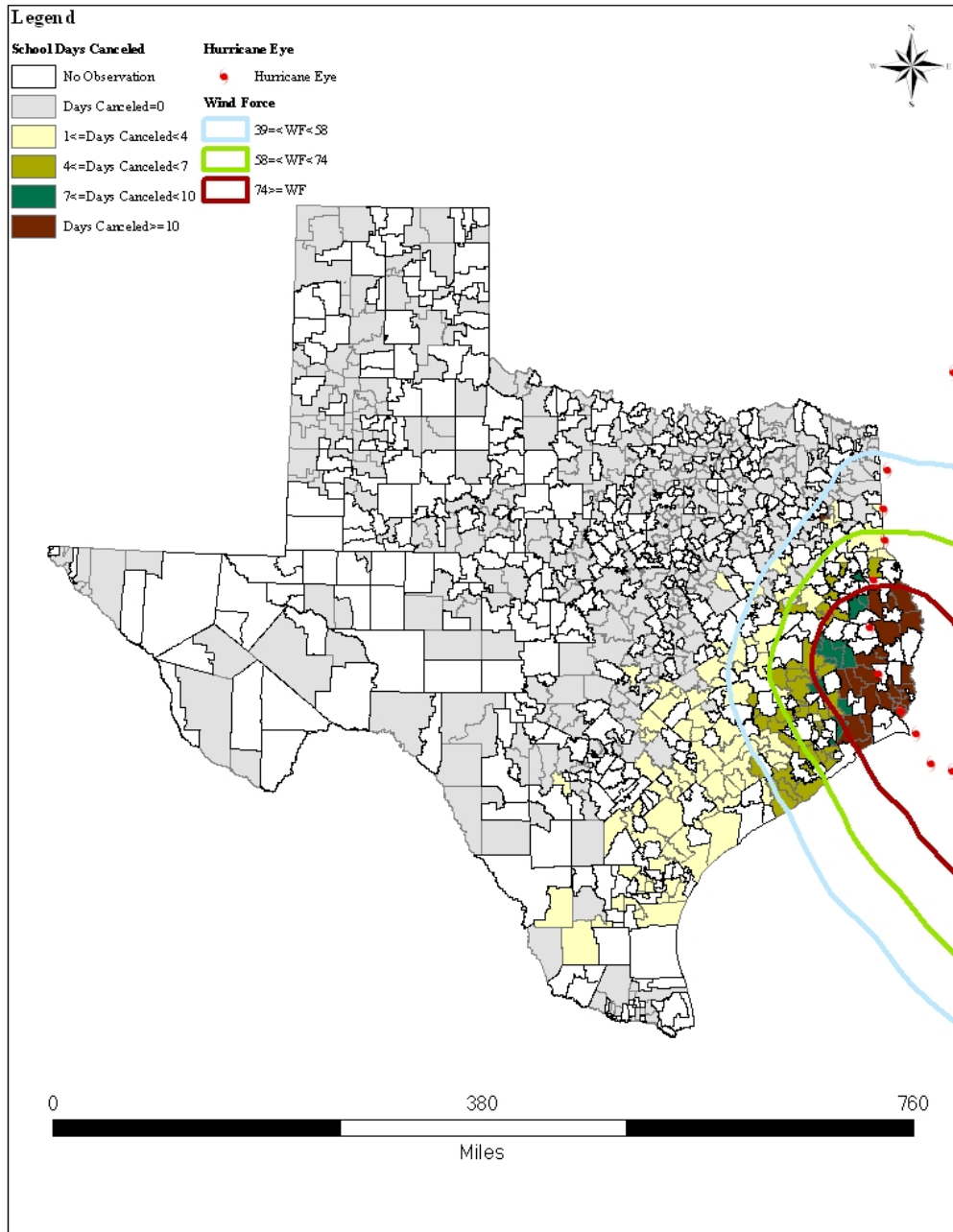
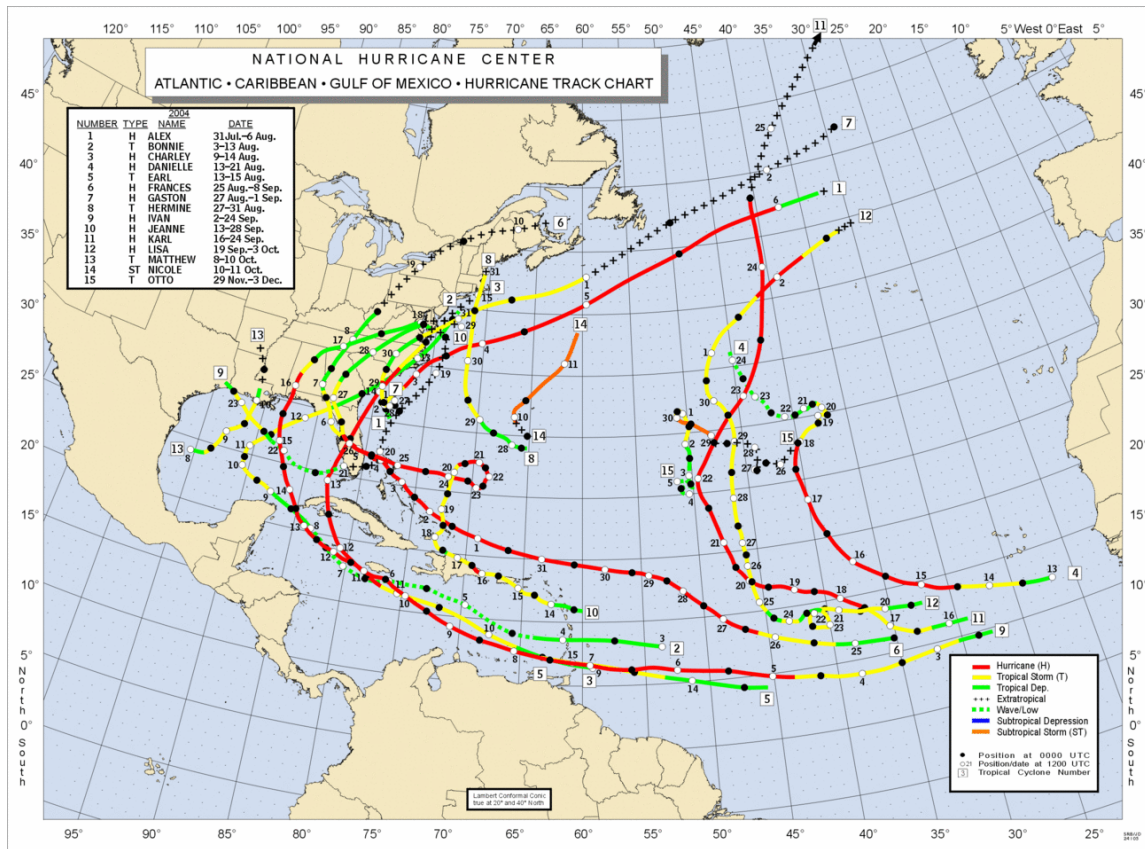


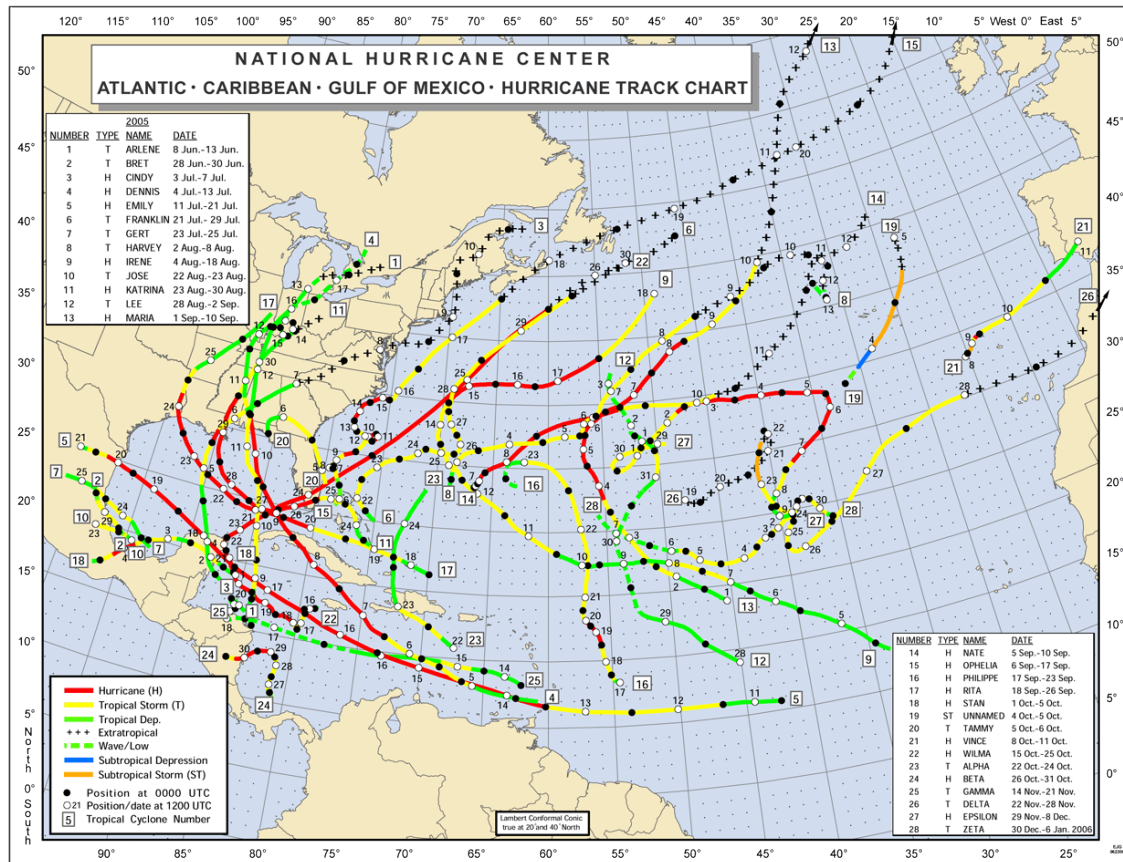
Figure 4-2. Past Tracks of Landfalling United States Major Hurricanes in 2004<sup>27</sup>



<sup>27</sup> Past Tracks of Land-falling United States Major Hurricanes. National Hurricane Center. 30 March 2011. <  
[http://www.nhc.noaa.gov/pastall.shtml#tracks\\_us](http://www.nhc.noaa.gov/pastall.shtml#tracks_us)>

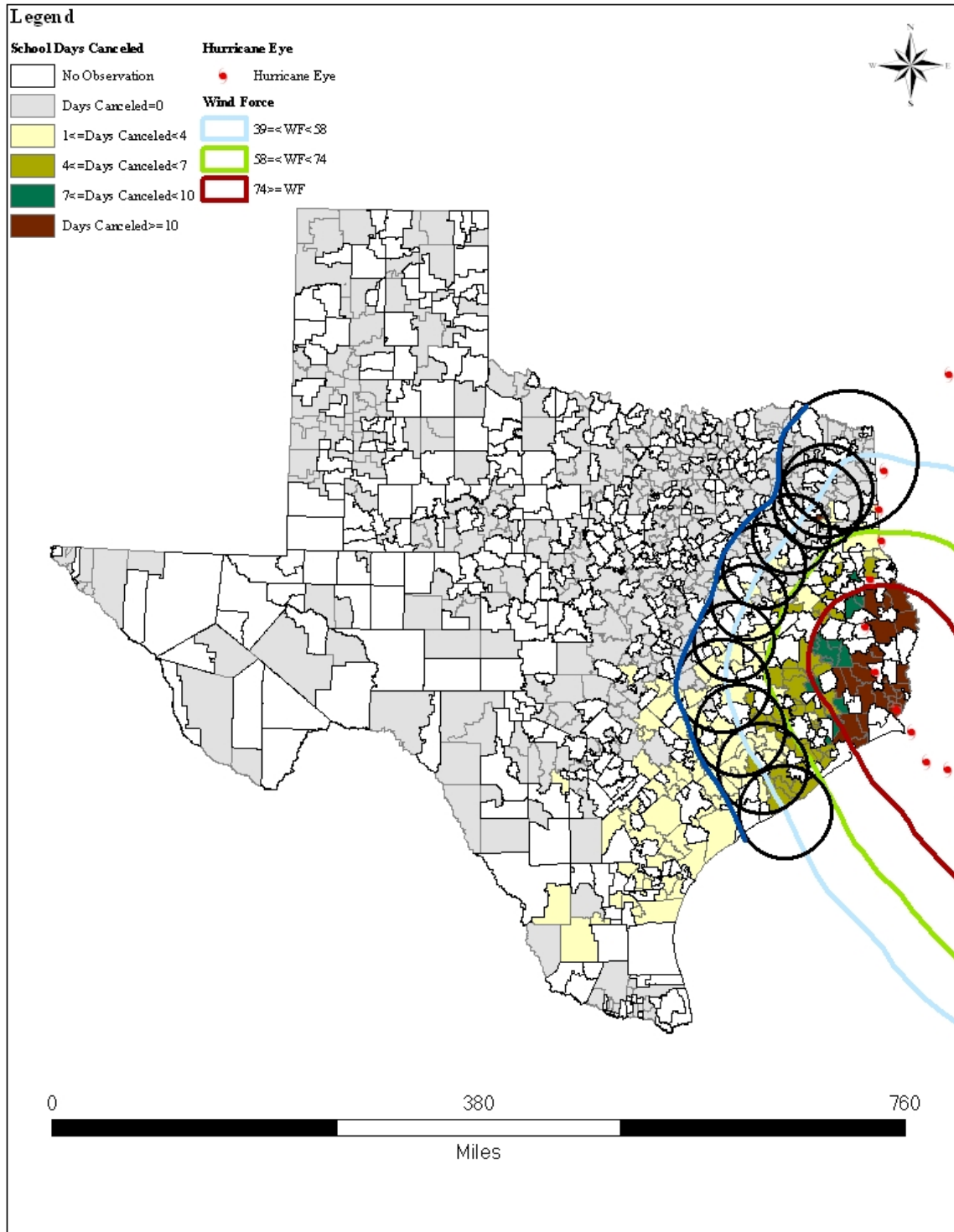


Figure 4-3. Past Tracks of Landfalling United States Major Hurricanes in 2005<sup>28</sup>



<sup>28</sup> Past Tracks of Landfalling United States Major Hurricanes. National Hurricane Center. 30 March 2011. <  
[http://www.nhc.noaa.gov/pastall.shtml#tracks\\_us](http://www.nhc.noaa.gov/pastall.shtml#tracks_us)>

Figure 4-4. Hurricane Wind Force Category and “Districts outside the Storm”



## **CHAPTER 5**

### **RESULTS: DETERMINANTS OF NEWLY ACTIVATED COLLABORATIVE NETWORKING**

The previous chapter found that active networking in preparation for emergencies improves organizational performance in both emergency and post-emergency contexts. If networking brings such an impact on organizational performance, what drives managers to activate networking with a new external organization? This chapter attempts to answer this question. This chapter will test the following hypotheses, which were developed in Section 2.2. of this study:

Individual Factors:

Hypothesis 3-1: Managers with higher compensation are likely to activate new networking.

Hypothesis 3-2: Managers of racial/sex minority are less likely to activate new networking.

Hypothesis 3-3: Managers' age may be associated with the activation of new networking.

Organizational Factors:

Hypothesis 3-4: Managers in organizations with abundant internal capacity to buffer environmental shocks are less likely to activate new networking.

Hypothesis 3-5: Organizational size may be associated with the activation of new networking.

Environmental Factors:

Hypothesis 3-6: Managers are likely to active new networking with a certain external actor if their organization has depended on that particular actor's resources.

Hypothesis 3-7: When managers perceive a high level of environmental uncertainty, they will be more likely to activate new collaborate networking to respond to it.

First, this chapter begins with an explanation of the data and sample. Then, a statistical method and an empirical model with descriptions of a dependent variable and independent variables will be presented. Lastly, findings and a summary will be included.

### 5.1. Data and Sample

This study uses two sets of post-hurricane surveys collected during two different periods of time. The first post-hurricane survey was conducted in 2005-06 (Time 1) and the second post-hurricane survey was conducted in 2007 (Time 2). Both surveys asked top managers (district superintendents) about the extent to which districts prepared for emergencies as well as about superintendents' networking behaviors in preparation for emergencies. In addition to the surveys, this study uses Texas school districts' financial and personnel data collected by the Texas Education Agency.

There was approximately a one-year time lag between the first and the second post-hurricane survey. During this period, superintendents who responded to the first post-hurricane survey could leave their position and newly appointed superintendents could respond to the second post-hurricane survey. In order to keep the sample consistent, this study includes only those districts whose superintendents responded to both surveys.

The first and the second post-hurricane surveys asked superintendents if they had held regular meetings with one or more of the following organizations for emergency preparedness

purposes: 1) police, fire department, and first responders, 2) government relief and welfare organizations, 3) nonprofit and relief organizations, 4) local/community/religious organizations, 5) other school districts, and 6) business organizations. Based on this question, the present study could develop six independent models that estimate the activation of networking with each type of organizations. However, when models are analyzed using the same predictors, only three models show statistically significant goodness-of-fit.<sup>29</sup> This study has good theoretical reasons to believe that predictors used in this section can explain the activation of new networking with each type of organizations, and it is not certain what caused the other three models to have statistically insignificant goodness-of-fit. Discussions about this point will be presented in the summary section. For the purpose of testing hypotheses, the following section will present the analysis of one model that estimates the activation of new networking with government relief and welfare organizations in detail, and brief presentation and discussion on results from the other two models with statistically significant goodness-of-fit will follow.

## 5.2. Empirical Models

The following model is employed to predict the likelihood of managers activating networking with a new external organization:

$$Y_{na} = \beta_1 \times X_{if} + \beta_2 \times X_{of} + \beta_3 \times X_{ef} \quad \text{----- (1)}$$

$Y_{na}$  in Equation 1 refers to the probability that superintendents will activate networking with a new external organization. This probability will be estimated by a vector of individual factors ( $X_{if}$ ), organizational factors ( $X_{of}$ ), and environmental factors ( $X_{ef}$ ). Individual factors include superintendents' salary (logged), gender, race, and age. Organizational factors include

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<sup>29</sup> The author estimated all six models with different model specifications, and the model-fit for each model did not change dramatically.

organizational size and organizational capacity. Organizational size is measured by the number of students in districts (logged) and total operating expenditure (except for expenditure in central administration; logged). Organizational capacity in this study is the percentage of central administrative staff in school districts' central offices. The perceived quality of an emergency plan will be also investigated as an organizational factor. Lastly, the perceived likelihood of experiencing emergencies and the number of resources shared will be examined as environmental factors. Logarithmic transformations are applied to some variables including a superintendent's salary, the number of students in a district, and total operating expenditure due to skewness.

#### 5.2.1. Measuring the activation of networking with a new external organization

Various approaches are available to measure networking, but the existing measures fail to capture the core of the collaborative relationship (Robinson and Gettis 2007). According to Robinson and Gettis (2007), networking has a temporal dimension (frequency in time) and an intensity dimension (interaction in depth), and some of the current measures of networking in previous literature such as resource sharing may not be necessarily called networking since they fail to capture either of these dimensions.

Taking the temporal dimension and the intensity dimension into account, this study measures networking based on whether or not superintendents held regularly scheduled meetings with external organizations. Regular meetings satisfy the temporal dimension and represent intensive networking between participants because participants who could have lots of obligations should show high motivation and commitment in order to activate and maintain regular meetings (Robinson and Gettis 2006).

The activation of networking with a new external organization in this study is measured based on superintendents' responses to the first and the second post-hurricane surveys. Each survey asked if a superintendent had regularly scheduled meetings with government relief and welfare organizations in regard to emergency management. The dependent variable is coded as 1 if superintendents had not held regular meetings with government relief/welfare organizations at Time 1 but held regular meetings with government relief/welfare organizations at Time 2. It is coded as 0 if superintendents had not held regular meetings with government relief/welfare organizations at either time. This study is interested in new networking that has not been established before. Thus, cases in which superintendents held regular meetings at both Time 1 and Time 2 are dropped from the sample. In doing so, this measure captures superintendents' activation of new networking only.

#### 5.2.2. Individual level factors

Individual factors include superintendents' demographic information as well as their base salary. A superintendent's salary has a mean of \$102,358.50 with a standard deviation of \$42,957.46. Wooldridge (2006) recommends taking a logarithmic transformation on variables with large integer values. Moreover, a superintendent's salary is not normally distributed (it is skewed to the right). Therefore, a logarithm is taken on superintendents' base salary.

As for demographic information, a responding superintendent's gender, race, and age are used. Female is coded as 1 if a responding superintendent is female; otherwise it is coded as 0. White is coded as 1 if a responding superintendent is white; otherwise it is coded as 0. Lastly, this study reported two opposite arguments about the possible direction of the relationship between age and the activation of new networking in the literature review section and left the direction unspecified. Both arguments may be plausible if age is non-linearly associated with the

likelihood of activating new networking. Therefore, this study includes a responding superintendent's age and its squared term in the model.

### 5.2.3. Organizational level factors

As for organizational factors, this study includes organizational capacity and organizational size in Academic Year 2005-06. As organizational capacity, this study uses the percentage of central administrative staff in each district. The administrative staff includes assistant superintendents and all other staff positions except school-level staff such as principals (Hicklin, O'Toole and Meier 2008).<sup>30</sup> Therefore, having more administrative staff allows superintendents to manage their organizations and environment more effectively. In addition to the percentage of central administrative staff, the perceived quality of an emergency plan is used as a part of organizational capacity. An emergency plan is a type of standard operating procedure that guides superintendents and other members in reacting to an emergency when an emergency occurs. Thus, superintendents of school districts with well-designed emergency plans may find few incentives to hold regular meetings with government relief and welfare organizations for emergency-preparedness purposes. To measure organizational size, this study uses the number of students in each school district. Previous literature such as Bidwell and Kasarda (1975) or Howley (1996) measured a school district's size using the number of students enrolled in the district. In order to correct for the skewness of this variable, this study takes a logarithm on the enrollment number. Total operating expenditure per pupil is used as another value for organizational size. Expenditure on central administration per pupil is moderately correlated with the percentage of central administrative staff ( $r=.598$ ,  $p\leq 0.000$ ). Therefore, the total expenditure

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<sup>30</sup> Hicklin, O'Toole and Meier (2008) used the percentage of central administrative staff as a measure of administrative capacity.



on central administration per pupil is excluded in this measure. Total operating expenditure per pupil is also skewed to the right, and a logarithmic transformation is taken on this measure.

#### 5.2.4. Environmental level factors

Environmental factors in this study include two variables: a perceived likelihood of experiencing an emergency and the level of resource sharing. In order to measure the likelihood of experiencing an emergency, the first post-hurricane survey asked the following:

How would you describe the likelihood of your district experiencing a disaster/emergency?

☐ Highly likely   ☐ Somewhat likely   ☐ Somewhat unlikely   ☐ Highly unlikely

This measure is coded from 1 to 4 where 1 denotes highly unlikely and 4 refers to highly likely. The mean of this measure is 2.32 with the standard deviation of .83.

Resource sharing is another type of environmental factor. The level of resource sharing is derived from the first post-hurricane survey. The survey asked if superintendents share money, goods, information or personnel with government relief and welfare organizations.

Superintendents could check all that applied. As a result, the measure varies from 0 to 4 where 0 means superintendents did not share anything with government relief and welfare organizations while 4 means superintendents shared all four items with government relief and welfare organizations.

### 5.3. Method

Table 5-1 presents correlations for all variables as well as descriptive statistics. As results show, most variables fall within the acceptable range of correlations except a few terms. First, due to superintendent's age and its squared term, high correlation between the two variables is found

( $r=.995$ ,  $p\leq .000$ ). In addition, it is found that the logged total number of enrollment is highly correlated with a superintendent's logged base salary ( $r=.889$ ,  $p\leq .000$ ). A high correlation between the logged total number of enrollment and a logged superintendent's base salary is not surprising. A superintendent's base salary is an outcome of various factors including human-capital factors and districts' characteristics. For instance, as the correlation coefficient shows, a district's size measured by the number of enrolled students is highly correlated with the superintendents' salary. However, a high correlation between explanatory variables should be resolved, because it can cause multicollinearity. For this reason, the variance inflation factors (VIFs) for each explanatory variable are evaluated. Results find that the logged total number of enrollment has the highest VIF (8.55) and a superintendent's logged base salary shows the second highest VIF (5.62). Remembering that Kennedy's (1997) maximum acceptable threshold of VIF is 10.0, these variables do not cause multicollinearity seriously enough to substantially influence the standard errors.

The dependent variable in this study is a binary variable, and in order to estimate the binary dependent variable, a probit regression analysis is employed.

#### 5.4. Analytic Results

The following section presents the analysis of how individual, organizational, and environmental factors explain the probability that superintendents activate new networking with government relief/welfare organizations. First, the Wald chi-square is 39.71 with a p-value of .000. It reveals that the model as a whole is properly specified, and no additional predictors that are statistically significant can be found except by chance (Chen et al. 2003).

As shown in Table 5-1, the dependent variable is dichotomous with a mean of .105 and a standard deviation of .307. This means that among superintendents who had not had regular meetings with government relief and welfare organizations at Time 1, 10.5 percent of them held regular meetings with government relief and welfare organizations at Time 2.

Table 5-2 presents beta estimates, standard errors, and average marginal effects based on the probit estimates. Among individual level factors – a superintendent's salary (logged), gender, race, age and age-squared – a logged superintendent's salary and age and age-squared are found to be statistically significant. A 10 percent increase in a superintendent's salary is 2.64 percent more likely to increase the likelihood that a superintendent will activate regular meetings with government relief and welfare organizations. A logged superintendent's salary has unique characteristics, and it has to be carefully interpreted. Unlike managers in other public organizations, superintendents have no upper or lower limits to their salary scale. Their salaries are annually determined by their school board members, and superintendents' human-capital factors such as education level, age, training, or the length of service or district's characteristics such as the size of districts, may play a significant role. In addition, district educational performance is also taken into account when superintendents' salaries are determined. Moreover, Meier and O'Toole (2002) contend that some variations of superintendents' salaries that are not explained by these factors reflect superintendents' managerial quality. Although the result shows that pay is an important predictor for networking activities, the given data are limited for interpreting which aspects of a salary truly influence the likelihood that a superintendent activates new networking.

Results show that age is associated with the likelihood of superintendents' activating networking with government relief and welfare organization, and its relationship is inverted-U

shaped. In other words, as superintendents are older they are more likely to activate new networking but after a certain age, they are less likely to activate new networking. This finding is interesting in that this study expected two opposite directions in a relationship between age and networking activation. As compared to junior managers, senior managers hold more legitimacy and resources so that they find more opportunities to network with external organizations. As a result, they are more likely to activate new networking. However, as Rogers and Whetten (1982) contended, activation of new networking can threaten managers' autonomy; therefore, senior managers may find few incentives to activate new networking in return for their autonomy. The inverted-U shaped relationship between age and activation of new networking well explains these two controversial arguments at once. That is, at a certain point, senior managers have more advantageous positions to activate new networking than junior managers. Therefore, they are more likely to activate new networking than junior managers. However, after a certain age, senior managers may fear for the loss of their autonomy and, as a result, they are less likely to activate new networking.

Lastly, this study hypothesizes that women and racial minorities are less likely to activate new networking. However, the results show that a superintendent's gender and race are found not to be statistically significant. In other words, gender and race are not significant predictors that determine the activation of new networking.

As for organizational factors, variables operationalizing organizational capacities are found to be statistically significant. First, school districts with large central administrative staff are less likely to activate new networking. Hiring one more percent of central administrators reduced the probability that superintendents activate new networking by 4 percent. In addition, a weak but statistically significant and negative relationship between the quality of the emergency

plan and the probability of activating new networking is found. That is, if districts have well-organized and good quality emergency plans, superintendents are less likely to activate new networking with an external organization. All these findings imply that as organizations have more capacity to deal with their own issues, they may find fewer incentives to rely on an external organization's resources. As a result, they are less likely to activate new networking. Contrary to the expectations, the result shows that organizational size represented by the number of students and the organization's financial status does not play a significant role.

Lastly, environmental factors are found to be statistically significant. First, if school districts had previously shared one additional resource with government relief and welfare organizations, they are 6.3 percent more likely to activate new networking with them in the following year. Based on the types of resources that two parties share, resource sharing could be an intense interaction or a shallow relationship (Robinson and Gettis 2007). However, the result shows that as one depends on external resources more and more, there is more likelihood to commit to the interaction and, in the end, develop intense networking. In summary, resource sharing does not necessarily mean networking. However, sharing more resources can be a direct cause of the activation of new networking between two resource sharers.

Along with resource sharing, the vulnerability to the environment is another factor that activates new networking. Recalling O'Toole and Meier's (1999) argument that networking can buffer the negative impact of environmental shocks on organizational performance, it can be noted that superintendents are more likely to activate new networking as they perceive a higher likelihood of environmental shock, or of experiencing emergencies. The results statistically support this argument.

So far, this study empirically tested hypotheses using the model estimating a superintendent's activation of new networking with government relief and welfare organizations. As noted earlier, this study finds another two models that have statistically significant goodness-of-fit. First, Table 5-3 is the resulting table for the model that estimates a superintendent's activation of new networking with business organizations. As presented in Table 5-2, Table 5-3 shows some similar results: a superintendent's salary and the number of resources that a superintendent shared with business organizations influence a superintendent's behavior to activate new networking with business organizations. However, unlike the results in Table 5-2, a superintendent's age, organizational capacity such as the percentage of central administrators and the quality of emergency plan, and the likelihood of experiencing emergencies are found not to be statistically significant. Instead, it is found that a superintendent's race and a district's size matter for the likelihood of a superintendent's activation of new networking with business organizations. Although directions of each variable in Table 5-2 remain same in Table 5-3 regardless of statistical significance, different statistical powers may raise issues of concern. It may result from different characteristics between government relief and welfare organizations and business organizations. However, with the data available, it cannot be determined what differences between these two external organizations result in such a different statistical power.

More controversial findings are presented in Table 5-4. Table 5-4 shows results from the model that estimates a superintendent's activation of new networking with nonprofit and relief organizations. First, only two variables —superintendent's salary and the number of enrollment— are statistically significant. Moreover, directions of these two variables are opposite to what this study initially hypothesizes and what is consistently found from the previous two models. Results in Table 5-4 show that a superintendent is less likely to activate

new networking with nonprofit and relief organizations as he/she earns more salary or as a district has more enrollment. What causes these unexpected findings is not certain at this moment, but this study assumes that the characteristics of nonprofit and relief organizations may be the factor that drives such differences. It may be a good strategy to control for characteristics of external organizations with which a superintendent activates new networking to see if different characteristics of external organizations result in differences in findings.

### 5.5. Summary

Networking has been a critical strategy for solving complex public problems, and understanding the driving forces of new networking is as critical as the consequences of networking. However, only a few scholars have explored the determinants of newly activated networking.

This chapter is one of the first studies that investigated the determinants of the precise pattern of managerial networking using individual factors, organizational factors, and environmental factors. The results from the model estimating a superintendent's activation of new networking with government relief and welfare organizations find that superintendents who receive more salary are more likely to activate new networking. Also, an inverted-U shaped association between age and activation of new networking is found. As for organizational factors, results reveal that superintendents in districts which have more organizational capacity – more central administrative staff and high quality emergency plans – are less likely to activate new networking. It confirms that organizations that are able to manage an environment by themselves find less incentive to get involved in networking with external organizations. As for environmental factors, superintendents who have shared resources with an external party are more likely to activate new networking with that party. Lastly, as superintendents perceive a

higher level of uncertainty, they are more likely to activate new networking. The association between environmental factors and the probability to activate new networking recalls O'Toole and Meier's (1999) argument. They contend that one networks with external organizations in order to mitigate environmental shocks and/or exploit environmental resources, and the results in the present study show that a higher likelihood of experiencing an emergency and more resource sharing increases the probability of activating new networking.

This research is a starting point in investigating the determinants of the activation of networking. However, this study finds some limitations. As stated earlier, this study estimated the likelihood of activating new networking with 1) police, fire department, and first responders, 2) government relief and welfare organizations, 3) nonprofit and relief organizations, 4) local/community/religious organizations, 5) other school districts, and 6) business organizations, respectively. However, it was found that only three estimations show statistically significant goodness-of-fit. It implies that the other three models may be misspecified. Moreover, among the models with statistically significant goodness-of-fit, results are not consistent. If theories hold, all six models should have acceptable goodness-of-fit with similar empirical results. One possible explanation is that the characteristics of each external organization may cause such differences. For instance, police, fire department, and first responders may have different organizational characteristics as compared to government relief and welfare organizations. However, each model does not account for these organizational characteristics. Unfortunately, the given data are limited to control for characteristics of organizations with which superintendents did or did not activate networking; thus, findings from this research warrant future studies to consider characteristics of networking partners with which one attempts to initiate networking in order to confirm the external validity of this research.



Table 5-1. Correlation and Descriptive Statistics

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Probability of Activating New Networking w/ Government Relief/Welfare Organizations	1.000						
(2) Superintendent's Salary (logged)	0.195	1.000					
(3) Female Superintendent	-0.053	0.049	1.000				
(4) White Superintendent	-0.144	-0.142	-0.016	1.000			
(5) Superintendent's Age	0.074	0.180	-0.030	0.022	1.000		
(6) Superintendent's Age (squared)	0.062	0.162	-0.029	0.023	0.995	1.000	
(7) # of Central Administration	-0.130	-0.389	-0.005	-0.084	-0.037	-0.027	1.00
(8) Quality of Emergency Plans	-0.047	0.230	0.004	0.079	0.152	0.150	-0.09
(9) # of Enrollment (logged)	0.184	0.889	0.021	-0.154	0.173	0.156	-0.57
(10) Total Operating Expenditure per Pupil (Except Central Administration; logged)	-0.052	-0.451	-0.043	-0.052	-0.025	-0.008	0.27
(11) # of Resources shared w/ Government Relief/Welfare Organizations	0.201	0.175	0.020	0.005	0.036	0.028	-0.17
(12) Likelihood of Experiencing Emergencies	0.217	0.261	0.150	-0.140	0.023	0.015	-0.16
Mean	0.105	11.463	0.180	0.916	53.331	2897.690	1.54
Std. Dev.	0.307	0.378	0.385	0.277	7.333	778.618	0.99
Min	0	9.903	0	0	34	1156	0.24
Max	1	12.653	1	1	75	5625	8.40

Table 5-2. Probit Regression of Activation of New Networking with Government

## Relief/Welfare Organizations

Dependent Variable: Activation of new networking with government relief/welfare organizations	Beta Coefficient	Marginal Effects
Superintendent's Salary (logged)	1.870** (0.872)	0.264
Female Superintendent	-0.485 (0.330)	-0.068
White Superintendent	-0.448 (0.455)	-0.063
Superintendent's Age	0.465** (0.213)	0.066
Superintendent's Age-squared	-0.004** (0.002)	-0.001
% Central Administration	-0.284** (0.141)	-0.040
Quality of Emergency Plans	-0.309* (0.168)	-0.044
# of Enrollment (logged)	-0.402 (0.273)	-0.057
Total Operating Expenditure per Pupil (Except Central Administration; logged)	0.290 (0.753)	0.041
# of Resources shared w/ Government Relief/Welfare Organizations	0.450** (0.206)	0.063
Likelihood of Experiencing Emergencies	0.450** (0.196)	0.063
Constant	-35.037*** (11.724)	
Observations		239
Wald Chi-squared		39.71***
Pseudo R-squared		0.226

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 5-3. Probit Regression of Activation of New Networking with Business

## Organization

Dependent Variable: Activation of new networking with business organization	Beta Coefficient	Marginal Effects
Superintendent's Salary (logged)	1.993** (0.803)	0.142
Female Superintendent	0.365 (0.424)	0.026
White Superintendent	-1.383*** (0.387)	-0.098
Superintendent's Age	-0.268 (0.184)	-0.019
Age-squared	0.002 (0.002)	0.000
% Central Administration	0.020 (0.150)	0.001
Quality of Emergency Plans	-0.280 (0.208)	-0.020
# of Enrollment (logged)	-0.556*** (0.193)	-0.039
Total Operating Expenditure per Pupil (Except Central Administration; logged)	0.908 (0.974)	0.064
# of Resources shared w/ Business Organizations	0.434** (0.190)	0.031
Likelihood of Experiencing Emergencies	-0.065 (0.204)	-0.005
Constant	-20.108 (12.246)	
Observations	209	
Wald Chi-squared	37.14***	
Pseudo R-squared	0.248	

Robust standard errors in parentheses

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Table 5-4. Probit Regression of Activation of New Networking with Nonprofit and Relief Organizations

Dependent Variable: Activation of new networking with nonprofit and relief organization	Beta Coefficient	Marginal Effects
Superintendent's Salary (logged)	-1.022** (0.475)	-0.189
Female Superintendent	-0.297 (0.324)	-0.055
White Superintendent	-0.544 (0.345)	-0.101
Superintendent's Age	0.244 (0.201)	0.045
Age-squared	-0.002 (0.002)	0.000
% Central Administration	0.153 (0.120)	0.028
Quality of Emergency Plans	0.154 (0.133)	0.029
# of Enrollment (logged)	0.492*** (0.178)	0.091
Total Operating Expenditure per Pupil (Except Central Administration; logged)	0.385 (0.710)	0.071
# of Resources shared w/ Nonprofit and Relief Organizations	0.127 (0.100)	0.024
Likelihood of Experiencing Emergencies	-0.017 (0.145)	-0.003
Constant	-4.050 (9.291)	
Observations	237	
Wald Chi-squared	26.01***	
Pseudo R-squared	0.129	

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## **CHAPTER 6**

### **RESULTS: IMPACT OF NETWORKING PARTNER SELECTION ON COLLABORATION SUCCESS**

In this chapter, this study empirically examines the impact of four possible scenarios of networking partner selection on the success of collaboration. Earlier, this study suggested the categories of intended-and-activated networking, not-intended-but-nonetheless-activated networking, intended-but-not-activated networking, and not-intended-and-not-activated networking. The present chapter will first test how each of these scenarios influences the success of collaboration. Then, a managerial strategy for networking partner selection will be suggested based on the concept of expected values.

#### **6.1. Conceptual Distinction between Collaboration Success and Collaborative Networking**

The perceived success of collaboration and managers' collaborative networking in different scenarios constitutes the set of variables of interest in this study. Collaboration is working together between two or more parties in order to mutually achieve both parties' needs (Rainey, 2009). As compared to cooperation or coordination, collaboration is an interaction that binds two actors with a higher level of service integration and less independent relationship (O'Leary, Gazley, McGuire, and Bingham 2009; Selden, Sowa, and Sanford 2002). Meanwhile, Fosler (2002) argues that "[c]ollaboration generally involves a higher degree of mutual planning and management among peers; the conscious alignment of goals, strategies, agendas, resources and activities; an equitable commitment of investment and capacities; and the sharing of risks,

liabilities and benefits ... Collaboration, therefore, suggests something less than authoritative coordination and something more than tacit cooperation” (19). In summary, collaboration is characterized as an interaction located somewhere in the spectrum between an autonomous relationship at one end and a completely constrained relationship at the other end among multiple actors in order to pursue certain goals that all parties are mutually eager to achieve.

The success of collaboration, or the perceived success of collaboration which this study particularly focuses on, depends on the achievement of mutual goals of collaboration (Oliver and Ebers1998). Many factors can determine the level of perceived success of collaboration. For instance, number of networking partners or the frequency of networking may be possible determinants. However, numbers or frequencies do not always guarantee successful collaboration. As previous literature reveals, too much time allocation on networking may negatively influence the success of collaboration, or organizational performance, (Hicklin, O’Toole, and Meier 2008). Sometimes networking with certain external organizations may benefit certain groups only rather than the general target (O’Toole and Meier 2004b). As a result, holding a collaborative networking tie with a certain party and the perceived success of collaboration with that party is a different matter.

In summary, the perceived success of collaboration and collaborative networking are distinctive, and to thoroughly understand the perceived success of collaboration, how networking is established needs to be taken into account. For this purpose, this study suggests four possible scenarios of networking partner selection and examines how each scenario influences the perceived success of collaboration. The following section will suggest the empirical model to estimate the success of collaboration using networking partner selection measures.

## 6.2. Data and Sample

This chapter utilizes the two post-hurricane surveys. The dependent variable and the independent variables of interests are derived from both surveys. In addition, some control variables are drawn either from the first post-hurricane survey or from the 2005-06 Academic Excellence Indicator System<sup>31</sup> on the website of the Texas Education Agency. The main research question is how each of four scenarios of managers' networking partner selection influences the change in the level of perceived collaboration success. In order to ensure internal validity, this study samples only those superintendents who responded to both surveys. Any superintendents who were newly employed or recently left between Time 1 (2005-06) and Time 2 (2007) are dropped in the analysis.<sup>32</sup>

The surveys asked about superintendents' collaborative behaviors in regards to emergency preparedness, and the main target external organizations were 1) police, fire department, and first responders, 2) government relief and welfare organizations, 3) nonprofit and relief organizations, 4) local/community/religious organizations, 5) other school districts, and 6) business organizations. This study initially examined superintendents' success of collaboration with each of the organizations above. However, it is found that the model investigating the success of collaboration with other school districts is the only one that statistically satisfies model-fit.<sup>33</sup> It is not certain at this point what caused such results. More discussion will be noted in the summary section. In this chapter, only results of the model estimating the success of collaboration with other school districts will be reported.

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<sup>31</sup> 2005-06 Academic Excellence Indicator System Available at <http://ritter.tea.state.tx.us/perfreport/aeis/2006/index.html>, accessed on October 29, 2011.

<sup>32</sup> 31 superintendents are dropped.

<sup>33</sup> The author experimented with different model specifications for the other 5 models; however, models with statistically significant goodness-of-fit were not found with the given data.

Among those superintendents who responded to both surveys, some superintendents already had regular meetings with other school districts and other superintendents had not. With the given data, it cannot be determined if superintendents annually re-assess the value of regular meetings with other school districts in regard to emergency management. Therefore, this study partitions the whole sample into two sub-samples: one sub-sample of superintendents who had had regular meetings with other school districts at Time 1 (n=120) and the other sub-sample of superintendents who had not had regular meetings with other school districts at Time 1 (n=60). The present study will analyze both partitioned sub-samples as well as the whole sample.

### 6.3. Empirical Models

This study employs the following empirical model to examine the impact of different scenarios of networking partner selection on the changes in the success of collaboration.

$$Y_{sc} = \beta_1 X_{ps} + \beta_2 X_{es} + \beta_3 X_{rs} + \beta_4 X_{sp} \quad \text{-----} (1)$$

$Y_{sc}$  in Equation 1 denotes the improved collaboration, and its variation will be estimated by a vector of four possible scenarios of partner selection ( $X_{ps}$ ), environmental shocks ( $X_{es}$ ), resources ( $X_{rs}$ ), and superintendents' characteristics ( $X_{sp}$ ).

**6.3.1. Measuring changes in the success of collaboration** The changes in the success of collaboration is measured by using superintendents' perception of the success of collaboration with other school districts in 2005-06 (Time 1) and in 2007 (Time 2). Both the first post-hurricane survey collected at Time 1 and the second post-hurricane survey collected at Time 2 asked superintendents to rate the degree of success that their district experienced in collaboration with other school districts. Each question is scored ranging from 1 (poor) to 4 (excellent). To measure changes in the success of collaboration, this study subtracts rates on the success of



collaboration at Time 1 from rates on the success of collaboration at Time 2. The distribution of the change of perceived collaboration success is shown in Table 6-1. About 33 percent of the sample responded that their level of collaboration success decreased over the period. About 48 percent of respondents perceived the same level of collaboration success between the two periods. About 19 percent of respondents rated a higher level of collaboration success as compared to the previous years.

Table 6-1 shows that there are only a few observations that indicate the level of collaboration success changed more than one level over the time period. Seven of them reported that the success of their collaboration decreased two or three levels. Likewise, another six of them perceived that the success of their collaboration increased two levels. Ordered probit regression will be employed to try to explain the reported changes. Extremely small observations in any of the categories make the analysis difficult.<sup>34</sup> Thus, it may be reasonable to combine all decreased levels of collaboration success into one category, “decrease” (=1) and all increased levels of collaboration success into the other category, “increased” (=3). In short, the dependent variable is transformed into three categories: “decrease” (=1) if the level of collaboration success decreased over years; “remain same” (=2) if the level of collaboration success remains same; and “increase” (=3) if the level of collaboration success increased. The distribution of the transformed dependent variable is presented in Table 6-2.

This form of measurement raises issues. Some criticize perceived performance measures because such measures may raise validity and reliability issues due to self-assessment bias (Andrews, Boyne, and Walker, 2006; Meier and O’Toole, 2010). For instance, Andrews, Boyne, and Walker (2006) measure four performance indicators (effectiveness, quality, quantity, and

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<sup>34</sup> Introduction to STATA. UCLA: Academic Technology Services, Statistical Consulting Group. from <http://www.ats.ucla.edu/stat/stata/dae/ologit.htm> (accessed August 12, 2011).

equity) using subjective survey items and objective data bases. They compare each subjective indicator with its corresponding objective indicator and find low and insignificant correlation between them. Meier and O'Toole (2010) review previous literature on this subject, and they also find no close correlation between subjective and objective performance in the Texas education context. Although they admit that citizens' perception of organizational performance is meaningful as feedback, managerial self-assessment on organizational performance is likely to be biased. Therefore, this study cannot rule out the possibility that the perceptual measure of the success of collaboration could be biased.

However, organizational performance is a very complex concept and no perfect measures of organizational performance exist. Andrews, Boyne and Walker (2006) contend that even objective measures of performance raise problems related to accuracy (Kim, 2010). They suggest, "no truly objective measures of public service performance exist" (p.30). Furthermore, Brewer (2006) contends that "organizational performance is a socially-constructed concept and all measures of performance are subjective" (p. 36). He argues that it is more likely in the public sector in which "competing views of reality exist and many important disputes are settled by election or mutual accommodation rather than by more objective or rational means" (p.36). Thus, managers' perception of collaboration success may be an important index.

Moreover, collaboration in this study aims to prepare for an emergency. After disastrous hurricanes in 2005, Texas did not experience such a serious emergency to test the performance of emergency-related collaboration. Thus, there is no archival way of measuring objective success of collaboration in preparation for emergencies. Under this situation, measuring the success of collaboration is inherently judgmental. This study uses a perceptual measure of collaboration success by admitting both the limitation of and the potential for the subjective measure.

### 6.3.2. Measuring Networking Partner Selection Scenarios

$X_{ps}$  is a vector of networking partner selection scenarios, and variables of  $X_{ps}$  are derived using two dichotomous variables – the intention measure and the activation measure. The intention measure is derived from the first post-hurricane survey. The survey asked if superintendents intended on sustaining regular contact with other school districts for the purposes of emergency preparation. The intention measure has a value of one if superintendents intended on sustaining regular contact with other school districts at Time 1; otherwise, it is coded as zero. The activation measure is derived from the second post-hurricane survey. The survey asked superintendents if they held regular meetings with other school districts. If they held regular meetings with other school districts at Time 2, the activation measure has a value of one; otherwise, it has a value of zero. By matching answers from the two dichotomous measures, the following measures are created: intended-and-activated regular meetings (Scenario I; yes to the intention measure and yes to the activation measure), not-intended-but-nonetheless-activated regular meetings (Scenario II; no to the intention measure and yes to the activation measure), intended-but-not-activated regular meetings (Scenario III; yes to the intention measure and no to the activation measure), and not-intended-and-not-activated regular meetings (Scenario IV; no to the intention measure and no to the activation measure). The number of observations falling in each category is presented in Table 6-3.

### 6.3.3. Control Variables

This study is based on two post-hurricane surveys, and the dependent variable is a change in managers' perceived success of collaboration in regard to emergency management. As a result, emergency-relevant variables should be controlled for. First, this study controls for the environmental shock ( $X_{es}$ ) – when school districts experienced emergencies. Experiencing an

emergency during the period when the survey was conducted (between Time 1 and Time 2) may influence managers' perceived success of collaboration in one way or another. To measure recent emergency experience, the second post-hurricane survey asked as follows:

Has your district faced an emergency that called for the activation of your district disaster/emergency plan in:

\_\_\_ past 6 months    \_\_\_ past year    \_\_\_ past two years    \_\_\_ Not in the past 2 years

The variable is categorical ranging from 1 to 4 where 1 denotes no emergency in the past 2 years and 4 refers to emergency occurred in past 6 months. The mean of this variable is 1.93 with a standard deviation of 1.10.

$X_{rs}$  is a vector of resources that may be of help for superintendents in collaborating with other school districts. Resources in this model include the percentage of central administrative staff and a district's total expenditure aside from that used for central administration. Central administrators support superintendents by assisting with their districts' managerial issues other than school-level day-to-day operations (Meier, O'Toole and Hicklin, 2010); thus, more central administrators may help enhance the success of collaboration in emergency management. Another resource that might be of help for collaboration success is districts' total expenditure except the expenditure on central administration. The collaboration examined in this study is voluntary. Given a fixed budget, a district may give up some amount of expenditure in some particular areas in order to maintain and enhance collaboration. The current data from the TEA website do not clearly identify expenditures devoted for collaboration. Instead, this study controls for total expenditure. Although the exact amount of expenditure spent on collaboration is not known, districts with more total expenditure may have more chances to spend more money on voluntary collaboration in regard to emergency management. The percentage of central

administration and the expenditure in central administration are highly correlated.<sup>35</sup> Therefore, the total expenditure in this model excludes expenditures for central administration.<sup>36</sup>

Lastly, a superintendent's characteristics ( $X_{sp}$ ) are controlled. They include a superintendent's demographic information such as gender, race, and age. It also includes a superintendent's base pay. A superintendent's base pay is skewed to the right, and in order to correct the skewness, a natural logarithmic transformation is taken on a superintendent's base pay.

#### 6.4. Method

The dependent variable in this study has three ordered categories (decreased, remained same, and increased), and an ordered probit regression analysis is an appropriate method to estimate such an ordinal variable (Long and Freese 2006). In order to conduct an ordered probit regression analysis, the proportional odds assumption that the relationship between all pairs of outcome groups is the same has to be satisfied.<sup>37</sup> This assumption enables one set of coefficients for each explanatory variable to describe the odds of the dependent variable being changed from one category to another. Using STATA 12, this study conducted the approximate likelihood-ratio test of proportionality of odds across response categories, and it was found that the analyses satisfied the assumption. In summary, an ordered probit regression analysis is an appropriate model. In order to interpret the results more easily, this study adopts the MEOPROBIT method that Cornelissen (2006) suggests. According to Cornelissen, the MEOPROBIT method re-estimates the results from ordered probit analysis in order to compute marginal probability

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<sup>35</sup> The correlation is .551 with a p-value of .000.

<sup>36</sup> Controlling for total expenditure with or without expenditure in central administration does not significantly affect overall regression results.

<sup>37</sup> Introduction to STATA. UCLA: Academic Technology Services, Statistical Consulting Group. available at <http://www.ats.ucla.edu/stat/stata/dae/ologit.htm> (accessed August 12, 2011).

estimates (Moynihan and Pandey 2010). As a result, interpreting estimates via the MEOPROBIT method is similar to the coefficients after ordinary least-squares analysis: a one-unit change in the explanatory variable increases a mean change on the predicted variable (Moynihan and Pandey 2010).

## 6.5. Analytic Results

Table 6-4 presents the analytic results. Model 1 estimates all 180 superintendents in the sample. Model 2 and Model 3 estimates partitioned sub-samples: the sample in Model 2 estimates 120 superintendents who had had regular meetings with other school districts at Time 1 and the sample in Model 3 estimated 60 superintendents who had not had regular meetings with other school districts at Time 1. In all three models, holding all other variables constant, intended-and-activated networking and not-intended-but-nonetheless-activated networking brings consistently higher marginal effects as compared to intended-but-not-activated networking.<sup>38</sup> As stated earlier in this chapter, collaboration is an interaction with a lower level of intensity while networking requires a higher commitment between two parties. Therefore, the success of collaboration between two parties can be measured and estimated even if they do not network with each other. In Model 1, superintendents of intended-and-activated networking and superintendents of not-intended-but-nonetheless-activated networking results in .407 and .657 increase in the 3-point changes in the success of collaboration use scale, respectively, as compared to superintendents of the intended-but-not-activated networking. Although the magnitudes of intended-and-activated networking and not-intended-but-nonetheless-activated networking are different, both variables positively influence the success of collaboration. It implies that networking, or regular meetings, is a significant predictor that drives the success of

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<sup>38</sup> Intended-but-not-activated networking is a baseline in this analysis.

collaboration. Between intended-and-activated networking and not-intended-but-nonetheless-activated networking, the marginal effects for not-intended-but-nonetheless-activated networking are found to be higher than the marginal effects for intended-and-activated networking across three models. Lastly, the findings reveal that not-intended-and-not-activated networking is not statistically significant in all models.

These findings may imply that a manager is better off when activating networking with a candidate who takes the initiative for the networking between them. They also suggest that networking with a certain party that a manager originally intends to activate brings a positive impact on the success of collaboration, but the failure of activating the intended networking can cause a negative impact.

Control variables play different roles based on the sample characteristics. First, Model 1 and Model 2 show that superintendents who have a higher salary are likely to lead to a positive impact on collaboration success. Considering that a superintendent's pay is determined by various factors such as human-capital factors (level of education or length of service) or a district's characteristics (size or financial status), it is not an easy task to figure out what aspects of salary increase the success of collaboration, but the finding shows that salary is a significant predictor for the success of collaboration. However, the association between salary and the success of collaboration is not statistically significant in Model 3, which samples superintendents who did not have regular meetings with other school districts at Time 1.

Age is another good predictor for the success of collaboration with other school districts. The findings in Model 1 and Model 3 show that older superintendents are less likely to be successful at changing the level of success of collaboration. However, it is not supported for those who had regular meetings at Time 1.

Findings also reveal that white superintendents are likely to improve the success of collaboration with other school districts as compared to non-white superintendents. However, it is not supported in Model 2.

Most control variables that are found statistically significant in Model 1 are statistically significant either in Model 2 or Model 3 as well. However, Model 2 finds that total expenditure except central administration negatively influences the success of collaboration while Model 3 finds that a female superintendent is more likely to result in collaboration success. As for the percentage of central administrators, Model 1 finds no statistically significant impacts. However, Model 2 finds more central administrators brings a statistically significant and positive impact on the success of collaboration with other school districts, while Model 3 finds the opposite impact.

All these mixed results for control variables may be related to whether superintendents had regular meetings with other school districts at Time 1. Table 6-5 presents an ordered probit regression analysis controlling for regular meetings with other school districts at Time 1. The main independent variables show similar impacts as the previous analyses: both intended-and-activated regular meetings and not-intended-but-nonetheless-activated regular meetings are positive with not-intended-but-nonetheless-activated regular meetings being greater. However, whether superintendents had regular meetings with other school districts at Time 1 does not statistically influence the change of collaboration success with other school districts. Meanwhile, results show that statistical powers of all control variables are similar to those in Model 1 in Table 6-4.



These findings suggest that control variables are systematically different between two groups, but the independent variables of interest are robust and not affected by whether superintendents had had regular meetings with other school districts at Time 1.

In summary, the findings above suggest that intended-and-activated networking and not-intended-but-nonetheless-activated networking have a positive impact on the success of collaboration. Furthermore, marginal effects of not-intended-but-nonetheless-activated networking are greater than those of intended-and-activated networking. It may suggest to the readers that the best strategy for managers when selecting partners is to wait until the other partner comes to the managers for networking. However, is it really so? Although managers of not-intended-but-nonetheless-activated networking are better off, if the possibility of such occurrence is rare, it may not be an optimal case for managers. In fact, the sample of this study shows that the actual number of superintendents that held the not-intended-but-nonetheless-activated regular meetings is few. As shown in Table 6-3, out of 180 superintendents in the sample, only 12 superintendents (6.7 percent) held the not-intended-but-nonetheless-activated regular meetings. About 33 percent of superintendents ( $n=59$ ) in the sample had the intended-and-activated networking. This result suggests that the strategy of the not-intended-but-nonetheless-activated networking may bring the highest utility but it is unlikely; thus, it is not a good strategy for managers.

Table 6-6 computes and compares expected values between intended-and-activated networking and not-intended-but-nonetheless-activated networking. Expected value refers to “the weighted average of their outcomes” (Kahneman 2003. 703), and it is derived by multiplying its utility and the probability of its occurring. According to Kaya and Kahraman (2011), the principle of expected utility maximization states that among a set of competing

alternative choices, a rational decision maker chooses a decision which will maximize his/her expected utility. The expected values in Table 6-6 are outcomes of marginal effects multiplied by the number of each case out of the sample. Considering the definition of the expected values, the values in Table 6-6 are not exact expected values per se. Although the marginal effects represents the utility for each networking case, the probabilities of each scenario are not completely random; rather, it represents how superintendents in the sample already behaved at the particular period that surveys were conducted. Thus, the result in Table 6-6 is not generalizable. However, the findings may help to assess superintendents in the sample in terms of their decision-making. Based on the result, this study may draw an implication about how managers make decisions when they select collaboration partners.

The comparison of expected values for intended-and-activated regular meetings and for not-intended-but-nonetheless-activated networking in Table 6-6 shows different stories compared to the regression results in Table 6-4 and Table 6-5. The regression results show that not-intended-but-nonetheless-activated regular meetings bring higher marginal effects on the change of the perceived success of collaboration than intended-and-activated regular meetings. However, as shown in Table 6-6, the expected value for intended-and-activated regular meetings ( $=.113$ ) is higher than the expected value for not-intended-but-nonetheless-activated regular meetings ( $=.044$ ). In other words, as compared to the effect size of not-intended-but-nonetheless-activated regular meetings, intended-and-activated regular meetings have lower positive impacts on the perceived change in the level of collaboration success. However, considering the likelihood of each networking, it is a better strategy for managers to actively search for a networking partner and activate networking with that partner.

## 6.6. Summary

This chapter estimates superintendents' perceived change in their level of collaboration success with other school districts with four scenarios of networking partner selection. Using a dichotomous intention of regular contact measure at Time 1 and a dichotomous activation of regular meetings measure at Time 2, four networking partner selection variables are generated. Using intended-but-not-activated regular meetings as a baseline, this study finds that not-intended-but-nonetheless-activated regular meetings results in the highest positive impacts on change in the success level of collaboration, while intended-and-activated regular meetings is the second highest.

However, the scenario of not-intended-but-nonetheless-activated regular meetings is unlikely. Out of 180 superintendents in the sample, only a few superintendents had such regular meetings. The expected values of intended-and-activated regular meetings and not-intended-but-nonetheless-activated regular meetings in the sample show that although the marginal effect of not-intended-but-nonetheless-activated regular meetings is higher than that of intended-and-activated regular meetings, the scenario of intended-and-activated regular meetings has a higher expected value than the scenario of not-intended-but-nonetheless-activated regular meetings. This result reveals that managers would be better off when they actively search the potential networking partners and to get their networking activated.

Although this study is one of the first studies that investigate decision making in partner selection and its impact on the success of collaboration, it has some limitations. First, the success of collaboration is a perception measure, and success of collaboration relying on one's perception may not be an ideal measure. However, there is no archival way to objectively

measure the success of collaboration; as a result, the perceptual measure is the best available alternative for assessing the success of collaboration at this point.

In addition, as stated earlier, this study could investigate partner selection and its impact in the change of success of collaboration with 1) police, fire department, and first responders, 2) government relief and welfare organizations, 3) nonprofit and relief organizations, 4) local/community/religious organizations, 5) other school districts, and 6) business organizations. If theories hold, hypotheses that this study proposes could have been tested for all six external organizations. However, only the model investigating the change of success of collaboration with other school districts has statistically significant goodness-of-fit. In other words, given independent variables of interest and control variables are jointly insignificant for the other five models. Different characteristics of external organizations may cause such differences. However, with the given data, it is not certain. In order to ensure external validity, future research in different policy contexts should follow.

Lastly, a few assumptions are made to describe each scenario. However, this study admits that each assumption may not hold in the real world. As a result, each decision-making scenario may not just be the way this study describes. Therefore, arguments and findings from this study require careful applications to management in the real world.

Table 6-1. Distribution of Collaboration Success Changes

Dependent Variable: Change in Collaboration Success	Freq.	Percent	Cum.
-3	2	1.11	1.11
-2	5	2.78	3.89
-1	52	28.89	32.78
0	87	48.33	81.11
1	28	15.56	96.67
2	6	3.33	100.00
Total	180	100	

Table 6-2. Transformed Collaboration Success Changes

Dependent Variable: Change in Collaboration Success	Freq.	Percent	Cum.
Decrease	59	28.89	32.78
Remain Same	87	48.33	81.11
Increase	34	18.89	100
Total	180	100.00	

Table 6-3. Counts of Partner Selection Scenarios

		Intended on Sustaining Regular Contact with Other School Districts ('05-'06)		
		Yes	No	Sum
Holding Regular Meeting with Other School Districts ('07)	Yes	59	12	71
	No	90	19	109
	Sum	149	31	180

Table 6-4. Ordered Probit Regression of Changes in the Success of Collaboration with Other School Districts

Dependent Variable: Changes of the Success of Collaboration w/ Other School Districts VARIABLES	Model 1 (Whole Sample)		Model 2 (Sub-Sample 1 <sup>+</sup> )		Model 3 (Sub-Sample 2 <sup>++</sup> )	
	Raw Coefficient	Marginal Effects	Raw Coefficient	Marginal Effects	Raw Coefficient	Marginal Effects
Intended and Activated Regular Meeting w/ Other School Districts	0.677*** (0.200)	0.407	0.623*** (0.234)	0.375	1.600*** (0.533)	0.752
Not-intended but Activated Regular Meeting w/ Other School Districts	1.121*** (0.401)	0.657	0.982* (0.511)	0.587	2.056*** (0.790)	0.930
Not-intended and Not-activated Regular Meeting w/ Other School Districts	0.421 (0.294)	0.255	0.063 (0.452)	0.038	0.372 (0.454)	0.176
Emergency Plan Activated within a Year	-0.020 (0.091)	-0.012	-0.170 (0.111)	-0.103	0.305 (0.198)	0.144
% Central Administration	0.134 (0.142)	0.080	0.351* (0.179)	0.212	-0.528* (0.309)	-0.250
Total Expenditure per Pupil (logged; except central administration)	-0.228 (0.405)	-0.137	-1.126** (0.571)	-0.679	-0.103 (0.802)	-0.049
Superintendent's Salary (logged)	0.669** (0.289)	0.402	1.384*** (0.418)	0.835	-0.323 (0.477)	-0.153
Female Superintendent	0.209 (0.227)	0.127	-0.093 (0.291)	-0.056	0.979** (0.462)	0.464
White Superintendent	0.602* (0.326)	0.344	0.540 (0.426)	0.311	1.176* (0.623)	0.538
Superintendent's Age	-0.030** (0.013)	-0.018	-0.019 (0.016)	-0.011	-0.080*** (0.028)	-0.038
Constant	4.575 (4.788)		5.175 (6.257)		-8.008 (9.190)	
Constant	6.042 (4.797)		6.625 (6.266)		-5.966 (9.156)	
Observations	180		120		60	
Pseudo R-squared	0.075		0.094		0.258	

+Sample of superintendents who had had regular meetings with other school districts at Time 1

++Sample of superintendents who had not had regular meetings with other school districts at Time 1

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1



Table 6-5. Ordered Probit Regression of Changes in the Success of Collaboration with Other School Districts

VARIABLES	Raw Coefficient	Marginal Effects
Intended and Activated Regular Meeting w/ Other School Districts	0.744*** (0.207)	0.446
Not-intended but Activated Regular Meeting w/ Other School Districts	1.115*** (0.401)	0.652
Not-intended and Not-activated Regular Meeting w/ Other School Districts	0.382 (0.295)	0.231
Regular Meeting w/ Other School Districts	-0.281 (0.201)	-0.169
Recent Emergency Plan Activation	-0.025 (0.092)	-0.015
% Central Administration	0.151 (0.143)	0.090
Total Expenditure per Pupil (logged; except central administration)	-0.395 (0.424)	-0.237
Superintendent's Salary (logged)	0.736** (0.293)	0.442
Female Superintendent	0.206 (0.228)	0.124
White Superintendent	0.636* (0.328)	0.361
Superintendent's Age	-0.029** (0.013)	-0.017
Constant	3.749 (4.825)	
Constant	5.225 (4.832)	
Observations		180
Pseudo R-squared		0.081

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 6-6. Expected Value of the Scenarios

	Intended and Activated Networking	Not-intended and Activated Networking
Utility (Marginal Effects)	0.407	0.657
Probability (Frequency of Each Case in the Sample)	0.328	0.067
Expected Value	0.133	0.044

## **CHAPTER 7**

### **CONCLUSION**

In this concluding chapter, principal findings of this study will be summarized. Then, based on these findings, implications for public administration and public management will be suggested. Although this study has touched some important aspects of networking research, it still has limitations; thus, this chapter will examine those as well, and suggest how future research can resolve them.

#### **7.1. Summary of the Findings**

This study consists of three parts: consequences of collaborative networking in an emergency context and in a post-emergency context, determinants of the activation of new networking, and four possible scenarios of networking partner selection and their impact on the success of collaboration. The following subsections will summarize findings of each part.

##### **7.1.1. Findings: Consequences of Collaborative Networking**

This study first examined the effects of networking with respect to preparedness in an emergency context and a post-emergency context using Hurricane Rita's impact on Texas school districts. In an emergency context, organizational recovery is operationalized by the number of days that school districts canceled their classes due to Hurricane Rita. Delays of school closure represent slow organizational recovery, which is poor organizational performance from an emergency management perspective. Previous literature contends that environmental shocks influence organizational performance (O'Toole and Meier 1999), and this impact of such shocks applies to

an emergency context as well; in this case, the severity of the hurricane represents an environmental shock, and it influences organizational recovery in an emergency context. In order to measure the severity of Hurricane Rita, this study used the hurricane's wind forces and districts' location from the coast. As expected, the severity of the hurricane was found to be highly associated with the delay of school reopening: the more severely Hurricane Rita hit school districts, the longer school districts canceled classes.

This study hypothesized that networking with emergency-relevant external organizations in preparation for emergencies can relieve the negative impacts of a disruptive emergency on organizational recovery and speed the restoration of an organization's normal functions. To test the hypothesis, this study used the number of superintendents' regular meeting partners and their level of resource sharing in preparation for emergencies as measures of networking. The results found that even after controlling for the severity of Hurricane Rita, school districts with superintendents who had had more regular meeting partners and had a higher level of resource sharing were likely to re-open classes faster.

In addition to the research on the impact of networking in an emergency context, this study further investigated the impact of networking in a post-emergency situation. First, based on Meier, O'Toole, and Hicklin's (2010) research, this study estimated the negative impact of days of school closure on averaged students' test performance. The analysis showed that school districts' academic performance on a key standardized exam was lower if they had more days of school closure in the previous year. Given the negative relationship between days of school closure and test performance, this study investigated networking's moderating role. The analysis found that the number of regular meeting partners in preparation for emergencies does not directly influence students' test performance, but does moderate the negative impacts of days of

school closure on test performance. This finding supports the O'Toole-Meier model (1999) that argues that managerial networking can buffer organizational performance from environmental shocks.

Both analyses, of emergency contexts and non-emergency contexts, reveal that environmental shocks negatively affect the organizational performance, but the latter can be managed or at least the size of negative shocks can be mitigated, as managers interact with emergency-relevant external organizations. In this sense, this study confirmed the original purpose of the study: to see if management matters for organizational performance.

#### 7.1.2. Findings: Determinants of the Activation of New Networking

Some scholars have emphasized networking in public administration (O'Toole 1997), and quite a number of studies have investigated the effects of networking on organizational performance (Andrews and Boyne 2010; Choi and Rainey 2010; Ingraham, Joyce, and Donahue 2003; Klinjn, Steijn and Edelenbos 2010; Moyhinian and Pandey 2005; Meier and O'Toole 2010; Milward and Provan 1998; Nicholson- Crotty and O'Toole 2004; O'Toole and Meier 1999, 2003, 2011; Schalk, Torenvlied, and Allen 2010). Unlike the emphasis on the consequences of networking, only a few studies have investigated determinants of the activation of new networking (see Andrew et al. 2010; Fleishman 2009; Gazley 2008; Krueathep, Riccucci, and Suwanmala, 2010).

This study has taken three approaches to estimate the probability that managers activate new networking: individual, organizational, and environmental approaches. At the individual level, this study found that managers' salary was a good predictor. Managers' salary (for superintendent in this study) is determined by various factors such as human-capital factors, organizational characteristics, or managerial quality. The present study cannot precisely determine which aspects of salary influenced the activation of new networking. In addition to

superintendent's salary, this study finds an inverted-U shaped relationship between age and the likelihood of activating new networking. In other words, as superintendents are getting older, they are more likely to activate new networking with government relief and welfare organizations, but the likelihood of their doing so decreases as superintendents' age exceeds a certain point. Lastly, and contrary to expectation, managers' race and gender did not contribute to an explanation of the probability of activating new networking.

At the organizational level, this study investigated the role of organizational capacity and organizational size. The measure of organizational capacity – the percentage of central administrative staff and the quality of emergency plan – were found to have statistically significant effects. That is, organizations with more capacity to manage their environment are less likely to rely on external organizations; as a result, they are less likely to activate new networking. In addition, and contrary to the hypothesis, organizational size measured by the number of enrolled students and the amount of total operating expenditure per pupil are not found to be statistically significant.

Lastly, managers' perceived likelihood of experiencing emergencies in the future and their level of dependence on external organizations' resources were used as environmental factors. Results revealed that as managers perceive more environmental uncertainty, they are more likely to activate new networking. In addition, the present study found that an organization's dependence on external organizations' resources increases the likelihood of activating new networking.

#### 7.1.3. Findings: Networking Partner Selection and its Impact on the Success of Collaboration

Most research on networking has investigated networking that has been ongoing, and little focuses on the process of networking partner selection. This study proposed four possible

scenarios of networking partner selection. To develop the four scenarios, this study used two dimensions of partner selection: one's intention to network with a certain party at Time T and one's actual activation of networking with that party at Time T+1. Based on these two dimensions, this study proposed intended-and-activated networking, not-intended-but-nonetheless-activated networking, intended-but-not-activated networking, and not-intended-and-not-activated networking.

Using intended-but-not-activated networking as a base line, this study estimated the change in perceived success of collaboration. As hypothesized, both intended-and-activated networking and not-intended-but-nonetheless-activated networking resulted in a positive impact on the change of success of collaboration. However, not-intended-and-not-activated networking was found to be statistically insignificant. Between intended-and-activated networking and not-intended-but-nonetheless-activated networking, not-intended-but-nonetheless-activated networking showed a higher influence on the change of success of collaboration than intended-and-activated networking.

However, from the sample, it was found that the case of not-intended-but-nonetheless-activated networking was unlikely. Adopting the idea of expected value, this study computed expected values of each case by multiplying the marginal effects and the frequency of each networking. It revealed that although the marginal effect of not-intended-but-nonetheless-activated networking was higher than that of intended-and-activated networking, intended-and-activated networking showed higher expected values. In other words, it is better for managers to actively search for a potential, beneficial networking partner and activate networking with that partner, despite the fact that searching for the right partner generates costs in time and effort.

## 7.2. Implications for Public Administration and Public Management

### 7.2.1. Implications: Consequences of Collaborative Networking for Organizational Performance

This study found that organizational performance is heavily influenced by environmental shocks. Performance of public organizations is directly linked to the quality of life of the public, and the public, therefore, bears burdens when public organizations fail. Therefore, public administration has to manage environmental shocks effectively.

Some environmental shocks are predictable, or the size of such shocks is small. In such cases, managing the environment may be relatively easy. However, it is a different story when organizations face environmental shocks such as a natural disaster – a random event that can have a massive impact. Recent disasters such as Hurricane Katrina and Hurricane Rita have attracted attention to emergency management, but studies of emergency management in public administration are yet to be intellectually and practically mature (Farazmand 2007). Unlike some government programs such as Medicare or Medicaid, the beneficiaries of emergency management are not clear in advance; in other words, emergency management may be directed at many and unspecified persons who may or may not suffer from unexpected potential emergencies. The public as well as administrators cannot evaluate the actual performance of emergency management unless they actually experience emergencies. In this sense, management in preparation for unexpected emergencies may be economically and stochastically inefficient. Although emergency management has received quite a lot of support since 9/11, generally emergency management has met with a lack of political and fiscal support due to apathy among citizens (Briechle 1999; Choi 2008). Although emergency preparedness is inefficient in a certain sense, public administration should not take a narrow economizing approach, because government is responsible for protecting its citizens against emergencies. Accordingly, public



administration should treat emergency management seriously.

Among other strategies, recent studies of emergency management have emphasized networking between governmental and non-governmental actors (Comfort 1999; Kapucu 2008; Kapucu, Arslan, and Demiroz 2010; Kapucu, Augustin, and Garayev 2009; McGuire and Silvia 2010; Waugh and Streib 2006). There are a few incentives to use networking as an emergency management strategy. First, few single organizations can manage massive environmental shocks such as a natural disaster. Fire departments used to be the main organization to manage a natural disaster (Erickson 1999), but as Hurricane Katrina showed, massive environmental shocks need to be managed by multiple organizations. Second, although environmental shocks should be managed to improve organizational performance, an organization should not spend most of its resources on managing environmental shock, especially when the shocks are random and massive. Rather, it is a better strategy to share risks with other organizations by networking. Networking enables organizations to realize economies of scale so that they may be able to manage their environment with less cost and effort while achieving desired outcomes. In summary, public administration and public management should give more attention to networking in order to manage environmental shocks.

#### 7.2.2. Implications: Determinants of the Activation of New Networking

Recent public problems have become so complex that a single organization is unable to fully or effectively resolve them. As a result, organizations are expected to form networks to manage public problems together. However, activating new networking varies among organizations or managers; some organizations or managers have more networking ties than others. What causes such differences? This study explored this question at three levels— individual, organizational and environmental levels.

At the individual level, the present study found statistical relationships between superintendents' salary and age and the likelihood of activating new networking. Considering that human resource management in the public sector emphasizes fairness, it is hard to derive implication from findings in this study regarding human resource management. However, it may be a useful note that superintendents with more salary are more likely to activate new networking while superintendents' age and the likelihood of activating new networking is an inverted U-shaped relationship; therefore, one is more likely to activate new networking as he/she gets older, but after a certain age, aging decreases the likelihood of activating new networking.

An implication from this study is the need to manage organizational capacity effectively. Findings reveal that organizations with more organizational capacity may have less likelihood to activate new networking. Both obtaining organizational capacity and expanding networks generate costs. Keeping these findings in mind, one may want to compare the costs for enhancing organizational capacity and the costs for activating new networking. Based on comparison of the costs, one can strategically choose to put efforts and resources on either improving organizational capacity or activating new networking.

#### 7.2.3. Implications: Networking Partner Selection and its Impact on the Success of Collaboration

Decision making is a complex process, and decision making on networking partner selection is even more difficult because it results from mutual agreements between a decision maker and his/her counterparts. Therefore, networking partner selection is the result of very complex processes. The present study proposes four possible scenarios when one makes decisions about selecting potential networking partners. Based on costs for searching and activating new networking and benefits from the networking, the case that managers activate networking with beneficial outsiders who first propose networking to managers before managers propose it may

be regarded as the best case. It is because managers could save the cost of searching for potential networking partners while obtaining benefits from the networking. However, this case is unlikely in the real world unless the manager or the organization has special advantages such as reputation or resources. The sample from the present study revealed that it was more likely to happen that managers activated networking with those whom they originally intended to network, and that networking resulted in the success of collaboration. Therefore, managers would be better off to actively search potential beneficial networking partner candidates. At this point, a careful study needs to be completed. Although networking with partners that one originally intended to network with is more likely to occur, it is also possible that one fails to activate networking with those intended partners. If the latter case occurs, one will have the worst outcome: failure of networking and resource waste. Therefore, if managers intend to network with a certain party, it is better for them to do their best to activate that networking.

### 7.3. Limitations of This Study and Suggestions for Future Research

#### 7.3.1. Limitations and Future Research: Consequences of Collaborative Networking

This study explored the effects of networking on organizational recovery and organizational core tasks after an emergency. In order to measure superintendents' networking, the survey listed the six most emergency-relevant external organizations as follows: 1) police, fire department, and first responders, 2) government relief and welfare organizations, 3) nonprofit and relief organizations, 4) local/community/religious organizations, 5) other school districts, and 6) business organizations. Then, the survey asked superintendents to check all that they had regular meetings with. These six types of external organizations are emergency-relevant, but this type of networking measure may be limited for the following reasons.

First, by limiting networking partners to six types, the survey failed to take into account other networking partners that superintendents might use for emergency preparedness purposes. It is likely that measuring one's networking ties by listing external organizations in the survey and asking a respondent to choose all that apply cannot capture the whole network that a respondent actually holds; as a result, the missing part of the whole network that a respondent uses to prepare for emergencies might be ignored.

Second, the survey failed to specify precise organizations that superintendents had networked with by categorizing types of external organizations. For instance, the survey asked if superintendents held regular meetings with government relief and welfare organizations. Some superintendents who answered yes to this question may have regular meetings with only one organization while others may have multiple. The number or quality of government relief and welfare organizations that superintendents interacted with may result in different outcomes, but the survey failed to capture such variation.

This study uses secondary data. As a result, the limitation noted above cannot be managed. For better network studies, future research should account for this limitation. One solution could be asking questions about networking ties in an open-ended fashion so that respondents could list all external organizations that they network with. In doing so, researchers can draw a whole ego-network.

This study uses a geographic information system (GIS) to control for the severity of Hurricane Rita. It is one of few attempts in the research literature to utilize GIS techniques in public administration. However, GIS techniques have great potential in public administration research because geographic information can explain the physical environment of the organization that can influence organizational performance. For instance, this study investigated

the variation of days of school closure using networking as a main variable of interest. Without geographic information, all school districts that had the same period of school closure might have been treated as the same regardless of a hurricane's influence. This could cause a serious omitted variable problem. For future research, GIS needs to be used whenever geography can play a significant role in one's model. In this sense, this study proposes future research that combines spatial analysis of an emergency with public management. For instance, investigating the route of infection of H1N1 flu, and managerial efforts to prepare for and respond to the infection, would be an interesting research topic.

#### 7.3.2. Limitation and Future Research: Determinants of the Activation of New Networking

Studies on the determinants that motivate one to activate new networking are rare, although the consequences of networking have been studied by many scholars. To fill this gap, this study proposed determinants of the activation of new networking by examining factors at individual, organizational, and environmental levels. However, this study may not suggest a complete framework to understand the determinants of the activation of new networking. To make a more refined framework, future research has to be done.

Particularly, the survey listed six emergency-relevant external organizations and asked superintendents if they had regular meetings with each of six organizations. This question can generate six dichotomous dependent variables, which allows this study to construct six independent models to explore the activation of new networking. However, this study found that only three models had a statistically significant goodness-of-fit. Moreover, findings from these three models were not consistent. What caused these issues still remains as a question. As stated earlier, it may be due to failure of controlling for different characteristics of organizational type. Organizational characteristics were not accounted for due to limitations of the data, and to

resolve this limitation, future research needs to be conducted with more complete data having information about the characteristics of organizations in different policy/management contexts (e.g., delivery of mental health service through networks).

### 7.3.3. Limitation and Future Research: Networking Partner Selection and its Impact on the Success of Collaboration

This study proposed four scenarios of networking partner selection using an intention measure at Time T and an activation measure at Time T+1. In order to draw each scenario, this study suggested five assumptions as shown in Table 7-1. However, if any of the assumptions is violated, the suggested scenarios do not work. Future research needs to confirm the validity of such assumptions. For instance, the fifth assumption assumes that transaction costs for a particular action are the same for all scenarios. Future research may want to actually measure transaction costs that are generated for 1) self-evaluation, 2) the attempt to activate collaboration, and 3) the process of activation, and control for them in the model.

This study used the change of perceived success of collaboration with other school districts as a dependent variable. As stated earlier, a perception measure as a dependent variable raises issues, although no other archival ways to measure the objective success of collaboration are available at this point. Future research should test the impact of each scenario using objective dependent variables if available.

Furthermore, the survey asked superintendents how successful their collaboration was when they collaborated with 1) police, fire department, and first responders, 2) government relief and welfare organizations, 3) nonprofit and relief organizations, 4) local/community/religious organizations, 5) other school districts, and 6) business organizations. This question generates six dependent variables which allow this study to estimate six independent models. However, results

revealed that only the model that estimated the success of collaboration with other school districts showed a statistically significant goodness-of-fit. At this point, this study cannot identify what causes such results. To confirm that the model itself is robust, future research should be followed in a different context.

Lastly, four scenarios this study suggests may not function in the real world as they are described in this study. Some assumptions that build each scenario may not hold in the real world. Thus, application of findings to management in the real world should be taken carefully, and more research needs to be conducted to develop the ideas of networking partner selection.

#### 7.4. Conclusion

Public problems are becoming more complex, and it is often infeasible or inefficient for a single public organization to resolve them. Scholars as well as practitioners find a better way of dealing with such complex problems from networks involving multiple, relevant external organizations. Therefore, scholarly work should give more attention to managing networks and network participants.

The present study explored three research questions: 1) consequences of collaborative networking; 2) determinants of collaborative networking; and 3) networking partner selection and its impact on the success of collaboration. In doing so, this study confirmed the positive and important role of networking in order to improve organizational performance. Further, this study investigated managers' networking behavior and suggested strategic networking partner selection.

All findings from this study suggest that collaborative public management matters for organizational performance. Although findings from the present study as well as previous

literature agree that networks and networking should be treated seriously, current scholarly findings are not enough, and more research on public management networks and network management behaviors should be conducted. This study suggests that findings, limitations, and implications as well as suggestions for future research offered here can contribute to the ongoing study of public administration.



Table 7-1. Assumptions for Networking Partner Selection Scenario

Assumption 1	A collaborative networking partner in each scenario is expected to bring positive net benefits to the ego.
Assumption 2	The ego does not have full information of whether or not a collaborative networking partner candidate finds any positive net benefits from the collaboration with the ego.
Assumption 3	The effects of collaborative networking with a certain collaborative networking partner candidate on organizational performance are the same regardless of how the collaborative networking is activated.
Assumption 4	There are only three transaction costs and each scenario will generate transaction costs involving a combination of the following three types: transaction costs for 1) self-evaluation, 2) the attempt to activate the collaboration, and 3) the process of activation.
Assumption 5	Transaction costs for a particular action are the same for all scenarios.

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## APPENDICE

### Appendix I. Hypotheses

1	A manager's collaborative networking in preparation for the emergency may speed an organization's recovery after the emergency.	Model 1
2	The length of school closure resulting from the emergency negatively influences academic performance.	Model 2
3	Collaborative networking in preparation for the emergency moderates the negative impact of school closure on academic performance.	Model 2
4	Managers who earn higher salaries are more likely to activate new networking.	Model 3
5	Managers of racial/gender minority are less likely to activate new networking.	Model 3
6	Managers' age may be associated with the activation of new networking.	Model 3
7	Managers in organizations with abundant internal capacity to buffer environmental shocks are less likely to activate new networking.	Model 3
8	Organizational size may be associated with the activation of new networking.	Model 3
9	As managers share resources with a certain organization's resources, they are more likely to activate new networking with that particular organization.	Model 3
10	When managers perceive a high level of environmental uncertainty, they will be more likely to activate new networking to respond to it.	Model 3
11	The effect of activated networking with a certain candidate on an ego's organizational performance is highest if networking with a certain candidate is not activated by the ego (Scenario II).	Model 4
12	The impact of networking with a certain candidate is second highest, if the ego intends to activate networking with that candidate, and that networking later does occur (Scenario I).	Model 4
13	The impact of networking with a certain candidate on an ego's organizational performance is lowest if the ego intends to activate networking with that candidate, which does not then occur (Scenario III).	Model 4
14	The impact of networking with a certain candidate is second lowest, if networking, which the ego does not intend to activate, does not occur (Scenario IV).	Model 4

## Appendix II. Survey Items to Measure Dependent Variable

#	Questionnaire	Source																																			
1	How many days did your district have to cancel (to evacuate for Hurricane Rita or because of the damage caused by Hurricane Rita)?	The first post-hurricane survey																																			
2	With which of these groups do you hold regularly scheduled meetings for purposes of preparing for emergencies or disasters? ____ police, fire, and first responders    ____ non-profit/relief organizations (i.e. Red Cross) ____ other school districts    ____ government relief/welfare organizations ____ business organizations    ____ local/community/religious organizations	The second post-hurricane survey																																			
3	Rate the success of your collaboration with the following groups. (please check one) <table><thead><tr><th></th><th>Poor</th><th>Fair</th><th>Good</th><th>Excellent</th></tr></thead><tbody><tr><td>Police, Fire, and First Responders</td><td>____</td><td>____</td><td>____</td><td>____</td></tr><tr><td>Non-Profit/Relief Organizations</td><td>____</td><td>____</td><td>____</td><td>____</td></tr><tr><td>Other School Districts</td><td>____</td><td>____</td><td>____</td><td>____</td></tr><tr><td>Government Relief/Welfare Organizations</td><td>____</td><td>____</td><td>____</td><td>____</td></tr><tr><td>Business Organizations</td><td>____</td><td>____</td><td>____</td><td>____</td></tr><tr><td>Local/Community/Religious Organizations</td><td>____</td><td>____</td><td>____</td><td>____</td></tr></tbody></table>		Poor	Fair	Good	Excellent	Police, Fire, and First Responders	____	____	____	____	Non-Profit/Relief Organizations	____	____	____	____	Other School Districts	____	____	____	____	Government Relief/Welfare Organizations	____	____	____	____	Business Organizations	____	____	____	____	Local/Community/Religious Organizations	____	____	____	____	The first and second post-hurricane survey
	Poor	Fair	Good	Excellent																																	
Police, Fire, and First Responders	____	____	____	____																																	
Non-Profit/Relief Organizations	____	____	____	____																																	
Other School Districts	____	____	____	____																																	
Government Relief/Welfare Organizations	____	____	____	____																																	
Business Organizations	____	____	____	____																																	
Local/Community/Religious Organizations	____	____	____	____																																	

### Appendix III. Survey Items to Measure Independent Variables

#	Questionnaire	Source
1	<p>With which of these groups do you hold regularly scheduled meetings for purposes of preparing for emergencies or disasters?</p> <p> <input type="checkbox"/> police, fire, and first responders    <input type="checkbox"/> non-profit/relief organizations (i.e. Red Cross)  <input type="checkbox"/> other school districts    <input type="checkbox"/> government relief/welfare organizations  <input type="checkbox"/> business organizations    <input type="checkbox"/> local/community/religious organizations </p>	The first post-hurricane survey
2	<p>What do you share with these groups? (check all that apply)</p> <p style="text-align: center;">Money    Personnel    Goods</p> <p>Information</p> <p>Police, Fire, and First Responders    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/></p> <p>Non-Profit/Relief Organizations    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/></p> <p>Other School Districts    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/></p> <p>Government Relief/Welfare Organizations    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/></p> <p>Business Organizations    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/></p> <p>Local/Community/Religious Organizations    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/></p>	The first post-hurricane survey
3	<p>With which of these groups do you intend on sustaining regular contact with for the purposes of emergency preparation?</p> <p> <input type="checkbox"/> police, fire, and first responders    <input type="checkbox"/> non-profit/relief organizations (i.e. Red Cross)  <input type="checkbox"/> other school districts    <input type="checkbox"/> government relief/welfare organizations  <input type="checkbox"/> business organizations    <input type="checkbox"/> local/community/religious organizations </p>	The first post-hurricane survey
4	<p>How would you evaluate the quality of your district's existing disaster/emergency plans?</p> <p><input type="checkbox"/> Poor    <input type="checkbox"/> Fair    <input type="checkbox"/> Good    <input type="checkbox"/> Excellent</p>	The first post-hurricane survey
5	<p>How would you describe the likelihood of your district experiencing a disaster/emergency?</p> <p style="text-align: center;"> <input type="checkbox"/> Highly likely    <input type="checkbox"/> Somewhat likely  <input type="checkbox"/> Somewhat unlikely    <input type="checkbox"/> Highly unlikely </p>	The first post-hurricane survey
6	<p>Has your district faced an emergency that called for the activation of your district disaster/emergency plan in:</p> <p><input type="checkbox"/> past 6 months    <input type="checkbox"/> past year    <input type="checkbox"/> past two years    <input type="checkbox"/> Not in the past 2 years</p>	The first post-hurricane survey
7	<p>What steps has your district taken to accommodate displaced students?</p> <p> <input type="checkbox"/> purchase additional textbooks    <input type="checkbox"/> hire additional teachers (including substitutes)  <input type="checkbox"/> provide meals at no cost    <input type="checkbox"/> open additional rooms/buildings </p>	The first post-hurricane survey
8	<p>What else did your district provide or facilitate for hurricane evacuees?</p> <p> <input type="checkbox"/> shelter    <input type="checkbox"/> food distribution  <input type="checkbox"/> clothing distribution    <input type="checkbox"/> information about FEMA, Red Cross, etc. </p>	The first post-hurricane survey

## Appendix IV. Descriptive Statistics and Correlation Matrix for Model 1

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Days of School Closure	1.000							
(2) Number of Regular Meeting Partners	0.049	1.000						
(3) Resource Sharing (factor score)	0.038	0.117	1.000					
(4) Quality of Emergency Plan	-0.124	0.132	-0.003	1.000				
(5) Recent Activation of Emergency Plan	0.391	0.087	0.240	0.065	1.000			
(6) % Low-income Students	-0.092	-0.094	0.005	-0.029	-0.074	1.000		
(7) Expenditure on Transportation per Pupil	0.208	-0.073	0.095	-0.103	0.146	0.007	1.000	
(8) Total Operating Expenditure per Pupil (except Transportation; in thousand)	-0.040	-0.302	-0.066	-0.077	-0.109	0.421	0.325	1.000
(9) Number of Students (in thousand)	0.051	0.218	0.021	0.019	0.176	-0.154	0.013	-0.249
(10) Superintendent's Tenure	-0.020	0.079	0.090	-0.013	-0.167	-0.079	-0.012	0.076
(11) Hurricane Wind Category	0.746	0.108	0.173	-0.003	0.339	-0.099	0.420	-0.046
(12) Districts from the Coast	0.597	0.240	0.107	0.022	0.370	-0.163	0.279	-0.049
Mean	3.667	1.676	0.151	3.010	0.255	49.796	245.480	7.417
Std. Dev.	4.954	1.401	1.005	0.605	0.438	13.894	93.334	0.837
Max	0	0	-0.673	1	0	18.900	0	6.061
Min	30	6	4.506	4	1	87.900	486	10.265



## Appendix V. Descriptive Statistics for the Model of Collaborative Networking in a Post Emergency Context

Variables	Obs.	Mean	Std. Dev.	Min	Max
TAKS Pass Rate in 2006	74	67.784	9.441	43	88
Days Closed (=0 if less than 6 days)	74	4.027	6.248	0	30
No Closure (dummy)	74	0.203	0.405	0	1
School Closure 1-5 days (dummy)	74	0.419	0.497	0	1
School Closure+6 days (dummy)	74	0.378	0.488	0	1
Collaboration (number of regular meeting partners)	74	1.743	1.434	0	5
% White Students	74	63.785	25.514	4.8	98.8
% Economically Disadvantaged Students	74	49.600	14.310	20	78.3
Class Size (Teacher to Student Ratio)	74	13.653	1.833	8.637	17.165
Teacher's Salary (2005-06, in hundred)	74	391.330	31.418	338.421	481.811
Instructional Expenditures per Pupil (in thousand)	74	4.340	0.635	3.279	6.812
Teacher's Experience	74	12.457	1.895	8.835	17.410
More Teachers Hired (dummy)	74	0.189	0.394	0	1
Purchased Textbooks (dummy)	74	0.216	0.414	0	1
TAKS Pass Rate in 2005	74	61.892	9.852	36	83