

TOWARDS DISASTER-RESILIENT COMMUNITIES
THROUGH FLEXIBLE GOVERNANCE

by

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ABSTRACT

When disasters strike communities, survival of citizens and businesses is greatly threatened. Because disasters affect virtually every part of a community and threaten lives, it is vital to set in place practices and relationships to create disaster-resilient communities by focusing on the actions that must occur before, during, and after a disaster strikes. Currently, organizations and the government work together to attempt to provide relief for communities, but these relationships and efforts are not nearly as effective as they could be. Previous research has looked at the needs in each of the disaster phases, but applying theories to each disaster phase to guide their actions and support the specific needs of the phase has not been looked at. This research aims to fill this gap by looking at how transaction cost economics, social capital theory, actor oriented architecture, and agency theory can be applied to each disaster phase to allow groups involved in disaster relief to make better decisions and more effectively prepare for, react to, and recover from disasters. By doing this research, the problems that communities have previously seen after a disaster strikes will be less severe and suffering that occurs among people and businesses post-disaster will be reduced, which will be a great improvement for our communities and society overall.

TABLE OF CONTENTS

INTRODUCTION	1
REVIEW OF LITERATURE	2
Governance	2
Theories to Explain Governance.....	4
Transaction Cost Economics.....	4
Social Capital Theory	7
Actor-Oriented Architecture	8
Agency Theory.....	9
Disaster Phases.....	10
Table 1	10
Pre-Disaster Phase	13
Disaster Phase	16
Post-Disaster Phase.....	18
ANALYSIS.....	20
Transaction Cost Economics.....	21
Social Capital Theory	22
Actor-Oriented Architecture	23
Agency Theory.....	24
Table 2	25
CONCLUSION.....	29
BIBLIOGRAPHY	32

INTRODUCTION

When disasters strike a community, the community faces numerous challenges, such as lack of a reliable food supply, lack of medication, destruction of infrastructure, and uncertainty of business survival. Because disasters affect virtually every part of a community, it is vital to set in place practices and relationships to create disaster-resilient communities by focusing on the actions that must occur before, during, and after a disaster strikes. Much research has been done that identifies what must occur in each stage of a disaster. The pre-disaster stage includes creating a community that can better withstand the physical impact of a disaster by building partnerships, establishing contracts, and writing disaster plans. The disaster stage includes responding to the pressing needs when the disaster occurs, attempting to stabilize the community, and helping critical businesses reenter the community. The post-disaster stage includes continuing to respond to pressing needs of the community, establishing long-term recovery plans, and helping the community return to normalcy.

Responding to natural and manmade disasters call for the creation of complex collaborative networks between private and public organizations. These networks of firms and government agencies have a diverse set of stakeholders (e.g., firms, disaster victims, NGOs, investors, political constituents, local, state, and federal agencies), each having differing needs and objectives. As such, governance of these collections of sovereign organizations is critical to effectively address the issues involved during the disaster and the restoration of the affected communities. Therefore, it is vital to set in place the relationships required to create disaster-resilient communities by focusing on the actions that must occur before, during, and after a disaster strikes. While it is clear

that the needs in each stage of disaster planning have been studied, the specific governance mechanisms needed during each of these three phases hasn't been examined in the literature thus far. This research paper addresses this gap by investigating emerging partnerships among governments, businesses, non-governmental organizations, and communities to promote disaster resilience. Specifically, this research seeks to understand the governance of such collaborative arrangements throughout the different phases of a disaster by defining governance, identifying theories to explain governance, developing the requirements, needs, and goals of various members of the partnership during each phase, and describing which theories are most applicable for meeting the needs in each phase. By applying theories to each stage of the disaster, stakeholders will be more prepared before disasters strike, can more quickly and effectively respond to the needs of the community during the disaster, and can better recover from the disaster after it has struck. The theories function to provide guidance as to what issues communities might be facing in the disaster phases and how theory can be used to overcome these issues as well as more effectively meet the needs in each phase. Overall, incorporating these governance theories can allow communities to better respond prepare, respond, and recover from disaster, which will improve the overall well-being of those affected by disasters and will improve our communities and society overall.

REVIEW OF LITERATURE

Governance

Many different definitions of governance have been given in literature in a number of different contexts. Donaldson (2012) says corporate governance refers to the "collection of rules, policies, and institutions affecting how a firm is controlled" (p.257).

Guarnacci (2012) defines governance as “the formal and informal arrangements through which decisions are taken and implemented in order to advance societal aims” and says that governance “recognizes that power exists inside and outside the formal authority and institutions of government” (p.75). Robichau (2011) believes governance to be “the action or manner of governing—that is, of directing, guiding, or regulating individuals, organizations, or nations in conduct or actions” (p.115). Jones, Hesterly, and Borgatti (1997) define network governance as “coordination characterized by informal societal systems rather than by bureaucratic structures within firms and formal contractual relationships between them—to coordinate complex products or services in uncertain and competitive environments” (p. 911). Wang and Wei (2007) defines relational governance as “the extent to which supply chain partners use mechanisms, such as relational norms and joint actions, to maintain their relationships based on a common goal” (p. 4). Hoetker and Mellewigt (2009) state that “formal and relational governance mechanisms are used in strategic alliances to coordinate resources and mitigate the risk of opportunistic behavior” (p. 1025). Carmeli and Markman (2011) believe that “governance strategy refers to management and administrative oversight before, during, and after expansion”, which alludes to the fact that potentially different governance strategies are used depending on the specific stage of an event (p. 323). Yin and Zajac (2004) define governance structure “as an organization design that incorporates systems of decision making, operational control, and incentives” (p. 367). Zaheer and Venkatraman (1995) define relational governance as “interfirm exchange which includes significant relationship specific assets, combined with a high level of interorganizational trust” (p. 374) and think of governance structure as “interunit or interfirm framework within which

exchange takes place” (p. 375). This wide array of definitions can be divided into two types of governance definitions, which are formal definitions of governance and relational definitions of governance. After analyzing these definitions, the comprehensive definition of governance that can be used to describe governance throughout this paper is the extent to which sovereign organizations develop a structure that combines decision making, incentives, and operational control such that it effectively coordinates its collective and individual conduct towards achieving common goals. In short, governance is an inter-organizational structure that coordinates collective and individual actions toward common goals.

Theories to Explain Governance

Many different theories can be used to explain governance in the disaster context. There are three elements of the definition of governance in the disaster context that drive theory selection. First, governance in this context involves sovereign entities, which are organizations that are independent and self-governing. Second, the sovereign entities are independent and have partial goal conflict. Third, there needs to be coordination and control between entities to promote goal achievement. Transaction cost economics, social capital theory, actor-oriented architecture, and agency theory incorporate these elements and offer guidance in terms of governance between organizations.

Transaction Cost Economics

Transaction cost economics says that “the costs and difficulties associated with market transactions sometimes favor hierarchies and sometimes markets as an economic governance structure” and views transaction costs as those that are incurred while

identifying suppliers, developing strong contracts, and following up with the contract (“BYU,” 2011, p.1). When two or more corporations are defining the governance that guides their relationship, they must consider all of the transaction costs that are present in building this structure, such as search and information costs, bargaining and decision costs, and policing and enforcement costs (Kaplan Financial Knowledge Bank, 2014, p.1). According to Dyer, transaction cost economics “essentially contends that ‘governance’ matters” (Dyer, 1996, p. 650). Transaction costs within an organization are costs associated with “managing and monitoring personnel and procuring inputs” and outside an organization include “source selection, contract management, and performance monitoring” (*Rand*, n.d., p. 3). Asset specificity, such as site specificity, physical asset specificity, human capital specificity, dedicated capacity, and brand name capital affect the overall transaction costs because the value of the transaction-specific assets depend on the continuance of the relationship between the two parties (*Rand*, n.d., p.6). These costs are high and these assets depend on the buyer/seller relationship’s existence, therefor typically lead to a more integrated governance structure to protect against opportunism. Transaction cost economics also assumes bounded rationality, which is the idea that “in decision making, rationality of individuals is limited by the information they have, the cognitive limitations of their minds, and the finite amount of time they have to make decisions” (“Princeton”, n.d., p.1). Bounded rationality often leads to a more integrated governance structure, which handles specificity better than market or contract governance structures (*Rand*, n.d., p. 10). Overall, transaction cost economics would say to look at the degree of asset specificity, potential for opportunism, bounded rationality, and production costs when deciding what governance structure would best fit. This

theory predicts that market governance is acceptable for relationships with little asset specificity thus eliminating potential for opportunistic behavior (*Rand*, (n.d.), p. 10).

According to Dyer, transaction cost economics says “when asset specificity is low, market governance (through classical contracts) is considered to be a (relatively) more efficient means of governance” (Dyer, 1996, p. 653) Formal contract theory, which is a subset of transaction cost economics, says that contracts are acceptable for some transaction-specific assets (*Rand*, (n.d.), p. 10). This theory, which focuses on creating contracts that “represent promises or obligations to perform particular actions in the future”, says that companies create contracts when “the consequences of a contractual breach are considerable” (Poppo and Zenger, 2002, p. 708). From the view of this theory, governance between organizations is grounded in contracts that govern and lay out the specific guidelines for the relationship because the benefits of creating the contract exceed the costs. According to Poppo and Zenger (2002), variables that encourage complex contracts are asset specificity, measurement difficulty, and uncertainty (p. 708). Asset specificity encourages more complex contracts because it requires relationships-specific investments. Measurement difficulty, the second variable, typically leads to formal, complex contracts because they allow corporations to “accurately measure and reward productivity” (Poppo and Zenger 2002, p. 709). If corporations cannot effectively evaluate how they are measured in a partnership, their incentive to follow through decreases. Therefore, putting contracts in place to measure performance could lead to more dependable partners and increase partnership goals. The third variable, uncertainty, also increases the need for formal contracts by allowing both parties within the partnership to adapt to unforeseen changes that may occur. Formal contracts encourage

each partner to feel comfortable making an investment because they are safeguarded by the contract (Poppo and Zenger 2002, p. 709). However, the higher the level of asset specificity, potential for opportunism, and bounded rationality, transaction cost economics predicts a vertical integration governance structure to be the most beneficial (*Rand*, (n.d.), p. 10).

Social Capital Theory

Another theory used to explain governance is social capital theory, which has its roots in social exchange theory, where “norms of reciprocating behavior suggest that people cooperate under the expectation that they will both give and receive assistance based on their membership in the relationship” (Roh, Whipple, and Boyer, 2013, p. 714-715). It is also described as “those expectations for action within a collectivity that affect the economic goals and goal seeking behavior of its members” (Roh, et al., 2013, p. 715). Social capital theory consists of three main dimensions. The first dimension, structure social capital, refers to “social control” that members of a relationship feel because of the ability for them to share information and base their behavior on the actions of other members. The second dimension, relational social capital, looks at what assets are included in the relationship and how members benefit from them as well as the trust established between members of the relationship. The third dimension, cognitive social capital, looks at a shared vision established between members of the relationship and their ability to understand one another (Roh, et al. 2013, p. 715). Social capital has also been described as an “investment in social relations with expected returns” (“Social Capital: Theory and Research by Nan Lin p. 6).

Actor-Oriented Architecture

The actor oriented architecture theory can also be used in the governance context, and it says that “control and coordination are based on direct exchanges among the actors themselves rather than by hierarchical planning, delegation, and integration” (Fjeldstad, Snow, Miles, & Lettl, 2012, p.739). This scheme is made up of three elements, which are “actors who have the capabilities and values to self-organize; commons where the actors accumulate and share resources; and protocols, processes, and infrastructures that enable multi-actor collaboration (Fjeldstad et al., 2012, p. 734). Because of the necessity of rapid, effective responses to issues in global business, this organizational form emerged that could provide this speed and efficiency, unlike the traditional hierarchical organization forms collaboration (Fjeldstad et al., 2012, p. 738). Actor oriented architecture also “contains mechanisms by which dynamic networks of relationships can be established, maintained, and dissolved” unlike hierarchical schemes (Fjeldstad et al., 2012, p. 739). This theory plays out well in the example of Network Centric Operations whose purpose is “increased survivability and lethality of military forces as well as to reduce the time required for mission accomplishment” (Fjeldstad et al., 2012, p. 743). They were able to establish shared situational awareness by creating the ability to get information from numerous sources and use it to “create a shared and current description of the situation” as well as use knowledge from many expert sources to properly interpret the information they obtained (Fjeldstad et al., 2012, p. 739). The establishment of this situational awareness included protocols for actors when using the commons. Because of the speed needed in carrying out actions in these military operations, a hierarchical structure is not as effective because forces must wait for a higher level to make decisions.

Overall, the actor-oriented scheme is highly successful for Network Centric Operations because of shared situational awareness, commons for communication, and protocols for actors involved that allow for rapid information sharing and decision making.

Agency Theory

Agency theory can also be used to explain governance, and it looks at the relationship between an agent and a principal, where the agent performs some type of task or duty on behalf of the principal, and the focus is to “examine contracting problems in order to determine the most effective contract type that will satisfactorily govern the agency relationship” (Roh and Whipple, 2010, p. 342). Problems between the agent and principal arise “when (a) the desires or goals of the principal and agent conflict and (b) it is difficult or expensive for the principal to verify what the agent is actually doing” (Eisenhardt, 1989, p.58). Contractual problems often occur because of goal conflict and information asymmetry between the agent and the principal, and both of these issues lead to potential opportunism. These issues can be overcome and goals can be better aligned through outcome-based contracts and behavior-based contracts. (Roh and Whipple 2010, 343). Outcome-based contracts are effective in situations where the actions of the agent are the driving force leading to the outcome and the power that outside factors can have on achieving the outcomes is weak. For instance, an outcome-based contract would be effective in a situation where a sales representative is being evaluated on his ability to sell a desirable product in a healthy market. Because neither the economy nor the quality of the product is reducing the likelihood that a sale will be made, the agent can be evaluated based on performance outcomes. Conversely, if a sales representative was selling mediocre product in a bad economy, he might be evaluated based on a behavior-based

contract in which the principle would “identify the specific behaviors expected of the agent” rather than compensating based on sales volume (Roh and Whipple 2010, 343).

Disaster Phases

It is clear that each disaster phase includes differing requirements, needs, and goals for each member of the partnership. Further, in each stage of the disaster, the form of governance and the way it is implemented also varies. Before identifying the form of governance needed for each phase, the literature has been analyzed to identify what specific phases occur during a disaster and what each phase entails. While each stage varies, it is well known that public private partnerships are vital for preparing a community pre-disaster, responding to immediate needs during a disaster, and successfully recovering post-disaster (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.132). Table 1 shows a summary of the requirements for the various disaster phases.

Table 1: Disaster Stage Requirements Table

Pre-Disaster	<p>Partnership Initiation:</p> <ul style="list-style-type: none"> • Build partnerships • Establish an economic recovery team • Goal identity alignment • Develop contracts • Develop charters and concept of operations <p>Plan Building:</p> <ul style="list-style-type: none"> • Disaster type/scenario identification • Identify human and material resources needed during a specific disaster and obtain information about how to access those
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	<p>resources</p> <ul style="list-style-type: none"> • Write disaster plan • Review disaster plans and modify if needed <p>Preparation:</p> <ul style="list-style-type: none"> • Test/exercise parts of plan • Solutions to scenarios • Develop communication methods • Establish warning systems • Inform public of partnerships • Stock food and supplies <p>Partnerships Formed:</p> <ul style="list-style-type: none"> • Public–private contractual partnerships for critical infrastructure • Public–private non-contractual partnerships for critical infrastructure • Government–community collaborative resilience building
Disaster	<p>Triage:</p> <ul style="list-style-type: none"> • First responders take action and assess the situation • Activate emergency or disaster plan • Respond to most pressing emergency issues • Resource distribution (food, water, medicine, care) • Increase security operations <p>Stabilize:</p> <ul style="list-style-type: none"> • Utilize communication system

	<ul style="list-style-type: none"> • Uphold contracts • Receive resources from federal and state programs • Continue to investigate the nature and source of threat • Apply intelligence and other information to lessen the effects <p>Initiate Critical Structure Reconstruction:</p> <ul style="list-style-type: none"> • Begin business reentry of essential groups • Repair key infrastructure (roads, electricity, water, communications) • Set up business recovery centers to centralize small business recovery resources <p>Partnerships Formed:</p> <ul style="list-style-type: none"> • For-profit, NGOs and government partnerships • Government–civil society partnerships • Government as one of many actors in a ‘many-to-many’ network partnership
Post-Disaster	<p>Sustain:</p> <ul style="list-style-type: none"> • Provide continued support in terms of housing and life sustaining services • Clean-up operations <p>Repair:</p> <ul style="list-style-type: none"> • Petition local, state, and federal governments for needs • Follow up with petitions • Clarify roles of partners

	<ul style="list-style-type: none"> • Develop long-term recovery plan <p>Return to Normalcy:</p> <ul style="list-style-type: none"> • Share lessons learned with emergency response community • Post incidence reporting • Develop initiatives to mitigate the effects of future incidents <p>Partnerships Formed:</p> <ul style="list-style-type: none"> • Public–private partnerships for physical reconstruction • Inter-sectoral partnerships for learning
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Pre-Disaster Phase

The first stage identified is the pre-disaster stage, which focuses on building resilient communities. This stage includes many developing partnerships, such as those of community organizations, private enterprises, and governments. (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.132). Because these relationships take time to form and must be well-developed and understood by each member before they can function properly, these partnerships must be formed in the pre-disaster stage so they are able to successfully work together in the event of a disaster. In Bangladesh, there is framework in place that defines these roles and responsibilities of those involved in disaster-relief partnerships, which are the Standing Orders on Disasters (SOD) and the Disaster Management Act (DMA). The government also created the Comprehensive Disaster Management Programme (CDMP), which provides guidance and support for the government and organizations involved in disaster relief by providing framework for coordination, collaboration, and prioritization. The CDMP collaborates with the

Emergency Capacity Building Project (ECB), which allows both groups to work together to better share information and avoid duplicate efforts. These partnerships have been put into place in the pre-disaster phase (Bannerman, Rashid, Rejve, 2011, p.1). The needs in the pre-disaster phase fall into three main categories. The first category of needs is partnership initiation. This includes building partnerships, establishing an economic recovery team, aligning goals between partners, developing contracts to specify the relationships and expectations of partners, and developing charters and concept of operations. The second category is plan building, which includes identifying the types of disasters and scenarios that could occur in the community, identifying materials and resources potentially needed for the disaster and plans for acquiring them, writing and reviewing the disaster plan, and modifying the plan if needed. The third category is preparation. This includes testing parts of the disaster plan, identifying solutions to the potential disaster scenarios, developing communication methods to allow partners to collaborate more easily and provide a method to communicate when typical communication systems fail, establishing warning systems, informing the public of partnerships created, and stocking food and supplies that could be needed. Types of partnerships in this stage include public–private contractual partnerships for critical infrastructure, public–private non-contractual partnerships for critical infrastructure, and government–community collaborative resilience building (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.133). Public-private contractual partnerships for critical infrastructure typically involve government and private companies working together to create infrastructure that provide safety and security. Because these projects typically have a high degree of uncertainty, contracts are typically incomplete and lead to future

renegotiations. Much trust is needed in these partnerships because of the volatility of contracts (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.134). Public-private non-contractual partnerships for critical infrastructure “facilitate the inter-sectoral coordination of resilience development activities and provide[s] overarching institutional structures for information sharing and inter- and intra-sectoral policy dialogues” (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.134). Overall, these partnerships increase the legitimacy of resilience policies and improve information sharing, thus improving coordination during disasters. However, lack of trust may lead to decreased information sharing. After 9/11, BEOC Alliance provided a way for private companies to build resilience through information sharing with the private sector (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.134). Government-community collaborative resilience building focuses on building relationships between the community-based resources and public and professional organizations. Because community-based organizations, such as churches, can play a critical role during the disaster, it is vital to equip them with the resources and training needed to successfully provide aid (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.135). Through the creation of these different partnerships, goals, communication methods, expectations, contracts, and solutions to scenarios should be established. Disaster plans should be reviewed and modified by an economic recovery teams established by the partnerships and businesses should be informed about how the plans will be carried out (*Restore your economy*, n.d., p.1). It is important that the disaster plan includes how resources and materials will be obtained during the disaster as well as what food and supplies should be stock-piled and where (Rosenberg, n.d., p.1).

Disaster Phase

The next phase of a disaster, the disaster phase, deals primarily with using the relationships formed in the first stage to quickly and efficiently respond to the needs of the community. Responder networks must work together to provide resources to the disaster site. (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.132). For example, after the Indian Ocean tsunami hit in 2004, Tamil Nadu, India was severely affected by the disaster, which spurred numerous coordination structures to form to provide support to the city during the crisis. The Tamil Nadu Tsunami Resource Centre (TNTRC) was formed to “provide coordination, political advocacy, and information dissemination” during the disaster and included seven organizations, which included the United National Development Program and the state government (Raju, Becker, 2013, p.82). This group’s goal was to coordinate efforts among a variety of stakeholders to bring recovery at the state level (Raju, Becker, 2013, p.82). Respondents from this disaster aimed to identify areas where efforts were being duplicated as well as gaps in assistance and worked together to attend to these areas. Without a relationship between organizations and a joint effort, this would not have been possible. The needs in the disaster phase also fall into three main categories. The first category is triage, which is where the most immediate and pressing needs are responded to. Activities in this phase include first responders taking action and assessing the situation to determine urgent needs, activating the disaster plan, responding to the most pressing emergency issues immediately, distributing resources, such as food, water, medicine, and care, and increasing security operations. The next category is stabilizing. This includes utilizing communication systems, upholding contracts previously established, receiving resources from federal and state programs,

continuing to investigate the threat of the disaster, and applying knowledge to decrease the effects of the disaster. The last category is initiate critical structure reconstruction, which includes reentering of essential groups, repairing of key infrastructure such as roads, electricity, water, and communication, and setting up business recovery centers to allow small businesses to have a centralized location for resources. The needs Types of partnerships in this stage include for-profit, NGOs and government partnerships, government–civil society partnerships, and government as one of many actors in a ‘many-to-many’ network partnership (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.133). For-profit, NGOs, and government partnerships are best explained through the example of Walmart’s relationship with the government during Hurricane Katrina. While big-box companies such as Walmart organized distribution points for food and supplies during the disaster, they were not given direction by governmental organization, FEMA, which inhibited them from providing the relief. However, Walmart was able to be more successful when they included a Red Cross official on their emergency operations centre team, which allowed them to more successfully coordinate efforts (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.135). Because of the difficulties in the supply chain during disasters as well as the specific skill set of government and NGOs, it is vital for communication and collaboration between the two to quickly and efficiently serve the disaster-stricken community. Government-civil society partnerships are partnerships between the government and civil groups, such as faith-based organizations, NGOs, and non-profits. In the United States, there is a strong partnership between FEMA, the federal emergency management agency, and the American Red Cross, which is an NGO that specializes in disaster relief. Without coordination between the two organizations, efforts

would be ineffective and potentially duplicated (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.136). Government as one of the many actors in a ‘many-to-many’ network partnership are relationships where the government is another node within a network rather than the hierarchical leader. These relationships typically use a Web 2.0 platform, which provides a constant flow of information, high speed, and increases the possibilities for individuals to get involved in disaster response. Crowdsourcing to raise funds for disaster relief is a prime example of this form of partnership (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.137). Within these partnerships, partners attend to the needs to the community during this phase, which includes resource distribution, upholding contracts, utilizing communication systems, avoiding duplication, responding to immediate needs, and activating the disaster plan. Specifically, business recovery centers set up centralized small business recovery resources, federal resources arrive, and essential businesses start to re-enter, such as fuel distributors (*Restore your economy*, n.d., p.1).. The nature and source of the threat is also investigated and security operations are increased (*St. Louis County Missouri*, n.d., p.1). Overall, the objective is for partnerships to attend to the most pressing needs of the community and handle short-term needs.

Post-Disaster Phase

The final stage of the disaster is the recovery stage, which includes the actions that are taken once the immediate threat of the disaster has passed and initial responsibilities of providing urgent support have been handled. In the process of reforming the community, interactions with external resources and know-how are vital (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.132). Corporations play a role in the

recovery stage by assisting their employees in the aftermath of a disaster. One study found that employer-sponsored support in the aftermath of a disaster reduced employee strains post-disaster (Sanchez, Korbin, Viscarra, 1995, p.11). This is one of many types of relationships that can assist individuals in a disaster-stricken community in returning to a state of equilibrium post-disaster. Looking at the recovery stage in terms of the Indian Ocean Tsunami of 2004, the United Nations Team for Recovery Support (UNTRS) was formed “with the mandate to coordinate all UN activities in the post-tsunami recovery” and attempted to bring various UN agencies into one disaster recovery group (Raju, Becker, 2013, p.82). Not only would this group help with post-tsunami recovery, it would also help to build a more resilient community for future disasters. The needs in this phase fall into three main categories. The first is sustaining, which includes providing continued support in terms of housing and life sustaining services and clean-up operations. Even though the immediate threat of the disaster has lessened, there are still people who need these services post-disaster. The second category is repairing, which involves petitioning local, state, and federal governments for needs, following up with the petitions, clarifying roles of partners for the future, and developing a long-term recovery plan, which states what the actions need to take place to repair the community. The last category is returning to normalcy, which includes sharing lessons learned with emergency response community, doing post incidence reporting, and developing initiatives to improve how future incidents are handled and to reduce their effects. Partnerships in this stage include public-private partnerships for physical reconstruction and inter-sectoral partnerships for learning. Public-private partnerships for physical reconstruction typically involve a company with particular expertise in the area of engineering or construction providing ad

hoc pro bono collaboration in the initial stages of reconstruction then shifting to a contractual, paid agreement once urgency started to wane. Because it is essential to get the construction started in the urgent stages of a disaster, partners are more willing to provide the services without an official contract. When weighing benefits and costs of such an arrangement, partners must consider reputation and the legal framework for government contracting (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.138). Inter-sectoral partnerships for learning provide opportunities for “catalyzed learning, which can create tipping points for transformation for promoting pro-active resilience building” (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.139). A learning and information sharing platform, such as the Disaster Response Intelligent System, can provide a means for regular interaction between partners. The DRIS, which was developed after Hurricane Katrina, assisted emergency managers in all stages of the disaster and allowed them to collaborate on post-disaster recovery (Chen, Chen, Vertinsky, Yumagulova, Park, 2013, p.139). Activity in this phase should focus on rebuilding communities, contacting insurance companies, getting funds to rebuild, identifying long-term recovery plans, and cleaning up the community. It is vital for partners to discuss lessons learned (Rosenberg, n.d., p.1), take part in post incidence reporting, develop plans to lessen the effects of future disasters, and provide housing if needed (*St. Louis County Missouri*, n.d., p.1).

ANALYSIS

The notions from transaction cost economics, social capital theory, actor-oriented architecture, and agency theory can be applied to each of the disaster phases to allow communities to better prepare for, respond to, and recover from disasters by guiding actions to better meet the needs in each phase. After applying the theories to each disaster

phase, it became clear which theories had particularly strong explanatory power in particular phases. It also became clear that the pre-disaster phase was the most essential phase. Because there is an extremely high degree of uncertainty during the disaster, it is critical that planning take place in the pre-disaster stage to eliminate the uncertainty that can be eliminated before the disaster strikes, such as identifying potential solutions to predicted scenarios, establishing roles of partners, establishing how partners will communicate, and writing overall disaster plans. Without planning ahead of time, communities reduce the likelihood of efficiently and effectively responding to the immediate needs of the community during the disaster and recovering in a timely manner. Table 2 shows a summary of each of the theories applied to the pre-disaster, disaster, and post-disaster phases.

Transaction Cost Economics

Transaction cost economics, which says that “costs arise when individuals try to acquire new ownership rights, defend their assets against transgressions and theft, and protect their resources against opportunistic behavior in exchange for a relationship” provides useful guidance for all three disaster phases, but has particular usefulness in the pre-disaster and post-disaster phases. In terms of the pre-disaster phase, there is high uncertainty in the partnership initiation phase and plan building phase because communities are uncertain of all groups that should be involved in the economic recovery team and are unable to cover all potential scenarios in contracts and disaster plans. Human asset specificity is high in the plan building phase because time consuming design building and development takes place as the disaster plans are written and close collaboration is needed between partners who are writing and are involved in these plans.

Partners involved in the creation of disaster plans must acquire specific knowledge pertaining to that particular community and how they would handle each type of disaster. Because these plans are so specific to the community and partners involved, there is a high degree of human asset specificity. Another type of asset specificity is present in the pre-disaster phase, which are dedicated assets. This is present in the preparation phase as they stock food and supplies to be used for victims during the disaster. While the food and supplies stocked isn't specific to the customer, there would be excess capacity if they were not used and distributed by members in the partnerships. Transaction cost economics is not particularly influential in the disaster phase because relationships have been set-up during the pre-disaster phase. In the post-disaster phase, there is uncertainty in the sustain phase as the economic recovery team identifies the continuing needs of the community. Often times it is difficult to identify what members of the community still need assistance and how they will get the resources to meet the needs. There is also high human asset specificity in the repair phase as partners develop long-term recovery plans for the community because partners accumulate knowledge and make plans specific to the community. Problem resolution contract clauses are also executed post-disaster. Overall, transaction cost economics would suggest that credible commitments are needed between partners to reduce opportunism. They will also make partners feel more comfortable investing in highly specific assets and trusting their partners in situations where contracts have not specified behavior.

Social Capital Theory

Social capital theory, which says that “people cooperate under the expectation that they will both give and receive assistance based on their membership in a relationship”

provides substantial guidance during the pre-disaster phase and provides some guidance in the post-disaster phase (Roh et. al., 2013, p. 714-715). In the pre-disaster phase, structural social capital, which involves information sharing between parties, is established in the partnership initiation phase as partners develop concepts of operations which provides information about what the partners should be doing as well as in the preparation phase as communication methods are established which will allow partners to communicate effectively during the disaster. Relational social capital is established in the partnership initiation phase as partnerships are developed, contracts are created, goals are aligned, and overall trust is established between partners. Cognitive social capital, which involves partners identifying a shared vision, is established in the partnership initiation phase as partners align goals and in the plan building phase as disaster plans are written and agreed upon. The disaster plans outline the shared vision of how the disaster will be handled and plans will be carried out. During the disaster phase, this theory has limited explanatory power because relationships were set up in the pre-disaster phase. In the post-disaster phase, cognitive social capital is needed as partners create a long-term recovery plan and must align their visions for the community's direction going forward and what their roles will be.

Actor-Oriented Architecture

Actor-oriented architecture, which says “control and coordination are based on direct exchanges among the actors themselves rather than by hierarchical planning, delegation, and integration”, also provides useful guidance for meeting the needs of the disaster phases (Fjeldstad, Snow, Miles, & Lettl, 2012, p.739). In the pre-disaster stage, this theory would say to identify actors, who are the individuals involved in disaster

relief, during the partnership initiation phase. It would suggest that the commons, where actors efficiently communicate and share resources, should be established in the preparation phase as communication methods and platforms are developed. It would also suggest that protocols should be established in the plan building phase where disaster plans are created and procedures are explained. During the disaster, actor-oriented architecture would suggest the commons to be heavily utilized during the triage and stabilize phases as actors identifying the most pressing issues and utilize communication system to align efforts and apply intelligence to lessen the effects of the disaster. Because actions need to take place very quickly during the disaster phase because people need life sustaining services and immediate relief, actor-oriented architecture would suggest eliminating the hierarchical process that typically takes place in decision making to allow for faster and more efficient decisions. It would also suggest that actors carry out the protocols during the triage phase as the disaster plan is activated and for them to communicate using the commons to adjust roles if necessary. Post-disaster, this theory would suggest upholding protocols during the sustain phase as actors continue to carry out specified roles and responsibilities to provide life sustaining services and using the commons to communicate lessons learned between partners in the return to normalcy phase.

Agency Theory

Agency theory, which says “problems arise between the principal and the agent “when (a) the desires or goals of the principal and the agent conflict and (b) it is difficult or expensive for the principal to verify what the agent is actually doing”, provides guidance for meeting needs particularly in the pre-disaster and post-disaster phases

(Eisenhardt, 1989, p.58). In the pre-disaster phase, outcome uncertainty is high and outcome measurability is low for public official serving as agents for the principal, which is the citizen. Outcome uncertainty is high because there is no information about how the plans of the agent will turn out since the disaster has not occurred. Outcome measurability is low because there is no way to measure the outcome of the agent's actions when it has not occurred yet or whether the agent has done due diligence preparing the community for various disasters. There are also multiple forces that also influence the outcome, such as the actions of those helping the agent and the severity of the disaster itself. To reduce the potential of shirking or moral hazard, agency theory would suggest citizens use behavior contracts to monitor agents, which look at the behavior of the agent and the degree to which the behavior will lead to the desired outcome. This will reduce information asymmetry because the principal will know what the agent is doing in terms of disaster relief actions. If goal congruence is low between the agent and the principal, this theory suggests working to remove the official. In the disaster phase, this theory has little to offer because relationships and contracts are set up in the pre-disaster phase. In the post-disaster phase, outcome uncertainty and outcome measurability are high as public official serve as agents for the citizens. Agency theory would suggest using outcome contracts to specify performance in this stage since the outcome of the disaster plans is evident. It would also suggest to use behavior contracts to reduce service-level information asymmetry and public official vulnerability.

Table 2: Application of Theory to Disaster Phases

Theory	Disaster Phase
Transaction Cost Economics:	Pre-Disaster (partnership initiation, plan building,

<p>Costs of control in a social system; costs arise when individuals try to acquire new ownership rights, defend their assets against transgressions and theft and protect their resources against opportunistic behavior in exchange for a relationship</p> <ul style="list-style-type: none"> • Uncertainty • Asset specificity • Opportunism • Credible commitments needed 	<p>preparation):</p> <ul style="list-style-type: none"> • High uncertainty in partnership initiation and plan building • Human asset specificity in plan building • Dedicated assets in preparation phase • Use credible commitments to reduce opportunism <p>Disaster (triage, stabilize, initiate critical structure reconstruction):</p> <ul style="list-style-type: none"> • High uncertainty in triage phase • Opportunism in stabilize phase • Theory has limited explanatory power in this phase as relationships primarily set-up during per-disaster phase. <p>Post-Disaster (sustain, repair, return to normalcy):</p> <ul style="list-style-type: none"> • Uncertainty in sustain phase • Human asset specificity in repair phase • Execute contingency and problem resolution contract clauses
<p>Social Capital Theory: People cooperate under the expectation that they will both give and receive assistance based on their membership in a relationship</p>	<p>Pre-Disaster (partnership initiation, plan building, preparation):</p> <ul style="list-style-type: none"> • Structural social capital in the partnership initiation phase and in the preparation phase • Relational social capital in the partnership initiation

<ul style="list-style-type: none"> • Structural (information sharing) • Relational (trust) • Cognitive (shared vision) 	<p>phase</p> <ul style="list-style-type: none"> • Cognitive social capital in partnership initiation <p>Disaster (triage, stabilize, initiate critical structure reconstruction):</p> <ul style="list-style-type: none"> • Theory has limited explanatory power in this phase as relationships primarily set-up during per-disaster phase. <p>Post-Disaster (sustain, repair, return to normalcy):</p> <ul style="list-style-type: none"> • Cognitive social capital in repair phase
<p>Actor-Oriented Architecture: control and coordination are based on direct exchanges among the actors themselves rather than by hierarchical planning, delegation, and integration</p> <ul style="list-style-type: none"> • Actors • Commons • Protocols 	<p>Pre-Disaster (partnership initiation, plan building, preparation):</p> <ul style="list-style-type: none"> • Actors establish partnerships initiation phase • Commons are established in the preparation phase • Protocols are established in the plan building phase, <p>Disaster (triage, stabilize, initiate critical structure reconstruction):</p> <ul style="list-style-type: none"> • Commons are utilized during the triage and stabilize phases • Protocols are carried out in triage phase <p>Post-Disaster (sustain, repair, return to normalcy):</p> <ul style="list-style-type: none"> • Commons are used during the return to normalcy phase • Protocols are used during the sustain phase

<p>Agency Theory : problems arise between the principal and the agent “when (a) the desires or goals of the principal and the agent conflict and (b) it is difficult or expensive for the principal to verify what the agent is actually doing</p> <ul style="list-style-type: none"> • Goal conflict • Outcome uncertainty & measurability • Information asymmetry • Shirk/moral hazard • Outcome & behavior contracts 	<p>Pre-Disaster (partnership initiation, plan building, preparation):</p> <ul style="list-style-type: none"> • Outcome uncertainty is high and outcome measurability is low for public officials as agents for citizens • In the partnership phase for government and other public/private organizations, align the partners' motives and increases goal congruence outcome contracts such as cost/gain-sharing. If goal congruence low, work to remove party.
	<p>Disaster (triage, stabilize, initiate critical structure reconstruction):</p> <ul style="list-style-type: none"> • Outcome uncertainty is high and outcome measurability is low for all actors. Theory has limited explanatory power in this phase as relationships primarily set-up during per-disaster phase.
	<p>Post-Disaster (sustain, repair, return to normalcy):</p> <ul style="list-style-type: none"> • Both outcome uncertainty and outcome measurability is high for public officials as agents for citizens <ul style="list-style-type: none"> ○ Use outcome contracts to specify performance

	<ul style="list-style-type: none"> ○ Use behavior contracts to reduce service-level information asymmetry and public official vulnerability
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CONCLUSION

Preparing for, responding to, and recovering from disasters are vital tasks that communities must engage in to allow communities to more effectively and efficiently handle disasters and increase the likelihood of community survival. Governance, which in the disaster context refers to the inter-organizational structure that coordinates collective and individual actions toward common goals, plays an important role as it provides the framework for individual organizations to collaborate and prepare communities in each stage of the disaster. Governance in this context has three key elements, which are sovereign entities, partial goal conflict, and the need for coordination and control. The theories used to analyze the relationship between organizations involved in disaster relief must relate to these key elements of governance, therefore transaction cost economics, social capital theory, actor-oriented architecture, and agency theory were selected to provide guidance as to how to better meet the needs of each disaster phase. In the pre-disaster phase, needs fall into three main categories, which are partnership initiation, plan building, and preparation. Overall, this stage aims to create partnerships, develop contracts and goal alignment between partners, create disaster plans, identify potential scenarios and solutions, and develop communication systems. These activities will allow the organizations to have basic roles, relationships, and procedures established

so they can activate them when the disaster strikes, thus somewhat reducing the uncertainty during the disaster. In the disaster phase, needs also fall into three main categories, which are triage efforts, stabilization, and initiation of critical structure reconstruction. Overall, this stage involves activating the partnerships and disaster plans, responding to the immediate and pressing needs of members of the community, and taking the initial efforts to move the community toward recovery. In the post-disaster phase, needs fall into the categories of sustaining, repairing, and returning the community to normalcy. This stage functions to provide long term recovery plans for the community and identify ways to better respond in the future.

In order to overcome inefficiencies in the past in terms of disaster preparedness, response, and recovery, this research uses theories to provide guidance for better meeting the needs of each phase. Overall, transaction cost economics suggests using credible commitments between partners in the pre-disaster and post-disaster since there is dedicated asset specificity, human asset specificity, and uncertainty in the pre-disaster phase and human asset specificity and uncertainty in the post-disaster phase. Credible commitments can reduce the risk that comes with asset specificity and can make partners feel comfortable relying on each other during uncertain situations. Overall, social capital theory suggests establishing structural, relational, and cognitive social capital in the pre-disaster phase to increase communication and trust between partners and establish a shared vision for disaster relief and to establish cognitive social capital again in the post-disaster phase as partners establish a shared vision for long-term recovery. Overall, actor-oriented architecture suggests eliminating hierarchical forms of communication in the pre-disaster stage and establishing commons and protocols for actors to use during the

disaster. Lastly, agency theory suggests using behavior-based contracts in the pre-disaster phase when outcome uncertainty is high and outcome measurability is low and using outcome-based contracts in the post-disaster stage to evaluate how public official performed and responded to the disaster. These theories provide practical guidance that allow organizations to work together to better meet the needs in each disaster phase. By improving communities' abilities' to prepare for, respond to, and recover from disasters, the overall well-being of society will be improved.

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