Who takes risks? A framework on organizational risk-taking during sudden-onset disasters

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Who Takes Risks?
A Framework on Organizational Risk-Taking During Sudden-Onset Disasters

Abstract: Do humanitarian organizations exhibit similar risk-taking behavior? This study analyzed 60 interviews from 24 case studies on four types of organizations involved in disaster response: established, expanding, extending, and emergent. By elaborating on organizational attention theory, this study investigated how organizational tasks, structures, attention, and context combine to influence organizational risk-taking behavior by different organizational types during sudden-onset disasters. Counterintuitively, the results indicate that two organizational types shift their risk-taking behavior in reverse directions during sudden-onset disaster response stages. Expanding organizations (e.g., primary disaster response NGOs) are generally risk-averse during the immediate response stage but become risk-taking during the short-term recovery stage. In contrast, extending organizations (e.g., homeless shelters) are risk-taking during the immediate response but become risk-averse during short-term recovery. While established organizations are generally risk-averse, the study differentiated between two sub-types of established organizations with nuanced differences in risk-taking behavior. Finally, while emergent organizations show a propensity toward risk-taking, the results differentiate between two emergent sub-types, where the socially emergent sub-type (e.g., church volunteer groups) shows more pronounced risk-taking behavior than the enterprise emergent subtype (e.g., corporate volunteer groups). The study contributes to organizational attention theory by showing how the varied risk-taking behaviors are related to the three dimensions of performance (resource agility, resource adaptability, and resource alignment), commonly referred to as the Triple-A model. The study implications provide researchers and managers with a framework to help understand and predict risk-taking behavior by organizational types and sub-types during disaster relief operations.

Keywords: Disaster relief operations, Humanitarian operations management, Risk propensity, Non-governmental organizations (NGOs), Organizational Attention Theory
1. Introduction

Risk-taking is commonplace among organizations that respond to sudden-onset disasters (Chakravarty 2011; Dong 2015). Risk-taking behavior involves acting under circumstances that might not lead to the desired results (March and Shapira 1987; Hoskisson et al. 1991). Often, the uncertain and devastating nature of sudden-onset disasters, be they natural or man-made, requires those involved to make decisions without assurances regarding the outcome. For example, in the aftermath of Hurricane Katrina, the Kingsley House, a humanitarian organization that focuses on children’s welfare, had exhausted its operating surplus and saw monthly revenues plummet to less than 9% of normal levels. Nevertheless, the organization decided to keep all 110 full-time employees on the payroll. This was an extremely risky decision because the organization did not know whether it could balance its finances and thus faced the risk of bankruptcy. The Kingsley House’s CEO justified this risky decision by noting that the crisis called for an extraordinary response (Liederman 2017). The Kingsley House is not alone in having to make risky decisions during humanitarian crises. Medicines Sans Frontieres stopped collecting donations for the 2004 Asian tsunami because it had excess funds and was unwilling to extend its services because of concerns about the negative publicity associated with their inability to manage the funds (Aflaki and Pedraza-Martinez 2016).

The above examples show how disaster relief organizations behave differently when having to make risky decisions. Yet, despite the tremendous strides taken by research in humanitarian operations, extant research has paid limited attention to organizational risk-taking behavior. For instance, notable progress has been made topics such as collaboration (e.g., Altay and Pal 2014; Bealt et al. 2016; Balcik et al. 2019), inter-organizational relationships (e.g., Moshtari 2016; Gunsee et al. 2018; Shaheen and Azadegan 2020; Azadegan et al. 2020c), routing and optimization (e.g., Besiou et al. 2014; De Vries and Van Wassenhove 2020), and pre-disaster preparations (e.g., Ye et al. 2020; Stauffer and Kumar 2021). The limited attention paid to organizational risk-taking behavior is an important omission because making risky decisions is an inherent part of disaster response management. In such contexts, decisions must be made in a quick and effective manner without adequate information in hand. A better understanding of humanitarian organizations’ risk-taking behavior, and its effects on organizational performance, is therefore of primary
importance to researchers and managers. This study aims to answer the following research questions: 1) *How does risk-taking behavior differ across organizational types involved in sudden-onset disaster response?* And 2) *How do risk-taking behaviors relate to sudden-onset disaster response outcomes?*

We attempt to answer these questions using an inductive, theory elaboration approach (Ketokivi and Choi 2014) that relies on explanations provided by organizational attention theory (March and Shapira 1987). We explore the applicability of the key tenets of organizational attention theory by four organizational types (established, expanding, extending, and emergent) in the context of sudden-onset disasters in the southern United States. We apply the organizational typology that was developed by the Disaster Research Center (DRC) (Brouillette and Quarantelli 1971; Dynes and Aguirre 1979). This typology categorizes disaster relief organizations based on their structure and operating tasks (Max 2020). During disasters, established organizations (e.g., police, fire departments, and utility companies) conduct tasks and organizational structures that are similar to tasks and structures used in normal times (Stallings 1978; Schmidt et al. 2018). Expanding organizations (i.e., primary disaster relief NGOs) are indirectly involved in disaster relief efforts during non-disaster periods and conduct similar tasks during disasters but make structural changes to increase their operating size (Brouillette and Quarantelli 1971; Max 2020). During disaster relief, extending organizations (e.g., shelters and food banks) retain their pre-disaster structure but engage in new tasks (Stallings, 1978). Emergent organizations (e.g., company-sponsored or church-sponsored volunteer groups) are newly formed, typically informal, and comprise affected area residents who develop structure and tasks during disasters that are aligned with their intended accomplishments (Schmidt et al. 2018).

Risk-taking literature suggests that dynamic and unstable settings reduce risk-taking behavior. Such behavior is related to performance outcomes, which could be linked to outcomes such as improved action speed (agility), and recognition of the need for structural changes (adaptability) to meet the changing environment. Appropriate risk-taking behavior must also reflect the extent to which various efforts are calibrated (alignment). These three performance factors are outlined in the Triple-A model (Lee 2004). Given the above, we examine the risk-taking behavior of the four organizational types by gathering data
from qualitative interviews with 60 managers in 24 organizations that responded to hurricanes, tornadoes, and floods. Next, we explore how disaster relief organizations’ risk-taking behaviors affect the three performance dimensions proposed in the Triple-A model.

This study offers several important contributions to the humanitarian operations literature on organizational risk-taking. First, it extends the existing humanitarian relief literature by offering a framework that explores the nuances associated with organizational risk-taking behavior based on organization type and the stage of sudden-onset disaster relief. Second, the study contributes by differentiating between four main organizational types and by proposing four subtypes. The subtypes are proposed according to how their manifested risk-taking behavior leads to performance outcomes. Third, the study examines the underlying influencers of risk-taking behavior. This study makes important contributions to the humanitarian operations field and to the literature on organizational risk-taking by identifying how organizational type and context affect an organization’s risk-taking behavior during disaster relief operations.

2. Literature Review and Theoretical Understanding

2.1 Organizational Attention Theory and Risk-Taking

Risk reflects the variations in a distribution of possible outcomes, their likelihoods, and their subjective values (March and Shapira 1987, p. 1404). Risk-taking behavior is defined as taking action under circumstances that might not lead to the desired outcomes. In organizational attention theory, March and Shapira (1987) theorize that organizational attention is a key determinant of how risk is assessed and how decisions are made. The model suggests that, since organizations cannot focus on everything at once, especially in complex situations, risk-taking behavior depends on which factors influence its prioritized attention. It should be noted that risk-taking, which is the tendency to make risky decisions (Lehman and Hahn 2013), is notably distinct from risk management, which involves controlling and mitigating risks (Azadegan et al. 2020a, Azadegan et al. 2020b).

An organization’s risk-taking behavior is determined by its aspiration for resources and desire to survive (March and Shapira 1987, 1992). Resources that exceed current aspirations lead to resource slack, which reduces fear of failure, leading managers to take larger risks, relax controls, and increase
experimentation (March and Shapira 1992; Greve et al. 2003). Conversely, when resources are limited, organizations will reduce risk-taking and implement tighter procedural controls (March and Shapira 1992; Greve et al. 2003). Risk-taking may also be influenced by organizational survival. For example, an organization in the early stages of financial distress will focus on survival and act conservatively; however, when threats to survival increase and the organization nears bankruptcy, it may exhibit greater risk-taking behavior (Chen and Miller 2007).

Organizational attention theory has been subjected to numerous empirical tests in previous organizational behavior research. Scholars broadly agree that risk-taking behavior depends on imminent threats to survival, level of performance above aspirations, or more nuanced factors (Greve et al. 2003; Chen and Miller 2007; Chen and Bozeman 2012, McNamara and Bromiley 1997, Lehman et al. 2011). Yet, despite organizational scholars’ interest, the theory has received limited attention in the humanitarian operations literature. The matter is surprising because the theory provides valuable insights into why organizations, humanitarian or otherwise, make different decisions within the same context as a result of their attention on resource slack or survival aspirations.

2.2 Organizational Risk-Taking Behavior and Humanitarian Operations

The risk behavior literature falls into three broad categories: individual risk behavior, organizational risk-taking behavior (e.g., managers’ decision-making behavior), and corporate finance risk-taking (McNamara and Bromiley 1997). This study focuses on organizational risk behavior, which is distinct from individual consumer behavior and risk behavior for personal gain (Stewart and Roth 2001; Dong 2015). Table 1 summarizes the organizational risk behavior literature.

Two particular observations are notable from a review of literature on organizational risk-taking. First, the majority of studies in this arena refrain from actually including the effects of risk-taking behavior on organizational performance. A few recent studies include innovation and financial performance as part of their work (Nicholson-Crotty 2017, Varma et al. 2020). For instance, Arrefelt (2018) applies meta-analysis relate risk-taking to ROA and Tobin's Q. As related to innovation performance, Arrundlel (2017) highlights the importance of risk-aversion in developing service innovations by public entities. Surprisingly, limited
attention has been paid to the effects of risk-taking behavior on relational performance – that which affects performance across organizations. Our study offers insights in this regard.

As expected, a large majority of empirical studies have placed focus on risk-taking behavior by commercial entities operating in normal contexts. In contrast, very few focus on the public sector (e.g., Nicholson-Crotty 2017, Arundel 2017). Even fewer studies have examined risk-taking behavior and outcomes in NGO organizations (e.g., Jenkins et al. 2015). For instance, Bankoff & Hilhorst (2009) compare risk-taking by NGOs and state organizations based on the prevailing social order. Another notable example is the work of Jenkins et al. (2015), which elaborates on how local non-profit organizations leverage risk-taking behavior to meet the emergent needs of Hurricane Katrina disaster victims.

Insert Table 1 here

While humanitarian operations management scholars often discuss the risks faced by disaster relief organizations, they pay limited attention to risk-taking behavior or its effects on organizational performance (Holguin-Veras et al. 2012). For instance, although Besiou et al. (2014) discuss decision-making in humanitarian operations, they concentrate on decentralizing and implementing aid programs. Jahre (2017) discusses how supply chain risk management strategies (e.g., postponement and strategic inventory) can be applied to humanitarian contexts but sets aside any discussion on how risk-taking behavior influences such strategies. This leaves a gap in our understanding of how risk-taking behavior affects humanitarian organizations’ disaster response.

To bridge this gap, we framed our study using the DRC typology (Brouillette and Quarantelli 1971), as noted earlier. We applied the Triple-A model to capture organizational performance outcomes (Lee 2004). The Triple-A model’s underlying assumptions include uncertainty and dynamism in the environment, and it asserts that in such settings, operational and structural adjustments (resource agility and adaptability) along with effort calibration (resource alignment) become important performance markers (Mak and Shen 2020). Here, agility is defined as the ability to rapidly respond and deploy resources to effectively overcome disruptions, on demand. Adaptability is the ability to adjust and modify organizational strategies, operations,
and activities on demand. Alignment is the ability to create dynamic roles, risk and resource sharing for better performance (Lee, 2004; Holguín-Veras et al. 2012).

2.3 The Organizational Typology in Disaster Relief

The DRC typology categorizes organizations into four types based on whether the tasks they perform during disasters are regular or non-regular and whether their response is based on existing or new organizational structures (Brouillette and Quarantelli 1971). To the best of our knowledge, no other well-established or long-standing typology of this short is available\(^1\). Figure 1 and Table 2 offer explanations on the DRC typology. Additional detail regarding the DRC typology can be found in the Online Supplement.

While several studies have applied and validated the DRC typology, validation of the typology is limited by lack of examination according to organizational structure and tasks (Schmidt et al. 2018, Max 2020). Nor has the DRC typology been empirically validated in disaster relief settings or as related to organizational risk-taking behavior. The lack of validation is a limitation because it can be difficult for managers to coordinate a humanitarian response in high-risk situations without a solid understanding of their organization’s risk-taking behavior.

2.4 Performance Outcomes in a Disaster Context

Generally, operations performance measures are framed by cost, quality, delivery, and flexibility (CQDF) (e.g., Ferdows and De Meyer 1990, Wong et al. 2011). The CQDF dimensions are suitable for measuring performance under stable conditions (i.e., “blue-skies”). However, the operating environment is distinctly different during disasters (“gray-skies”). Lee’s (2004) Triple-A model is a fitting model for measuring performance in unstable settings (Erhun et al. 2020, Sodhi and Tang 2020). It asserts that in such ever-

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\(^1\) The only other classification of disaster response organizations known to us is based on institutional types, which differentiates between public and non-profit organizations and between large national and small local organizations. An example of recent work using this classification is by Shaheen and Azadegan (2020). The classification was not applied because of inadequate nuance in explaining risk-taking and organizational attention.
changing settings, performance is reflected by agility (the ability to quickly respond to change), adaptability (accommodating structural shifts in the environment), and alignment (integration and process calibration).

The Triple-A model also fits for another reason. During disasters, humanitarian organizations’ performance is measured by the number of lives saved and quality of life improvements implemented (Beamon and Balcik 2008). This is, in contrast, to simply considering costs, profits, and losses (Day et al. 2012). Applying the Triple-A model to humanitarian settings was first advocated by Van Wassenhove (2006) (See Figure 8 on page 486). Others have since clarified Triple-A model applications. For instance, D’Haene et al. (2015) highlight the importance of rapidly responding to short-term changes in humanitarian settings through resource agility. Wild and Zhou (2011) explain the importance of adaptiveness by international aid organizations in ensuring ethical procurement.

Literature suggests that unstable settings affect risk-taking behavior (Hoskisson et al. 2017). The organizational attention model asserts that risk-taking also depends on problem framing and on how the context is perceived (March and Shapira 1987). It follows that depending on the perception of the circumstance, organizations may be risk-averse or risk-taking. Moreover, if appropriate risk-taking behavior is related to performance outcomes, these outcomes could be linked to improved action speed (resource agility) and recognizing the need for structural changes (resource adaptability) to meet the changing environment. Appropriate risk-taking behavior must also reflect the extent to which various efforts are calibrated (resource alignment) (Lee 2004).

3. Methodology

3.1 Research Design

This study used an exploratory design, employing an interpretivist research paradigm based on a multiple case design (Eisenhardt 1989; Narasimhan 2014). Given the scant risk-taking literature in humanitarian efforts and the unique aspects of humanitarian supply chains, we adopted a theory-building approach (Eisenhardt and Graebner 2007). Our initial conceptualization of the research questions was based on the

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2 We appreciate comments from the anonymous reviewer at POMJ for guidance on the need to highlight the relevance of the Triple-A model in this research.
key tenets of organizational attention theory. Therefore, the study conformed to what Merton (1968, 9) called “mid-range theory.” This strategy reflects theory-building through theory elaboration (Ketokivi 2006).

We used a case study research design because we were examining a contemporary phenomenon about which little is known (Yin 2018). Our unit of analysis was the relief organization involved in disaster relief, and the study context was sudden-onset disasters in the southern United States. Organizations were strategically selected based on the DRC typology (Brouillette and Quarantelli 1971; Stallings 1978). To be qualified, organizations had to have responded to more than one of the following sudden-onset disasters: Hurricanes Harvey, Irma, Maria, Nate, Florence, Michael, the 2019 Arkansas River Floods, the 2020 Easter tornado outbreak, and the April 2020 tornado outbreak. To permit cross-case comparisons and achieve analytical generalizability (Eisenhardt 1989), 24 organizations were studied, four in each DRC typology. Two to four informants from each of the 24 organizations were interviewed. It should be noted that interviewees clearly differentiated between their individual risk-taking and that of the organization. In other words, their responses reflected organizational risk-taking behavior in line with our level of analysis.

We focused on sudden-onset disasters because they tend to carry heavy damage (i.e., have large severity), involve a multitude of parties from a cross-sector of organizations, and require a relatively well-defined, multi-step response and recovery process. These unique factors make organizational risk-taking behavior more pronounced and observable. In the period chosen for data collection, man-made disasters of a size that required the involvement of multiple parties across multiple states were not available to us. Our choice of disasters was also justified by their recency (occurring after 2017) in order to ensure proper recall. All selected disasters caused significant damage, requiring significant risk-taking from multiple organizations involved in the response process. Figure 2 shows the research process steps: formulating the research questions, theory development, and results reporting.

3.2 Data Collection

Data were collected from January 2017 to October 2020 using rigorous data collection measures to address construct validity, internal and external validity, and reliability concerns (Eisenhardt 1989; Barratt et al.)
First, an interview protocol was developed to increase study reliability (see Online Supplement). Questioning employed a funnel approach, with general questions asked first and more specific and refined questions asked toward the end (Charmaz and Belgrave 2007). Table A-2 in the Online Supplement provides additional details on the tactics employed to ensure the study’s validity and reliability. The interview protocol covered broad themes related to risk-taking behavior and more specific questions focused on risk-taking during the immediate response and short-term recovery period. We defined immediate response as the day of the disaster and the following three weeks and short-term recovery period as three weeks to three months after the disaster has occurred (Holguín-Veras et al., 2012).

For data triangulation and to address construct validity concerns (Yin 2018), data were collected from three sources. In-depth, semi-structured interviews with key informants allowed us to reflect on respondents’ experiences and perceptions within the U.S. disaster management community. We started with established organizations and used a snow-ball sampling technique to identify key informants in other disaster relief organizations. We validated the qualifications of the informants through a LinkedIn search. The combination of snow-ball techniques and LinkedIn ensured that input was gathered from the most qualified informants. Before the interviews, we sent each participant an e-mail highlighting the study purpose and the specific areas to be investigated during the interviews.

During the interviews, informants were encouraged to recall their individual and organizational activities in the immediate response and short-term recovery stages of the studied sudden-onset disasters. Interviews were 50 minutes on average and were digitally recorded and transcribed. Sixty interviews were conducted, resulting in over 57 hours of recording. We ensured that all organizations represented diverse groups in terms of disaster relief missions, responsibilities, and roles. To maintain confidentiality,

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3 The data collection purposefully refrained from including data related to the COVID-19 pandemic. This was justified by the fact that such pandemics essentially causes human losses and are primarily led by Health organizations. The selected sudden-onset disasters (hurricanes, floods, and tornadoes) lead to great destruction of infrastructure and equally involve a multitude of humanitarian organizations. We thank anonymous reviewers at POMJ for highlighting and clarifying this distinction.
organizations and informant names are not disclosed. Tables 3a-d summarizes the organizations that were interviewed using the National Response Framework codes (FEMA 2016), which are employed by the United States Emergency Support Function (ESF) to group organizations that provide federal and state support for declared disasters and emergencies. ESF #13 includes public safety and security, #4 is firefighting, #3 includes public works and engineering, and #12 includes energy (utilities). Each organization’s geographical area and population are shown in Tables 3a-d. Disaster experience was based on respondents’ self-reported number of times involved in disaster situations, as well as their length of experience in years.

Supporting evidence (e.g., internal documents, after-action reports, email correspondence, and web postings) was gathered to verify the interview findings and improve construct validity (see Table 4 for descriptions of the supporting evidence). Visits to organizations’ facilities, listening in on inter-organizational conference calls and studying archival materials added to the depth of the analysis. Investigator triangulation was accomplished by confirming that information provided by the different informants and the foundations of each disaster were aligned (Lockström et al. 2010; Barratt et al. 2011). This step was conducted by two members of the research team who cross-checked and reviewed the informants’ interview files, observations, and other materials (Lockström et al. 2010).

Insert Table 4 about here

Investigator triangulation reduces potential bias in collecting, coding, and analyzing the data, increasing the credibility of the research findings. It also enhances the study’s creative potential and facilitates convergent perceptions (Eisenhardt 1989, p. 538). Throughout the data collection and analysis process, the DRC typology and organizational attention theory were compared to themes emerging from the data (Voss et al. 2002; Barratt et al. 2011). When new findings emerged, we formed new theoretical insights and elaborated the theory (Barratt et al. 2011).

3.3 Data Analysis

Within- and across-case analyses were conducted. First, cases from each type of organization were compared to one another. Then, a cross-case analysis was conducted. Section 4 explains the details of the cross-case
analysis. Next, the systematic three-step approach to theory building suggested by Gioia et al. (2013) was used to analyze the interview data and supporting evidence. During the first step, NVivo 11 software was used to identify a set of first-order categories in the data (at the informant's level of meaning). This step applied single codes to a large unit of data to detect the overall sense of content and identify new categories for coding (Corley and Gioia 2011). Using pattern-matching logic (Braun and Clarke 2006), the initial codes were collated and linked to second-order themes, such as willingness to take risks, prior experience, reference points, risk-taking activities during an immediate response, and risk-taking activities during a short-term response. The coding considered responses that reflected organizational risk-taking behavior in line with the level of analysis. Next, we revised and refined the themes, identified ways to link them, and created clear definitions and names for each theme. Finally, the process was repeated by a second member of the research team to enhance inter-rater reliability (Gioia et al. 2013; see Table A-1 in Online Supplement 1 for examples of the data coding categories and progression). We ensured inter-coder reliability by having two coders categorize content gathered from the interview transcripts, emails, recorded observations, and documents (Dube et al. 2016, Roscoe et al. 2019). Using these categorizations, we calculated a numerical index for the extent of agreement between the coders using NVivo 11 software ($\alpha=0.95$). The two coders discussed the coding until the agreement between researchers reached 100%.

We collected data until there was consistency across the interviews and no new observations emerged (Binder and Edwards 2010). In this case, consistency and lack of new insights (for each type, established, expanding, extending, and emergent) occurred at the point of saturation, after we had interviewed between 13 and 17 informants for each organization type.

4. Findings

4.1 Within-Case Comparison

4.1.1 Risk Propensity of Established Organizations: Category-Based Distinction

The findings highlight that risk-taking behavior varies among the four organization types. Established organizations demonstrated a general aversion to risk-taking because of stringent protocols and standard operating procedures that restricted individuals’ actions. Practices and protocols are designed to handle risky
situations; thus, risky behavior beyond normal standard operating procedures is not commonplace. Staff members are trained to deal with relief situations and carry out tasks by carefully following protocols; therefore, staff members do not perceive situations as particularly risky or outside their job role’s norms.

However, case evidence suggests that established organizations comprise two sub-types with nuanced risk-taking behavior during disasters. The support services sub-type (EST-SS) includes utility companies and infrastructure repair organizations, and the victim support sub-type (EST-VS) includes police, fire departments, hospitals, and nursing homes. Results suggest that EST-SS organizations are particularly risk-averse because they are not typically in direct contact with victims. An electric utility company member explained his organization’s methodical approach to addressing disaster-related efforts:

_We are very restrained in what [our employees] do, and I do not think that we do take a lot of risks. We are very structured. We are very restrained, very methodical. We are not like [the] police._

[Planning Program Manager, EST.SS-1-Public]

The Infrastructure Service Manager of an urban planning group explained how customers viewed their organization’s response efforts during disasters as “slow and safe.” Other informants offered similar observations about why they refrain from risky situations. For instance, the Director from EST.SS-3-Public highlighted how his organization does not take risks, even it is labeled as “sluggish.”

We noticed nuanced behavior in the EST-VS subtype organizations, which are in direct contact with victims. This sub-type, while still bound by institutional norms, shows slightly more willingness to take risks, albeit within certain boundaries. A member of the local fire department explained how his organization may take risks beyond normal protocols in certain cases:

_Generally, we perform our regular operations during hurricanes…. However, there are also nonprofit organizations that have different models to fulfill their mission. Therefore, in order not to create tension, we would go beyond our protocol to avoid creating problems and friction. It is not necessarily risking our lives…. but not [following] the structure brings certain risks to what we do._

[Division Chief, EST.VS-2-Fire]

A member of the police force explained how his organization follows a structured protocol but expects some level of risky behavior by its members during disasters:

_We have a very structured hurricane response. We divide our operations into two categories. Half of them basically do hurricane operations [for example, monitoring shelters and stadiums refurbished to house displaced citizens], and then half of them do routine normal patrol operations_
[for example, 911 emergency or attempted robbery calls]. Sometimes, the patrol operation group will need to do something risky, but that is what we all signed up for. [Training Captain, EST.VS.1-Police]

A sheriff from a different police force involved in tornado response highlighted how his organization considers the regulations and “stays in their lane” to carry out its responsibilities appropriately. Another interviewee from the police department explained how they had employed means that were unfamiliar to them, with unpredictable outcomes, including looking for used generators and sending multiple drivers to look for fuel to make an offsite location operational. These observations, alongside other case evidence, suggest that established organizations refrain from risky activities beyond their existing protocols (see Table B-1 in the Online Supplement for additional case support). This is particularly true for the EST-SS subtype. The EST-VS subtype took relatively more risks but maintained its operating protocol to the extent possible.

4.1.2 Risk Propensity of Expanding Organizations: A Temporally Based Distinction

The case analysis results suggest that expanding organization’s risk behavior is contingent on the disaster period. During the immediate response period (see Table 2 for definitions), expanding organizations leaned toward caution. One informant explained how her organization refrained from taking risks during the immediate response stage because it already had sufficient donor support:

The donors and the companies that support us .... are funding us in some way and the relationships you have with your donors are critical. That is why I would sometimes think very carefully about performing a task that might jeopardize these relationships in the future. For example, during Irma, we had hundreds of thousands of dollars coming from our donors. As a result, we just quietly did our job... we had everything we needed. [Executive Director, EXP-1-Disaster Response]

An Executive Director explained how her organization exhibited cautious behavior during the immediate response stage because of the intense news and social media spotlight, since unnecessary risks could damage the organization’s reputation. A third informant explained how the outpouring of donations and volunteers helped keep his organization’s focus on carrying out business as usual and avoiding activities that were deemed unnecessary.

Case evidence suggests the potential for extra scrutiny from media and donors and abundant resources leave expanding organizations less prone to taking risks during the immediate response period. However, their risk-taking behavior shifts during the short-term recovery stage when the media spotlight
dims and financial donations are no longer pouring in. One informant explained how the changing landscape allowed them to be more open to risk-taking behavior:

"First, the donations were pouring in, and we had so many volunteers who were ready to workday and night. However, less than 2 weeks after Irma hit Florida..., all the NGOs and donors started bringing their resources to Florida, so we were left with almost nothing. At that time, I needed to take a risk. In less than a month, donations [were] gone and I needed to find the money. When you are there, when you see that after a month, people are still suffering and the areas are still flooded, you will do everything to deliver those needs." [Training and Development Manager, EXP-5-Disaster Response]

Lack of public and media attention can be a concern in the short-term recovery phase when donations diminish, and volunteers return home. Being open to risk-taking behavior can help maintain attention on the disaster and extend contributions of funds, resources, and volunteers. An informant highlighted how diminished public and media attention required his organization to take risky, outside-the-box approaches:

"After a month, donations decreased, and all volunteers went back to their jobs, so we needed to think out of the box to find resources. That is, I think we take more risks just to raise the awareness of the public that the response is not over yet, and people still need help." [Area Coordinator, EXP-4-Disaster Response]

The case evidence suggests that the risk of reputational damage from errors of judgment makes expanding organizations risk-averse during the immediate response period (See Table B-2 in the Online Supplement for additional case support). During this period, expanding organizations prefer not to risk their relationships with current donors and partners. However, as media-attention wanes and resources begin to dwindle, the operational landscape changes. During short-term recovery, risk-taking becomes beneficial to expanding organizations through improved recognition of the organization, potential rewards from donors, and additional volunteers. These observations suggest that risk-taking behavior in expanding organizations influences donors and media attention.

4.1.3 Risk Behavior of Extending Organizations: A Temporally Based Distinction

In contrast to expanding organizations, extending organizations engaged in risk-taking behavior during the immediate response stage but took fewer risks in the short-term recovery stage. This might be because immediate responses and short-term recoveries represent different operational contexts for extending organizations, leading them to prioritize certain disaster aspects over others. Extending
organizations do not have established funding sources or the name-recognition of expanding organizations. Tight budget constraints are extending organizations’ primary challenge. Most have very limited, if any, emergency financial reserves and follow a “pay as you go” philosophy. Therefore, extending organizations exhibited more risk-taking behavior to draw positive attention to their organization and cause. One informant explained how the immediate response stage was an opportune time for taking larger risks:

[During gray sky conditions,] ... all the volunteers are there, on the ground, and being there gives me an opportunity to discuss and figure out how to get things back on track, and that really makes the difference. The fact that I am not in the office allows me to probably push the envelope and be able to do more, probably take a greater risk to do something maybe a little further versus when you are not on the ground. [Executive Director, EXT-3-Food]

The following quotation explains how increased public and media attention presented an opportunity for extending organizations to take risks and attract funds.

The disaster response is probably what we are most well-known for because it receives the most media attention. Anytime there is a big disaster, media outlets are wanting to know who is doing what, who is responding, what are you doing, and what are some stories. We get a lot of attention during times such as that. In the interest of trying to develop our messaging and our branding, we will send a team right to a center of [the] disaster, and it helps us with fundraising for other projects. [Executive Director, EXT-5-Human Services]

In the short-term recovery period, extending organizations shifted their behavior and took fewer risks because of the limited positive potential. One extending organization informant explained that the time pressure decrease made it unnecessary to take on risks:

... After a couple of weeks, the urgent needs were met, and we raised some extra money to support our cause. Most of the victims were able to return to their houses.... For those that still needed help, we would help but there is no time pressure. [Chief Operating Officer, EXT-3-Food]

Other informants offered a similar interpretation (See Table B-3). Another extending organization informant clarified that his organization would limit risk-taking in the short-term recovery period because the media had left. These findings suggest that at the onset of a disaster, extending organizations take more risks because the positive potential of their risky activities benefiting their reputation supersedes the negative potential of risky activities leading to errors (See Table B-3 in the Online Supplement for additional case support). Extending organizations see additional public and media attention as an opportunity to raise their media profile and attract financial donations that could be used to support their regular causes. During the
short-term recovery stage, the positive outcomes from risk-taking are limited for extending organizations, leading them to be risk-averse. Overall, risk-taking behavior for extending organizations is driven by media attention and donors.

4.1.4 Risk Propensity of Emergent Organizations: A Category-Based Distinction

Case evidence suggests that emergent organizations generally see risk-taking as beneficial, with many believing that there is not enough risk-taking in traditional disaster relief. Within-type analysis results suggest that emergent organizations comprise two subtypes. The first, EMR-SE, is created through social gatherings (e.g., church-based volunteer groups) and has a strong propensity toward risk-taking, possibly as a result of their loose social structure. A member of this subtype explained how her organization “risked their lives” because they value the well-being of their community members:

Our county was affected during the storm, and we called a hotline to request some help, but no one showed up. Then, we were stuck with only the resources of our county.... People needed us and all those NGOs were not coming. We risked our lives, but we did what we have to do because we are all one community, and we need to stick [with] each other. Finally, [Name of NGO] showed up and started telling us what to do, what we were not doing right. [Assistant Pastor, EMR.SE-1-Spiritual]

Other EMR-SE informants offered similar evidence. One explained that despite warnings from local authorities, her group decided to ensure that community members’ needs were addressed. The other explained how, unlike “fearful” organizations, their organization does all that it can during disasters.

We organize groups of people to go out and do clean-up after tornadoes. We try to do as much as we can in those moments of crisis. There are always those that are fearful, not like us, and we understand that. But those who [respond] are doing everything in their power to help those affected by tornadoes. We want people to be safe. [Emergent Group Leader, Spiritual-SE-3]

The second emergent subtype, EMR-EE, is enterprise-based and is created through company and enterprise initiatives (e.g., company volunteer groups). EMR-EEs exhibited slightly more cautious risk-taking behavior, possibly because of inherent indirect organizational protocols.

Since our region was affected the most during Irma, we decided to go out the next day and help clean up the streets. Almost everyone from our law firm was there. We wore T-shirts with our logos and took pictures. We helped a lot, and it was risky—there were trees everywhere, one of my partners needed to go up [on] the roof of one of the houses to remove some branches. Later, [Name of the NGO] showed up, and they were not happy with us putting ourselves in danger, but our community needed us, and we were there. We both helped people and represented our firm well. [Clinical Educational Manager, EMR.EE-2-Business]
These observations suggest that while there are no official organizational protocols, emergent organizations’ overall risk-taking behavior is influenced by a strong belief in helping victims and minimizing their suffering at any cost (See Table B-4 in the Online Supplement for additional case support). The EMR-SEs’ loose social structure strongly influenced their willingness to take on risky behavior. The same underlying influence (belief in need to help victims) motivates EMR-EEs to manifest risk-taking behavior. However, certain indirect organizational protocols make EMR-EEs slightly more cautious than EMR-SEs.

4.2 Cross-Type Comparison: Organizational Risk Taking and Performance

There were notable observations as related to the association between each organization type’s risk-taking behavior and the Triple-A model’s (Lee 2004) three dimensions of performance. Established organizations’ risk aversion was associated with alignment, especially alignment of organizational resources. For instance, one established organization informant highlighted the importance of alignment over risk-taking:

“Everybody works as a team, and everybody has their own task in that team. Especially during a hurricane, there is no just, "Okay, I'm just going to go out and drive and see what I can do."” Another informant explained how the risk-averse approach of using pre-established protocols and pre-assigned responsibilities (as determined by a special planning group) was linked to personnel efforts alignment:

We actually have a special group that sets up a hurricane plan. The activation is very costly, so we need to ensure that we use our funds and supplies proficiently. They have locations set up beforehand for us to go to when and if we get activated. They actually have a hurricane plan that they prepare. They're the ones that do all the budgeting and determine where we're going to go. Then they send out the plans to each individual officer and act strictly according to the plan [Training Captain, EST.VS-1-Police]

Infrastructure Services Manager highlighted how the risk-averse approach of proceeding carefully and waiting for more resources to show up was associated with resource alignment. In established organizations, risk-averse behavior led to improved performance through resource alignment (See Table B-5 in the Online Supplement for additional case support).

During the immediate response, expanding organizations’ risk-aversion is associated with better alignment in the use of resources. One informant notes: “Risking is going to be rough because it seems like no matter what we do, [some person finds] fault in us. As such, we hold back to line up the ground units and
supporting organizational staff.” Another informant describes how internal coordination (i.e., alignment) is linked to avoiding unnecessary:

Let me give you an example. In the aftermath of the hurricane, we work with all kinds of senior communities. The call came up that some of our low-income senior complexes and whatever were without power, were without cooling, and water and ice.... Some of us [internal departments] gathered supplies together to give.... You know what I'm saying? I think for me, that inner coordination piece is the key, it’s not about doing unnecessary risk taking, it’s all about acting meticulously by engaging every individual employee and volunteer. [Executive Director, EXP-1-Disaster Response].

Director of Emergency from another expanding organization associated risk aversion with minimizing reputational impacts. In the case described below, internal alignment minimized internal conflict by having everyone act as one unit. In the short-term recovery period, expanding organizations’ risk-taking was associated with improved adaptability. One respondent explained how the need for donations during the short-term recovery period forced his organization to take risks by modifying its processes and functions:

...We are very structured and for us any modification of the functions or processes is a risk. But to get extra funding or constructional materials, we need to do it. [Director of Emergency, EXP-6-Disaster Response]

Chief Programs Officer highlighted how his organization’s risk-taking behavior during the short-term recovery period was associated with its ability to restructure resource use. One informant highlighted how his organization’s change toward increased risk-taking was linked to restructuring resource use toward a more adaptive approach:

Then [During Short-term recovery], shortage of donations happens but tornadoes result in billions of dollars of property damages... that’s when we step up... We integrate our processes, structure, and people to provide essential aid. We think and act beyond the traditional approaches to raise the funds. [Response Program Coordinator, EXP-6-Disaster Response]

As noted earlier, expanding organizations shift their behavior from risk-aversion toward risk-taking as the disaster progresses. These contrasting behaviors are associated with improved resource alignment in the immediate response and better adaptability in the short-term recovery stage.

Extending organizations’ risk-taking behavior during the immediate response enhances performance through improved agility. One informant explained how they reacted to a youth shelter’s needs by moving the youth to safer places during Hurricane Irma: “It was risky, but we did that right away without much
thinking based on the situation. [Director of Mission, EXT-4 Community].” Another extending organization informant emphasized how his organization’s risk-taking approach in the immediate response stage was associated with a quick adjustment to the situation on the ground [President & CEO, EXT-3-Food]. Another informant explained the importance of adjusting to the situation during immediate response and calibrating efforts with partners during the short-term recovery:

Agility is in everything we accomplish, and it is absolutely essential if you decide to respond.... During the flooding last year, we used our delivery vehicles to transport people into higher lands. It was super risky cause if the truck got damaged, we did not have extra $100,000 to get a new one. But we literally had no time to make the decision. [Chief Operating Officer, EXT-6-Food].

In contrast, during short-term recovery, extending organizations’ risk aversion was associated with improving performance through resource alignment. One extending organization informant explained this approach. Another explained that while they avoided risk-taking in the short-term recovery stage, they focused on resource alignment bringing all their resources to the table:

For the recovery, we do not act quickly or take risks as you call it, typically we put out a funding appeal, and they raise money from all over the country. We then bring to the table all the resources that we have raised, and we had before. [Assistant Director of Procurement, EXT-1-Food]

Shifting to a risk-taking approach is associated with extending organizations improving their performance through better adaptation in the immediate response stage but toward resource alignment in the short-term recovery stage. Much of emergent organizations’ focus is on rapid response to the needs that may have been side-stepped by other organization types. As noted earlier, emergent organizations demonstrated higher levels of risk-taking behavior, which the evidence suggests was associated with improving performance through agility. One emergent organization informant explained how they made-do by gathering resources from volunteer’s garages, allowing them to quickly help their neighbors. Another emergent organization respondent stressed how they did not have time to wait for additional resources from other organizations, and therefore needed to use alternative resources (i.e., other people) to help utilize their own existing resources:

Speed is everything, I am telling you with our experience during Harvey. Everyone was so slow, [Name of NGO] was talking with [Name of NGO], [Name of Government Agency] was following the rules. But people needed help, houses were ruined, there was a deadline for filling the
paperwork. We actually did not wait, we used our resources rapidly, we asked for additional people through our alumni, we got things done. [Faculty Member, EMR.EE-1-Education]

Overall, we note that Emergent organizations’ risk-taking behavior is associated with improvements through agility in using resources.

5. Discussion and Conclusions

While the discourse on collaboration and coordination in disasters is increasing in depth and significance (Holguín-Veras et al. 2012; Altay and Pal 2014; Moshtari 2016), there is little empirical evidence on how disaster relief organizations consider risk-taking during sudden-onset disasters. This study offered findings that help bridge this important gap. As noted earlier, the organizational attention model (March and Shapira 1987) suggests that, since organizations cannot focus on everything at once, their risk-taking behavior depends on the focus of their prioritized attention. The findings from this study revealed four influencers draw organizational attention toward either risk-taking or risk-aversion (Figure 3). For established organizations, the driving influencers are regulations and institutional norms. For expanding and extending organizations (contingent on the disaster recovery stage), organizational attention teeters between donor influence and scrutiny by the media. For emergent organizations, the driving influence is the victims’ well-being. Furthermore, for the EST-SS subtype, organizational attention is on following established protocols and adhering to regulations; the chain of command and protocols move organizational behavior away from risk-taking. For the EST-VS sub-type, exposure to and interaction with disaster victims draws attention to victims’ needs, making them more open to risk-taking behavior when necessary. Therefore:

**Proposition 1a:** For established organizations, institutional norms and protocols lead to risk-averse behavior during sudden-onset disasters.

**Proposition 1b:** Risk-aversion is less pronounced in the established organizations victim services subtype (EST-VS) in contrast to the support services subtype (EST 1-SS) because of their direct contact with and awareness of victims’ needs.

For expanding organizations, disaster relief involves a balancing act of meeting donor expectations alongside meeting victim needs. During the immediate response stage, the surge in public and media scrutiny drives expanding organizations to attend to continuity in donor relationships. However, during the short-term recovery stage, attention shifts toward attracting and replenishing resources. Combined, this leads to a
shift from risk-aversion and risk-taking (Figure 3). Interestingly, the same factors lead to the opposite behavior by extending organizations. Extending organizations, which have limitations regarding their source of funding and name recognition, take risks during the immediate response stage to draw positive attention to themselves and their causes. However, extending organizations shy away from risk-taking behavior in the short-term recovery stage. These findings lead us to propose the following:

**Proposition 2a:** Expanding organizations exhibit relatively more risk-averse behavior in the immediate response because of public and media scrutiny and to avoid affecting incoming donations.  
**Proposition 2b:** Expanding organizations shift to relatively more risk-taking behaviors in the short-term response because public and media attention lessens, and resources begin to dwindle, creating a need to find novel ways to replenish funds and resources.  
**Proposition 3a:** Extending organizations exhibit relatively more risk-taking behavior in the immediate response stage to gain media attention and attract additional donor support.  
**Proposition 3b:** Extending organizations exhibit relatively more risk-averse behavior in the short-term response stage because media attention diminishes, and donor resources can no longer be garnished by drawing attention to their efforts.

Emerging organizations can be differentiated into two subtypes. The fact that the EMR-SE subtype is developed through social interactions suggests that these organizations are governed by social obligations. On the contrary, EMR-EE subtype is created through corporate or company interactions, which are governed by contractual obligations, even if only loosely or implied. We find that the EMR-SE subtype shows high risk-taking because of the limited influence of organizational and professional obligations. Therefore:

**Proposition 4a:** A strong emphasis on meeting the needs of the victims, and a lack of direct organizational protocol and stakeholder influence leads emergent organizations to take risks during sudden-onset disasters.  
**Proposition 4b:** Risk-taking behavior in the socially emergent services subtype (EMR-SE) is more pronounced than in the enterprise emergent services subtype (EMR-EE) because of their loose social structure.

Perhaps most importantly, our observations suggest for the association between risk-taking behavior and the three dimensions of performance outlined by the Triple-A model across the types and sub-types studied. We find an association between risk-aversion and resource alignment performance in established organizations, and between risk-taking and resource agility performance in emergent organizations. During our interviews, a community leader from the emergent organization explained how the organizations was able to swiftly reposition the donations made for the church’s primary mission toward the Hurricane Maria response. In the immediate response stage, risk-aversion by expanding organizations leads to resource
alignment performance, while risk-taking by extending organizations leads to resource agility performance. In the short-term response stage, risk-taking by expanding organizations leads to resource adaptability, while risk-aversion by extending organizations leads to resource alignment. Arguably, risk-aversion is leveraged to ensure inter-organizational resources are calibrated to work in tandem. The following propositions summarize the observations made. Table 5 provides a depiction of the findings as related to performance.

**Proposition 5a:** Established organizations’ risk-aversion is associated with performance improvement through better resource alignment.

**Proposition 5b:** For expanding organizations, risk-aversion during the immediate response stage is associated with improved performance through better resource alignment. Risk-taking during the short-term recovery period is associated with better performance through resource adaptability.

**Proposition 5c:** Extending organizations’ risk-taking during the immediate response period is associated with improved performance through better resource adaptability.

**Proposition 5d:** Emergent organizations’ risk-taking is associated with improved organizational performance through better agility in using resources.

Insert Table 5 Here

Our results regarding established organizations’ risk-averse behavior and emergent organizations’ risk-taking behavior are counterintuitive. Referencing the DRC typology, one might expect that organizations more familiar with disasters (i.e., established organizations) would be more open to risk-taking because of their experience and confidence. Their wealth of experience and training in managing similar situations should permit them to be open to risk-taking behavior, especially considering that people’s lives and well-being are at stake. The DRC typology also suggests that organizations with less disaster experience (i.e., emergent organizations) would be more risk-averse. However, our case observations offer a more nuanced explanation, which is, in part, contrary to these presumptions (see Propositions 1a and 4a).

Equally surprising is the shifting behavior of expanding and extending organizations. It is understandable that these organizations adjust their behavior depending on the landscape to best leverage their internal resources and improve their chance of collecting donations (i.e., external resources). However, it is both surprising and insightful that these two types actually behave in opposite ways during the immediate response and short-term recovery stages (Propositions 2a/b, 3a/b). An important factor to consider is that these organizations are responsible for essential needs, such as food, water, and basic medical supplies during
a sudden-onset disaster. Indeed, the last mile delivery of these supplies is a key aspect of disaster relief. We noted how, for each of these two types, risk-aversion during the two sudden-onset disaster stages was associated with better resource alignment, which is likely to assist in resource mobilization and material procurement.

6. Contributions

6.1 Theoretical Contributions

Our study’s theoretical contribution rests on its explanation of how organizational tasks, structures, attention, and context combine to influence organizational risk-taking behavior during sudden-onset disasters. Developing a series of propositions specific to the risk behavior of specific organizational types is a preliminary step toward exploring different organizational types’ risk-taking behavior during disaster relief operations and how the behavior may change in response to the context. In other words, our study moves beyond differentiating organizational risk-taking behavior to explain the behaviors’ underlying causes. We assert that, as the landscape of disaster operations changes, some organizations’ risk propensity is adjusted. This is an important contribution because much of the work to date has focused on anecdotal explanations and prescriptive emphasis on the importance of risk-taking by disaster relief organizations.

This study offers a framework of organizational risk-taking behavior during sudden-onset disasters (see Figure 3). In addition, the study contributes to the humanitarian operations management literature by introducing and empirically elaborating the DRC typology. Generally, humanitarian operations research examines the actions of governments, NGOs, and businesses during disaster relief (Tatham and Kovács 2010; Altay and Pal 2014; Besiou et al. 2014; Shaheen and Azadegan 2020). The DRC typology, a highly useful but less commonly applied typology in humanitarian supply chain research, can be a suitable starting point for differentiating various types of organization’s behavior. This study contributes to the DRC typology by differentiating between two subsets of established organizations and two subsets of emergent organizations.

This study also offers insights on risk-taking behavior in organizational management and contributes to the stream of literature related to organizational risk-taking (Shoham and Fiegenbaum 2002). It highlights
the key influencers affecting risk behavior by organizations in disaster relief. A handful of studies have highlighted the role of institutional norms in limiting organizational risk-taking (Shoham and Fiegenbaum 2002; Brettel et al. 2015). A few others have highlighted the role of media exposure and risk-aversion (Zavyalova et al. 2012; Yi and Youyang 2020). However, to our knowledge, no study has considered the four influencers identified in this study in tandem. In addition, the study augments insights by other scholars on behavioral operations (e.g., Hora and Klassen 2013). It exposes disaster relief organizations’ risk-taking behavior and differentiates the organizations based on their structures and tasks. We noted earlier the work by McNamara and Bromiley (1997), who suggest that organizational risk-taking involves individual factors (such as ambiguity avoidance) alongside organizational factors (such as the degree of formalized processes).

This study offers evidence of operational performance during sudden-onset disasters. Unlike ordinary times when cost and quality are the main performance drivers, humanitarian disaster relief tends to focus on different performance dimensions. Scattered resources need to be quickly aligned and adapted to the fast-changing settings. We provide a detailed explanation of how different risk-taking behaviors by different organizational types during different stages of a humanitarian disaster are justified by how well they improve performance based on resource alignment, adaptability, and agility (Lee, 2004, 130).

Finally, our study contributes to risk management in a disaster relief context. The volume of risk-taking research ranks quite low in the list of organizational behavior issues (Wieland et al. 2016). Although risk-related research (i.e., risk management) is growing at a rapid pace, studies on risk-taking behaviors in the public or nonprofit sectors remain scarce. Some studies have addressed the impact of structural or environmental features on organizational risk-taking propensity and behavior (Sitkin and Pablo 1992; McNamara and Bromiley 1997; Shoham and Fiegenbaum 2002). However, little empirical evidence connects sector differences to organizational risk-taking behavior, particularly in the aftermath of disasters.

6.2 Managerial Contributions

Given our findings, what should operations managers do differently? Our framework suggests that managers should begin by recognizing that organizations’ context, task, and structure are strong determinants of how risk-taking is viewed and practiced in humanitarian relief. As such, managers should adjust their risk-taking
expectations accordingly. For instance, those working with emergent organizations should recognize that risk-taking is embedded in these organizations’ way of thinking; therefore, expecting them to practice extreme caution may not be easy. Similarly, managers working for established organizations should recognize the heavy influence of standard operating procedures can be an inhibitor. More importantly, managers should recognize the importance of how the shifting operating landscape affects risk-taking behavior by expanding and extending organizations.

This study provides managers with a framework that illustrates organizational risk-taking on a continuum from risk-averse to risk-taking, which is important for humanitarian operations because they engage in collaboration among different organizations. It is important during disaster relief for partners and allies to know the extent to which they can rely on their organizational counterparts. Not all organizations are programmed to take all types of risk. For example, expecting a utility company to take risks above and beyond during a disaster is not feasible⁴. In other instances, the promise of improved public and media attention, which can lead to financial gains, can have a great influence on risk-taking behavior even for those concerned with disaster victims’ well-being.

6.3 Limitations and Future Research Directions

The current study has limitations that provide an opportunity for future research. We used a case design to build theory and achieve analytical generalization (Yin 2018), but our findings do not necessarily achieve statistical generalization. We focus our data collection on sudden-onset disasters because this category tends to carry heavy damage (i.e., large severity), involves a multitude of parties from a cross-sector of organizations, and requires a fairly well-defined, multi-step response and recovery process. However, in the period of data collection, man-made disasters of a size that required the involvement of multiple parties across multiple states were not available to us. Future researchers should examine the validity of our propositions by examining the risk-taking behavior of other organizations during man-made disasters.

Based on the methodology of the current research, it would be informative to test the propositions’

⁴ We appreciate comments from the anonymous reviewer at POMJ for clarifying the role and behavior of utility companies.
robustness by replicating the study with additional disaster relief organizations, concentrating on different types of sudden-onset disasters. In the period of data collection, man-made disasters of size that required involvement of multiple parties across multiple states were not available to us. Studying man-made disasters is certainly a viable context for future research. Another key matter is worth noting here. Clearly, the risk to one’s own health (and even life) becomes a critical consideration for individuals involved in disasters related to contagion, such as pandemics. Future studies focused on such unique disasters that pose life-threatening risks to those involved can offer further insights into how organizations can adjust their risk-taking behavior accordingly.

Our study was also limited to the immediate response and short-term recovery periods of a sudden-onset disaster, so future researchers may wish to expand our findings by examining the risk-taking behavior of different organizational types during the preparation and long-term recovery stages. Interesting findings may emerge by examining the propositions in different countries and different types of disaster. Particularly in the developing world, conditions can hamper organizational responses and potentially lead to more risk-taking behavior. It should be noted that frequent exposure to disasters may affect organizational learning, which can be an interesting area of research. In the developed or developing world, studying countries that may not have the same institutional and governmental structures as the United States may produce different findings. For instance, NGOs operating in countries with more socialist tendencies might behave differently. One might also expect different risk tolerance for sudden-onset disasters, such as hurricanes versus earthquakes (with after-shocks) or famine areas where wars or other problematic human activities are occurring.
References


<table>
<thead>
<tr>
<th>Authors</th>
<th>Findings</th>
<th>Type of Research</th>
<th>Sector Focus</th>
<th>Crisis Type</th>
<th>Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baird &amp; Thomas 1985</td>
<td>Highlights a series of variables affecting organizational risk aversion and managerial risk-taking behavior.</td>
<td>Conceptual</td>
<td>C</td>
<td>None</td>
<td>None</td>
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<td>Hoskisson et al. 1991</td>
<td>Extensively diversified firms reach limits to risk-taking and control loss reduces managerial risk-taking.</td>
<td>Conceptual</td>
<td>C</td>
<td>None</td>
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<td>Sitkin &amp; Pablo 1992</td>
<td>Highlights a series of variables affecting organizational risk aversion and risk-taking behavior.</td>
<td>Conceptual</td>
<td>C</td>
<td>None</td>
<td>None</td>
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<td>McNamara &amp; Bromiley 1997</td>
<td>Combination of organizational and cognitive risk factors overwhelm cognitive biases.</td>
<td>Empirical</td>
<td>C</td>
<td>None</td>
<td>None</td>
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<tr>
<td>Gilley et al. 2002</td>
<td>Executive team risk taking propensity has a positive effect on manufacturing outsourcing activities.</td>
<td>Empirical</td>
<td>C</td>
<td>None</td>
<td>Operational</td>
</tr>
<tr>
<td>Greve 2003</td>
<td>Shows high performance leads to lowering of risk-taking behavior in R&amp;D.</td>
<td>Empirical</td>
<td>C</td>
<td>None</td>
<td>Innovation</td>
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<tr>
<td>Kocabasoglu et al. 2007</td>
<td>Risk propensity mediates the relationship between uncertainty and investment in supply chains.</td>
<td>Empirical</td>
<td>C</td>
<td>Financial</td>
<td>Relational</td>
</tr>
<tr>
<td>Demrell 2008</td>
<td>Empirically observes a U-shaped association between managerial risk taking and organizational return.</td>
<td>Empirical</td>
<td>C</td>
<td>None</td>
<td>Financial</td>
</tr>
<tr>
<td>Bankoff &amp; Hilhorst 2009</td>
<td>Compares risk-taking by NGOs and state organizations based on prevailing social order and social relations.</td>
<td>Conceptual</td>
<td>NP</td>
<td>Disaster</td>
<td>None</td>
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<tr>
<td>Lehman et al. 2011</td>
<td>Deadline proximity leads to raised risk taking behavior in both lower performing and high performing firms.</td>
<td>Empirical</td>
<td>C</td>
<td>None</td>
<td>Operational</td>
</tr>
<tr>
<td>Wild and Zhu 2011</td>
<td>Among risks to consider for NGO managers are negative public opinion and negative large donors’ opinion.</td>
<td>Empirical</td>
<td>NP</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Chen &amp; Bozeman 2012</td>
<td>Influence of multiple stakeholders makes risk aversion more pervasive in public than in non-profit sector.</td>
<td>Empirical</td>
<td>P</td>
<td>None</td>
<td>None</td>
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<tr>
<td>Lehman &amp; Hahn 2013</td>
<td>Views risk-taking across time-periods and finds positive momentum to affects to risk taking behavior.</td>
<td>Empirical</td>
<td>C</td>
<td>None</td>
<td>Operational</td>
</tr>
<tr>
<td>Jenkins et al. 2015</td>
<td>Local non-profit risk-taking behavior is related to adaptation and experimentation to meet emergent need.</td>
<td>Empirical</td>
<td>NP</td>
<td>Disaster</td>
<td>None</td>
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<td>Park et al. 2016</td>
<td>Provides empirical evidence on the link between risk taking propensity and supply chain security practices.</td>
<td>Empirical</td>
<td>C</td>
<td>Disaster</td>
<td>Relational</td>
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<td>Gao et al.2017</td>
<td>Examines the impact of local religious beliefs on organizational risk-taking behaviors.</td>
<td>Empirical</td>
<td>C</td>
<td>Disaster</td>
<td>None</td>
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<td>Arundel 2017</td>
<td>Differentiates managerial risk aversion between large-risk averse and small risk-taking public organizations.</td>
<td>Empirical</td>
<td>P</td>
<td>None</td>
<td>Innovation</td>
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<td>Hoskisson et al. 2017</td>
<td>Challenges perceptions about risk-taking under uncertainty and its relation to competitive advantage.</td>
<td>Conceptual</td>
<td>C</td>
<td>Financial</td>
<td>None</td>
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<td>Arrfelt et al. 2018</td>
<td>Explorative, exploitative, and debt-oriented risk-taking exhibit different relationships with performance.</td>
<td>Empirical</td>
<td>C</td>
<td>None</td>
<td>Financial</td>
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<td>Varma et al. 2020</td>
<td>Investigates the impact of management controls and managerial risk taking on competitive advantage.</td>
<td>Empirical</td>
<td>C</td>
<td>None</td>
<td>Financial</td>
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</tbody>
</table>

*Sector Focus: C=Commercial, P=Public, NP=Non-Profit*
<table>
<thead>
<tr>
<th>Terminology</th>
<th>Definition</th>
<th>Citations/Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular (vs non-Regular) task</td>
<td>Work or assignment undertaken during disasters that is part (VS not part) of those routinely and in normal circumstances completed by an entity in its operation.</td>
<td>Police routinely respond to emergencies by answering 911 calls.</td>
</tr>
<tr>
<td>Existing (vs New) Organizational Structure</td>
<td>The use of established and customary systems (VS new systems) that outlines how activities (such as rules, roles, and responsibilities) are directed.</td>
<td>The hospital’s structure does not change to cater to the needs of victims of the disaster.</td>
</tr>
<tr>
<td>Established (Established) Organizations</td>
<td>Type of disaster relief organizations that conduct tasks similar to what they would normally perform and use the same organizational structure during non-disaster and disaster periods.</td>
<td>(Brouillette and Quarantelli 1971) Police, fire department and utility companies</td>
</tr>
<tr>
<td>Established-SS (Support Services)</td>
<td>A sub-category of established organizations not typically in direct contact with the victims of sudden-onset disasters and tend to be more rule-bound and policy-focused.</td>
<td>Utility companies and infrastructure repair organizations</td>
</tr>
<tr>
<td>Established-VS (Victim Support)</td>
<td>A sub-category of Established organizations that is typically in direct contact with the victims of sudden-onset disasters.</td>
<td>Police, fire departments, hospitals and nursing homes.</td>
</tr>
<tr>
<td>Expanding (Expanding) Organizations</td>
<td>Type of disaster relief organizations that conduct tasks similar to what they would normally perform during non-disaster and disaster periods but undergo changes in structure to increase the size of their operation during disaster periods.</td>
<td>(Brouillette and Quarantelli 1971) Primary disaster response NGOs</td>
</tr>
<tr>
<td>Extending (Extending) Organizations</td>
<td>Type of disaster relief organizations that retain their pre-disaster structure but engage in new disaster relief related tasks during disaster periods.</td>
<td>(Brouillette and Quarantelli 1971) Homeless shelters, food banks</td>
</tr>
<tr>
<td>Emergent (Emergent) Organizations</td>
<td>Type of disaster relief organizations that are newly formed entities that develop new structures and tasks to deliver aid to victims of disasters.</td>
<td>(Brouillette and Quarantelli 1971) Sponsored or local volunteer groups</td>
</tr>
<tr>
<td>Emergent-SE (Socially Emergent)</td>
<td>A sub-category of Emergent types created through social gatherings.</td>
<td>Church-based volunteer groups</td>
</tr>
<tr>
<td>Emergent-EE (Enterprise Emergent)</td>
<td>A sub-category of Emergent types created through company and enterprise initiatives.</td>
<td>Company volunteer groups</td>
</tr>
<tr>
<td>Agility</td>
<td>Ability of humanitarian organizations to rapidly respond and deploy resource to effectively overcome disruptions, on demand.</td>
<td>Lee 2004; Van Wassenhove 2006</td>
</tr>
<tr>
<td>Adaptability</td>
<td>Ability of humanitarian organizations to adjust and modify their strategies, operations, and activities on demand.</td>
<td>Lee 2004; Van Wassenhove, 2006</td>
</tr>
<tr>
<td>Alignment</td>
<td>Ability of humanitarian organizations to create dynamic roles, risk and resource sharing for better performance.</td>
<td>Lee, 2004; Van Wassenhove, 2006</td>
</tr>
<tr>
<td>Immediate Resolution-Recovery</td>
<td>The day of the disaster and the following three weeks.</td>
<td>Holguín-Veras et al. 2012</td>
</tr>
<tr>
<td>Short-Term Recovery</td>
<td>Three weeks to three months after the disaster has occurred.</td>
<td>Holguín-Veras et al. 2012</td>
</tr>
</tbody>
</table>
### Table 3a – Established Organizations Interviews

<table>
<thead>
<tr>
<th>Interview Number</th>
<th>Organization Code</th>
<th>Informant Number</th>
<th>Informant Position</th>
<th>Informant Experience (years)</th>
<th>Interview Length (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int 1</td>
<td>EST. VS-1</td>
<td>Inf 1</td>
<td>Police Lieutenant</td>
<td>&gt;20</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Police</td>
<td>Inf 2</td>
<td>Training Captain</td>
<td>10-15</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>Police</td>
<td>Inf 3</td>
<td>Sergeant</td>
<td>10-15</td>
<td>50</td>
</tr>
<tr>
<td>Int 4</td>
<td>EST. VS-2</td>
<td>Inf 1</td>
<td>Fire Chief</td>
<td>&gt;20</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Fire</td>
<td>Inf 2</td>
<td>Fire Lieutenant</td>
<td>&gt;20</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Fire</td>
<td>Inf 3</td>
<td>Division Chief</td>
<td>&gt;20</td>
<td>60</td>
</tr>
<tr>
<td>Int 7</td>
<td>EST. VS-3</td>
<td>Inf 1</td>
<td>Sheriff</td>
<td>&gt;20</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Police</td>
<td>Inf 2</td>
<td>Deputy/Paramedic</td>
<td>15-20</td>
<td>50</td>
</tr>
<tr>
<td>Int 9</td>
<td>EST. SS-1</td>
<td>Inf 1</td>
<td>Emergency Management Planner</td>
<td>10-15</td>
<td>65</td>
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<tr>
<td></td>
<td>Public</td>
<td>Inf 2</td>
<td>Planning Program Manager</td>
<td>10-15</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Public</td>
<td>Inf 3</td>
<td>Chief Technical Officer</td>
<td>5-10</td>
<td>45</td>
</tr>
<tr>
<td>Int 11</td>
<td>EST. SS-2</td>
<td>Inf 1</td>
<td>Infrastructure Services</td>
<td>5-10</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Energy</td>
<td>Inf 2</td>
<td>Training Specialist</td>
<td>10-15</td>
<td>45</td>
</tr>
<tr>
<td>Int 14</td>
<td>EST. SS-3</td>
<td>Inf 1</td>
<td>Director</td>
<td>10-15</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>Public</td>
<td>Inf 2</td>
<td>Water Superintendent</td>
<td>5-10</td>
<td>60</td>
</tr>
</tbody>
</table>

** Overall Disaster Experience: 1 - Limited, 2 - Considerable, 3 - Extensive, 4 - Very Extensive;**

Disaster experience is based on the respondents' self-reported number of times that they were involved in disaster situations, as well as their length of experience in years.

** Area Served (square miles) Very Small (VS) - <500, Small (S) - 1,000, Medium (M) - 1,000-2,000, Large (L) - 2,000-5,000, Very Large (VL) - >5,000

** Population Served - <50,000, S - 50,000 - 500,000, M - 500,000 - 2,000,000, L - 2,000,000 - 5,000,000, VL - >5,000,000**

### Table 3b – Expanding Organizations Interviews

<table>
<thead>
<tr>
<th>Interview Number</th>
<th>Organization Code</th>
<th>Interview Number</th>
<th>Informant Position</th>
<th>Informant Experience (years)</th>
<th>Interview Length (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int 16</td>
<td>EXP-1</td>
<td>Inf 1</td>
<td>Executive Director</td>
<td>&gt;20</td>
<td>60</td>
</tr>
<tr>
<td>Int 17</td>
<td>Disaster</td>
<td>Inf 2</td>
<td>Regional Disaster Officer</td>
<td>5-10</td>
<td>55</td>
</tr>
<tr>
<td>Int 18</td>
<td>Response</td>
<td>Inf 3</td>
<td>Senior Disaster Program Manager</td>
<td>10-15</td>
<td>55</td>
</tr>
<tr>
<td>Int 19</td>
<td>Disaster</td>
<td>Inf 2</td>
<td>Director</td>
<td>&gt;20</td>
<td>75</td>
</tr>
<tr>
<td>Int 20</td>
<td>Disaster</td>
<td>Inf 2</td>
<td>State Liaison</td>
<td>10-15</td>
<td>110</td>
</tr>
<tr>
<td>Int 21</td>
<td>Response</td>
<td>Inf 3</td>
<td>Assistant Director for Programs</td>
<td>10-15</td>
<td>45</td>
</tr>
<tr>
<td>Int 22</td>
<td>EXP-3</td>
<td>Inf 1</td>
<td>Executive</td>
<td>&gt;20</td>
<td>55</td>
</tr>
<tr>
<td>Int 23</td>
<td>Disaster</td>
<td>Inf 2</td>
<td>Director Recovery Specialist</td>
<td>&gt;20</td>
<td>75</td>
</tr>
<tr>
<td>Int 24</td>
<td>Response</td>
<td>Inf 3</td>
<td>Chief Programs Officer</td>
<td>10-15</td>
<td>60</td>
</tr>
<tr>
<td>Int 25</td>
<td>EXP-4</td>
<td>Inf 1</td>
<td>Regional Manager</td>
<td>&gt;20</td>
<td>55</td>
</tr>
<tr>
<td>Int 26</td>
<td>Disaster</td>
<td>Inf 2</td>
<td>Area Coordinator</td>
<td>10-15</td>
<td>55</td>
</tr>
<tr>
<td>Int 27</td>
<td>EXP-5</td>
<td>Inf 1</td>
<td>Director U.S. Disaster Response</td>
<td>&gt;20</td>
<td>60</td>
</tr>
<tr>
<td>Int 28</td>
<td>Disaster</td>
<td>Inf 2</td>
<td>Site Supervisor</td>
<td>5-10</td>
<td>65</td>
</tr>
<tr>
<td>Int 29</td>
<td>Response</td>
<td>Inf 3</td>
<td>Training and Development Manager</td>
<td>10-15</td>
<td>55</td>
</tr>
<tr>
<td>Int 30</td>
<td>EXP-6</td>
<td>Inf 1</td>
<td>Captain</td>
<td>&gt;20</td>
<td>35</td>
</tr>
<tr>
<td>Int 31</td>
<td>Disaster</td>
<td>Inf 2</td>
<td>Director of Emergency</td>
<td>&gt;20</td>
<td>45</td>
</tr>
<tr>
<td>Int 32</td>
<td>Response</td>
<td>Inf 3</td>
<td>Response Program Coordinator</td>
<td>10-15</td>
<td>60</td>
</tr>
</tbody>
</table>

** FTE - Number Full Time Employees Very Small (VS) - <10, Small (S) - 10-50, Medium (M) - 50-100, Large (L) - 100-500, Very Large (VL) - >500**

** Operating Budget VS - <$500,000, S - $500,000 - $1,000,000, M - $1,000,000 - $5,000,000, L - $5,000,000 - $10,000,000, VL - >$10,000,000**

** Total Number of Volunteers VS - <1,000, S - 1,000 - 5,000, M - 5,000 - 100,000, L - 100,000 - 500,000, VL - >500,000**

** Overall Disaster Experience: 1 - Limited, 2 - Considerable, 3 - Extensive, 4 - Very Extensive**

Disaster experience is based on the respondents' self-reported number of times that they were involved in disaster situations, as well as their length of experience in years.
### Table 3c – Extending Organizations Interviews

<table>
<thead>
<tr>
<th>Interview Number</th>
<th>Organization Code</th>
<th>Interview Number</th>
<th>Informant Position</th>
<th>Informant Experience (years)</th>
<th>Interview Length (min)*</th>
<th>Disaster Experience**</th>
<th>Organizational Size***</th>
<th>NRF Code</th>
<th>NTEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int 33</td>
<td>EXT-1-Feed</td>
<td>Inf 1</td>
<td>Executive Director</td>
<td>&gt;20</td>
<td>125</td>
<td>4</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Int 34</td>
<td>EXT-1-Feed</td>
<td>Inf 2</td>
<td>Director of Development</td>
<td>5-10</td>
<td>60</td>
<td>2</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Int 35</td>
<td>EXT-1-Feed</td>
<td>Inf 3</td>
<td>Assistant Director of Procurement</td>
<td>0-5</td>
<td>40</td>
<td>1</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Int 37</td>
<td>EXT-2 - Spiritual</td>
<td>Inf 1</td>
<td>Director of Public Relations Field Control Secretary</td>
<td>10-15</td>
<td>70</td>
<td>3</td>
<td>VL</td>
<td>VL</td>
<td>VL</td>
</tr>
<tr>
<td>Int 38</td>
<td>EXT-3-Feed</td>
<td>Inf 1</td>
<td>President &amp; CEO</td>
<td>&gt;20</td>
<td>50</td>
<td>4</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Int 39</td>
<td>EXT-3-Feed</td>
<td>Inf 2</td>
<td>Senior Director of Strategic Initiative</td>
<td>5-10</td>
<td>80</td>
<td>2</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Int 40</td>
<td>EXT-3-Feed</td>
<td>Inf 3</td>
<td>Chief Operating Officer</td>
<td>10-15</td>
<td>60</td>
<td>3</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Int 41</td>
<td>EXT-4 - Community</td>
<td>Inf 1</td>
<td>Executive Director</td>
<td>&gt;20</td>
<td>70</td>
<td>4</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Int 42</td>
<td>EXT-4 - Community</td>
<td>Inf 2</td>
<td>Director of Development Director of Mission</td>
<td>5-10</td>
<td>55</td>
<td>2</td>
<td>L</td>
<td>L</td>
<td>S</td>
</tr>
<tr>
<td>Int 43</td>
<td>EXT-5 - Human</td>
<td>Inf 1</td>
<td>Executive Director</td>
<td>&gt;20</td>
<td>70</td>
<td>4</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Int 44</td>
<td>EXT-5 - Human</td>
<td>Inf 2</td>
<td>Development Manager</td>
<td>10-15</td>
<td>60</td>
<td>4</td>
<td>L</td>
<td>L</td>
<td>S</td>
</tr>
<tr>
<td>Int 45</td>
<td>EXT-5 - Human</td>
<td>Inf 3</td>
<td>Event Coordinator</td>
<td>5-10</td>
<td>55</td>
<td>1</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Int 46</td>
<td>EXT-6 - Feed</td>
<td>Inf 1</td>
<td>Chief Executive Office</td>
<td>&gt;20</td>
<td>65</td>
<td>3</td>
<td>S</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Int 47</td>
<td>EXT-6 - Feed</td>
<td>Inf 2</td>
<td>Chief Operating Officer</td>
<td>&gt;20</td>
<td>55</td>
<td>3</td>
<td>S</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>

* FTE - Number Full Time Employees Very Small (VS) - <10, Small (S) - 10-50, Medium (M) - 50-100, Large (L) - 100-500, Very Large (VL) - >500
** Operating Budget VS - <$500,000, S - $500,000 - $1,000,000, M - $1,000,000 - $5,000,000, L - $5,000,000 - $10,000,000, VL - >$10,000,000
*** Total Number of Volunteers VS - <1,000, S - 1,000 - 5,000, M - 5,000 - 100,000, L - 100,000 - 500,000, VL - >500,000
**** Overall Disaster Experience 1 - Limited, 2 - Considerable, 3 - Extensive, 4 - Very Extensive

Disaster experience is based on the respondents’ self-reported number of times that they were involved in disaster situations, as well as their length of experience in years.

### Table 3d – Emergent Organizations Interviews

<table>
<thead>
<tr>
<th>Interview Number</th>
<th>Organization Code</th>
<th>Interview Number</th>
<th>Informant Position</th>
<th>Informant Experience (years)</th>
<th>Interview Length (min)*</th>
<th>Disaster Experience**</th>
<th>Organizational Size***</th>
<th>NRF Code</th>
<th>NTEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int 48</td>
<td>EMR-SE-1 - Spiritual</td>
<td>Inf 1</td>
<td>Assistant Pastor</td>
<td>&gt;20</td>
<td>45</td>
<td>2</td>
<td>VS</td>
<td>VS</td>
<td>VS</td>
</tr>
<tr>
<td>Int 49</td>
<td>EMR-SE-1 - Spiritual</td>
<td>Inf 2</td>
<td>Community Leader</td>
<td>&gt;20</td>
<td>45</td>
<td>2</td>
<td>VS</td>
<td>VS</td>
<td>VS</td>
</tr>
<tr>
<td>Int 50</td>
<td>EMR-SE-2 - Spiritual</td>
<td>Inf 1</td>
<td>Administrator</td>
<td>5-10</td>
<td>55</td>
<td>2</td>
<td>VS</td>
<td>VS</td>
<td>VS</td>
</tr>
<tr>
<td>Int 51</td>
<td>EMR-SE-2 - Spiritual</td>
<td>Inf 2</td>
<td>Youth Pastor</td>
<td>10-15</td>
<td>45</td>
<td>1</td>
<td>VS</td>
<td>VS</td>
<td>VS</td>
</tr>
<tr>
<td>Int 52</td>
<td>EMR-SE-3 - Spiritual</td>
<td>Inf 1</td>
<td>Pastor</td>
<td>&gt;20</td>
<td>35</td>
<td>1</td>
<td>VS</td>
<td>VS</td>
<td>VS</td>
</tr>
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<td>Int 53</td>
<td>EMR-SE-3 - Spiritual</td>
<td>Inf 2</td>
<td>Emergent Group Leader</td>
<td>5-10</td>
<td>45</td>
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<td>VS</td>
<td>VS</td>
<td>VS</td>
</tr>
<tr>
<td>Int 54</td>
<td>EMR-EE-1 - Education</td>
<td>Inf 1</td>
<td>Faculty member</td>
<td>5-10</td>
<td>55</td>
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<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Int 55</td>
<td>EMR-EE-1 - Education</td>
<td>Inf 2</td>
<td>Faculty member</td>
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<td>75</td>
<td>1</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Int 56</td>
<td>EMR-EE-1 - Education</td>
<td>Inf 3</td>
<td>Graduate Assistant</td>
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<td>45</td>
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<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Int 57</td>
<td>EMR-EE-2 - Business</td>
<td>Inf 1</td>
<td>Corporate Manager</td>
<td>&gt;20</td>
<td>45</td>
<td>3</td>
<td>L</td>
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<td>L</td>
</tr>
<tr>
<td>Int 58</td>
<td>EMR-EE-2 - Business</td>
<td>Inf 2</td>
<td>Clinical Education Manager</td>
<td>10-15</td>
<td>35</td>
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<td>L</td>
<td>L</td>
<td>N/A</td>
</tr>
<tr>
<td>Int 59</td>
<td>EMR-EE-3 - Business</td>
<td>Inf 1</td>
<td>Senior Manager</td>
<td>5-10</td>
<td>30</td>
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<td>L</td>
<td>L</td>
<td>L</td>
</tr>
<tr>
<td>Int 60</td>
<td>EMR-EE-3 - Business</td>
<td>Inf 2</td>
<td>Director</td>
<td>&gt;20</td>
<td>30</td>
<td>1</td>
<td>L</td>
<td>L</td>
<td>L</td>
</tr>
</tbody>
</table>

* FTE - Number Full Time Employees Very Small (VS) - <10, Small (S) - 10-50, Medium (M) - 50-100, Large (L) - 100-500, Very Large (VL) - >500
** Operating Budget VS - <$500,000, S - $500,000 - $1,000,000, M - $1,000,000 - $5,000,000, L - $5,000,000 - $10,000,000, VL - >$10,000,000
*** Total Number of Volunteers VS - <1,000, S - 1,000 - 5,000, M - 5,000 - 100,000, L - 100,000 - 500,000, VL - >500,000
**** Overall Disaster Experience 1 - Limited, 2 - Considerable, 3 - Extensive, 4 - Very Extensive

Disaster experience is based on the respondents’ self-reported number of times that they were involved in disaster situations, as well as their length of experience in years.
Table 4 – Data sources and their use in research (beyond interviews)

<table>
<thead>
<tr>
<th>Type of Archival Data</th>
<th>Number of Documents</th>
<th>Description</th>
<th>Source of Data</th>
<th>Use in Research and Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emails</td>
<td>75</td>
<td>Email correspondence</td>
<td>Informants</td>
<td>Email communications with key informants to clarify interviews, follow up inquiries, additional information requests. The data were used to support propositions. The data also improved our understanding of the research setting and phenomena of interest.</td>
</tr>
<tr>
<td>Observations notes</td>
<td>448</td>
<td>Direct written in-depth descriptions from each of the interviews</td>
<td>Researchers</td>
<td>Observation notes allowed researchers to create a more detailed rendering on activities, observe operations capabilities of each facilities, and notice programs and services key informants have described during interviews. Observation notes helped researchers to identify any distortions or inaccuracies in description provided by key informants.</td>
</tr>
<tr>
<td>Published disaster response information</td>
<td>35</td>
<td>Standard response protocols, published emergency response procedures, after-action reports, etc.</td>
<td>Informants; Publicly available resources, obtained through <a href="http://www.fema.gov">www.fema.gov</a> and individual websites of participated disaster relief organizations</td>
<td>The reports and protocols were attained using official FEMA website based on key informants’ advice. The reports were used to expand the information on activities performed during disaster relief operations. The data also provided examples of activities that performed during different stages of disaster. During the data analysis, these documents were revised to ensure they validated discoveries from interviews and other sources.</td>
</tr>
<tr>
<td>Press Releases</td>
<td>21</td>
<td>Official statements delivered to the news media that provided information or/made an announcement.</td>
<td>Publicly available resources, obtained through <a href="http://www.fema.gov">www.fema.gov</a> and <a href="https://www.nhc.noaa.gov">https://www.nhc.noaa.gov</a></td>
<td>The various press releases from FEMA and National Hurricane center provided background information about each disaster as well as activities performed by each organization. Furthermore, the press releases helped the research team to stay updated on events and helped to identify specific events that might influence risk-taking behavior.</td>
</tr>
<tr>
<td>Organization’s Internal Documents</td>
<td>10</td>
<td>Annual/Quarterly Reports, Financial Reports, Mission and Value Statements.</td>
<td>Informants</td>
<td>Key informants were asked to share (if available) organizational documents that show examples of risk-taking behaviors performed during the recent hurricanes. These documents triangulated the findings.</td>
</tr>
</tbody>
</table>
Table 5 – Risk-taking behavior and organizational types

<table>
<thead>
<tr>
<th>Risk-taking by established organizations</th>
<th>Alignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk-aversion by expanding organizations</td>
<td>Alignment</td>
</tr>
<tr>
<td>Risk-taking by expanding organizations</td>
<td>Adaptability</td>
</tr>
<tr>
<td>Risk-taking by extending organizations</td>
<td>Agility</td>
</tr>
<tr>
<td>Risk-aversion by extending organizations</td>
<td>Alignment</td>
</tr>
<tr>
<td>Risk-taking by emergent organizations</td>
<td>Agility</td>
</tr>
</tbody>
</table>

Figure 1 – Typology of Disaster Response
Adapted from Quarantelli and Dynes 1977.
Figure 2 – Methodological Steps on case selection, analysis, triangulation and proposition development

Figure 3 – Risk-taking behavior by organizational type and sub-type during disaster relief operations