

Managing Disasters through University Co-provision of Public Services:  
The Role of Managerial Problem Framing and Organizational Structure

by

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## ABSTRACT

The roles of American Universities/colleges assets, knowledge and partnerships with local governments during disasters and emergencies become more important but have not been emphasized sufficiently in the scholarship community. Universities/colleges have provided disaster services in partnership with local government through different ways: providing facilities and logistical support (e.g., disaster sheltering), critical knowledge support (e.g., disaster information forecasting), and human resources and special expertise support (e.g., university hospitals and voluntary work of nursing and medical students/faculty). Through 34 interviews with emergency managers from both universities/colleges and local governments, and a national survey of 362 university emergency managers, this dissertation finds that: First, previously established partnerships between universities/colleges and local governments can reduce coordination costs when disasters happen and can facilitate new partnerships on disaster preparedness. Second, local government capacity gap in responding to disaster needs is a critical precondition for universities/colleges to participate in the disaster service co-provision, which is not specified or examined by other co-production, co-creation, or co-management theories. Third, internal coordination efforts within universities/colleges can facilitate external coordination activities with local governments to guarantee efficient disaster service provision. Fourth, a disaster resilience culture needs to be facilitated within universities/colleges to develop a robust disaster response plan. Furthermore, first response providers' health and wellbeing should get

more attention from universities and local governments to maintain a sustainable and healthy workforce as well as efficient disaster response.

## DEDICATION

To my grandfather, Hongwen Yu, who taught me to be a tough girl, never compromise easily to life challenges, and always encouraged me to pursue my dreams. Without him, I would not have had a playful childhood and been able to accomplish my second doctoral degree. Yeye, you are always in my heart, and I will carry your words and spirits with me—in my soul and actions, throughout my entire life.

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## CHAPTER 1

### INTRODUCTION

Disasters of various types are challenging the organizational capacities of different sectors. The large-scale and catastrophic damages and unpredictable nature of disasters require a timely response from local organizations in the forms of collaborations, cooperation, and co-provision of public services (Dollery et al., 2020; Kapucu et al., 2021; Martin, 2014; Steelman et al., 2021; Sapat et al. 2019). Service capacity problems that are caused and challenged by disasters, such as the pandemic, require public managers to build collaborative capacity through networking with other stakeholders and mobilizing knowledge, information, and resources to effectively solve them (Weber & Khademian, 2008).

Providing public services to solve disaster-caused problems is critical to protect human safety, maintain social order, and boost public confidence in local government and organizations (J. Kim & Oh, 2015; Noordegraaf & Newman, 2011; Schwartz & Sulitzeanu-Kenan, 2004; Wehde & Choi, 2021). For example, during hurricanes and wildfires, providing evacuation services to local citizens has saved many lives and helped thousands of families avoid great loss (Gerber, 2010; Regnier, 2008; Wolshon et al., 2005). To respond to wildfires, community organizations have initiated search and rescue groups to collaborate with the local fire department in locating lost and missing persons in wildfires (Pfau & Blanford, 2018). During the COVID-19 pandemic, many communities have mobilized volunteers to provide public services, such as emergency

transport and delivering food, masks, and medicines to vulnerable populations (Miao et al., 2021). These activities and services provided by community organizations and individuals have demonstrated that the *government-centric disaster response paradigm* is shifting, and more stakeholders from other sectors are engaged in the disaster response process (Simo & Bies, 2007; Steen & Brandsen, 2020).

In practice, a special type of organizations—universities of different types—has collaborated with local governments and other community organizations in providing public services to respond to disasters in many ways (Booker Jr., 2014; Fortunato et al., 2018; Quattrone et al., 2020). For example, universities have provided scientific knowledge, professional medical services, space, and shelters to local communities to respond to various emergencies and disasters. However, few academic studies have investigated why and how universities participate in public service provision in disaster response as nongovernment actors (Alpert, 2012; Bruxvoort, 2012; Wise, 2021).

In my dissertation, I want to address this research gap. I argue that universities, as stakeholders outside of the first-response agencies, are of great importance in local disaster management processes. In addition, their co-provision of disaster services with local communities deserve to be investigated further and theorized to expand their future influence in disaster management practice and theory.

The first reason is also my research motivation. In many situations, local governments may not have adequate resources and capacities to respond to public needs, particularly during various natural and manmade disasters. In fact, in many cases, local governments have experienced failures in disaster responses, such as Hurricane Katrina and the September 11 attacks (Col, 2007; Eikenberry et al., 2007). Disaster management

is not only the function and responsibility of government agencies (Eller et al., 2015; Xiang, 2021) but other organizations, such as universities, are also responsible for protecting their students, faculty, staff, and assets, which are critical members of local communities. Furthermore, the characteristics and resources possessed by universities enable them to be great players in responding to public needs and solving problems faced by the whole society. Universities have disaster management experts, scientific information, financial resources and assets, and professional logistic systems, which are critical for building response capacity when local community experience disasters and service capacity are challenged (Haigh et al., 2014).

Second, when facing public problems, especially disaster-caused service capacity problems, universities are not always reactive or waiting for local governments to respond. Existing studies have been overly concerned with the *ancillary roles* and functions that universities play in the local responses to disasters, which are typically initiated and coordinated by local government agencies. These activities mainly include voluntarily medical services provided by university-affiliated hospitals and medical schools (Seifi et al., 2019; A et al., 2014; Burns et al., 2020), providing scientific knowledge to predict disasters (Masri & Sabzalieva, 2020), or training community members (Brundiars, 2018; Osofsky et al., 2018). In practice, many universities have proactively participated in disaster responses. These activities include but are not limited to the following: in the mitigation phase, universities *actively* coordinate with local, state, and regional stakeholders to provide medical services and other services to local communities (Booker Jr., 2014; El Masri & Sabzalieva, 2020); in the preparedness phase, universities develop disaster preparedness plans for what to do, where to go, or who to

call for help in a disaster and provide disaster simulation and training services to the local community (Weber et al., 2018); in the response stage, universities initiate collaboration with local governments and other organizations in information and asset sharing, organizing volunteer medical students to protect students, faculty, staff, and all community members (Fuller, 2015); and in the recovery phase, universities prevent damages or rebuild capacity from the preceding disaster. These activities demonstrate that universities have been involved greatly in providing public services in disaster responses.

Third, methodologically, current studies have dominantly used the case study approach or other qualitative methodology to investigate the roles and functions of universities in solving problems and disaster responses (Seifi et al., 2019; Turner, 2020). This approach constrains the ability to apply the findings to other problems and emergency situations, regions, or response types. This approach is also difficult to generalize about and predict future responses to disasters. In short, the methodological limitations of current emergency and disaster management studies have limited external validity.

In this dissertation, I attempt to bridge the above research gaps by using a mixed-methods research design to answer general **research question of why some universities co-provide various public services with other organizations to respond to disasters whereas others do not?** I focus on exploring the effects of contextual, organizational, and managerial factors on university co-provision of public services. Specifically, my first two research questions ask in the context of general disasters whereas the last three

questions are related to university co-provision of public services in the context of the COVID-19 pandemic.

1. Why do some universities co-provide public services to respond to disasters whereas other universities do not?
2. When do they co-provide? What contextual, organizational, and managerial factors determine whether co-provision of services actually happens?
3. In the specific case of COVID-19, what pandemic services are co-provided by universities?
4. How and why do some universities co-provide related services? What are the determining factors that affect university co-provision of COVID-19-related public service?
5. Why do some universities co-provide disaster services better than others regarding the timeliness, and the coverage of these services?

In this dissertation, based on the work of Ferris (1984), Weschler and Mushkatel (1987), and Powers and Thompson (1994) on co-provision of public services, I define co-provision as the conceptualization, design, and provision of public services by organizations outside of emergency first-response agencies for solving important service capacity limitation problems.

Notably, although some overlaps exist, the co-provision of public services is substantially distinct from the co-production and co-creation of public services. Essentially, co-provision is problem-oriented, focuses on the resource allocation relationships between the nongovernment service co-providers and state agencies, such that mobilizing more resources from the former can complement and expand the service

capacity of the latter. Furthermore, as co-providers, nongovernment organizations do not necessarily have a professional service production system that provides a specific type of public service. A good example of co-provision is that as a professional education service production and provision system, during the COVID-19 pandemic, many universities have co-provided testing and vaccination services with local government agencies to all community members, although many of them may not have the systems to produce testing kits and vaccines. University co-provision of testing and vaccination services addresses the service capacity limitations of local governments in quickly responding to public health disasters. Not only does it reduce the financial pressure on local governments, but the service level is also expanded promptly to the entire community.

Currently, co-production has no consistent definition (Osborne et al., 2021.; Voorberg et al., 2015), but the original definition provided by Ostrom (1978; 1996), which was followed and expanded by many other scholars, emphasizes that public services are jointly produced by government officials and the general public. Nabatchi et al. (2017) argued that co-production can be realized through citizens' voluntary or involuntary participation in the different phases of the service cycle (commissioning, designing, delivery, and assessment) in different forms (individual, group, or collective). However, co-production does not need to be problem-oriented or to address the resource/capacity gap, and the ultimate goal of co-production is to produce services or goods.

Recently, many elements have been added to the co-production theory, such as the co-created values (J. Bryson et al., 2017; Osborne et al., 2016; Frow et al., 2015; Cluley & Radnor, 2020) and the design and planning features realized through citizen



participation (Ranjan & Read, 2016; Baptista et al., 2020; Jukić et al., 2019; Brandsen et al., 2018). Some scholars have even developed co-creation theory, which is separated from the co-production theory and focused on the creative features and social innovation brought by citizen participation (Osborne et al., 2021; Torfing et al., 2019, 2020; Torfing & Ansell, 2021). I do not reject that the newly added elements (e.g., value creation) and analytical dimensions and the expanded service stages (e.g., service producing and delivery) can enrich co-production theory and practice but doing so also has risks. It increases the complexity, ambiguity, and inconsistency of co-production, which is ineffective for knowledge generation and communication among public administration and management (PAM) scholars.

In short, co-provision focuses on resource allocation relationships between citizens of various forms and the state agencies, whereas a narrower but clearer co-production definition addresses a joint production process between citizens and state agencies based on the input–output logic. I will explain and elaborate on their differences in Chapter 2.

To answer the above research questions, this dissertation uses a mixed-methods research design with two stages to collect qualitative and quantitative data. For the first data collection stage, I conducted a small number of case studies through in-depth interviews of university emergency management leads from five US universities and their government counterparts. This small purposive sample is for in-depth case examination. The universities are selected because of the variation across four dimensions of analytic interests: student population size and diversity, geographic location (urban and non-urban communities), educational types (different levels of research activities and graduate

education), and predominant hazards relevant to geographic areas (e.g., extreme heat, hurricanes, and extreme weather). Furthermore, relevant document-based data from universities, such as reports and emergency response plans, are also collected and analyzed.

For the second stage, I conducted a national survey of emergency management leads in US universities. I also developed a survey instrument based on the literature review and the analysis of interviews, reports, documents, and case study data. The goal of the national survey is to examine and generalize my understandings of the roles of US universities in the management of the current COVID-19 pandemic and other disasters.

Hypotheses are derived from my observation of university practices, review of documents, and literature. These small number of observations come from my interviews, higher education chronicles, and newspapers. The first strand of literature I use is related to emergency and disaster management theory and practice, and the other is related to organizational theories, such as institutionalism, community psychology, and public values theory. I mainly use survey data and regression analysis techniques<sup>1</sup> to examine these hypotheses. However, given that few studies and measures have been developed for university disaster management, qualitative in-depth interview data are used to describe the disaster situation, develop measures for key concepts in the survey instrument, and explain findings (Creswell & Clark, 2017; Hendren et al., 2018).

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<sup>1</sup> The type of regression analysis that I choose varies according to the types of variable.

## CHAPTER 2

### THEORETICAL FRAMEWORK

The focus of this dissertation is university co-provision of public services with other organizational stakeholders to respond to a full range of disasters. In this dissertation, I define co-provision as the conceptualization, design, and provision of public services by nongovernment organizations outside of emergency first-response agencies for solving important service capacity limitation problems. Although this concept somewhat overlaps with co-production and co-creation, it has its own specialty and strengths in explaining organization-level activities in solving public problems related to service capacity limitations.

In the following, I review co-production and co-creation theories and their relationships with a set of similar concepts, including co-management, co-governance, collaboration, coordination, and public–private partnership. The goal of this section is two-fold. First, reviewing co-production and co-creation theories can help summarize their core elements and analytical and theoretical dimensions, which is useful in identifying the distinctiveness and their strengths and weakness and in comparing with the co-provision theory. Second, the review can provide dimensions that co-provision theory can borrow and be analyzed, as well as identify the research gaps that co-provision theory can fill.

## Co-production Theory

Co-production was initially proposed by Ostrom et al. (1978) when they studied the participation of individual citizens in ‘producing community policing services. In Ostrom’s (1996) sense, “co-production” is a “process through which inputs used to produce a good or service are contributed by individuals who are not ‘in’ the same organization.” (p. 72). Citizens are not only *consumers* but also producers of public services and goods when their resources and inputs are organized with rules and regulations based on consensus and trust (Ostrom, 1996; Whitaker, 1980).

Currently, one widely accepted definition of co-production was provided by Alford (2009), which defines co-production as “any active behavior by anyone outside the government agency which, (1) is conjoint with agency production, or is independent of it but prompted by some action of the agency; (2) is at least partly voluntary; and (3) either intentionally or unintentionally creates private and/or public value, in the form of either outputs or outcomes” (p. 23). Another popular definition was provided by Osborne et al. (2016), in which co-production was defined as “the voluntary or involuntary involvement of public service users in any of the design, management, delivery and/or evaluation of public services” (p. 640). Both definitions emphasize that co-production involves service users’ participation (voluntary or involuntary), and value is co-created in the service production and delivery process.

To date, co-production still has no consistent definition, many scholars have described it as an option that can add to the repertoire of institutional arrangements available to public sector organizations in seeking to achieve their purposes (Alford,

2009a; Nabatchi et al., 2017). Built on the work of Ostrom, many scholars (Alford, 2009a; Nabatchi et al., 2017; Palumbo, 2016; Meijer, 2011; Bovaird, 2007; Osborne et al., 2013) have advanced the theory of co-production by expanding the scope of actors (who), applied fields and situations (what and when), and advancing specific (institutional) arrangements (how) to regulate collective behaviors. Specifically, Brandsen and Pestoff (2006), Bovaird (2007), Alford (2014), and Cheng (2019) claimed that not only individual citizens and nonprofits and for-profit organizations but also volunteers, associations, and neighborhood groups can be *co-producers* and participate in the production and delivery of various public services to serve larger communities. Another group of scholars have devoted to expanding the application of co-production theory to many other fields, including healthcare (Batalden et al., 2016; Palumbo, 2016; Rycroft-Malone et al., 2016), education (Davis & Ostrom, 1991; Paarlberg & Gen, 2009), infrastructure (Weschler & Mushkatel, 1987; Wiewiora et al., 2016; Wolsink, 2018), police (Frank et al., 1996; Hong, 2016), and public housing and fire services (Alford, 2014a) in developing and developed countries. Another group of scholars have focused on exploring the normative side of citizen participation in the co-production of public services (Clark et al., 2013; Jakobsen & Andersen, 2013; Gazley et al., 2020; Clark et al., 2020; Burgess & Choudary, 2021).

Table 1 summarizes the different definitions of co-production and the identified co-producers or actors in the co-production process found in the literature. In short, many scholars and practitioners have explored and devoted themselves to the definition and scope of co-production of public services by regular or professional producers (typically, referred to state professionals) and other actors that are initially not designed to provide

public services (e.g., individual citizens, community organizations, neighborhoods, and families) in different stages of the service cycle.

**Table 1. Definitions of Co-production**

<b>Sources</b>	<b>Definition of coproduction</b>	<b>Actors/coproducers</b>
Ostrom et al. (1978)	The model identifies a “production flow” through which organizational arrangements structure inputs into activities that produce outputs and outcomes (p.381).	The police department is the government agency that provides police services. Individual citizens are coproducers of policing services. They have different inputs and activities when participating in the production process.
Whitaker (1980)	Three broad types of activities constitute coproduction: (1) citizens requesting assistance from public agents; (2) citizens providing assistance to public agents; (3) citizens and agents interacting to adjust each other’s service expectations and actions (p. 242).	Citizens as coproducers could be existing as individuals or groups (e.g., form a board). State agents are the formal service providers.
Brudney and England (1983)	The coproduction model is defined by the degree of overlap between two sets of participants-regular producers (e.g., service agents, public administrators) and consumers (e.g., citizens, neighborhood associations). A typology of coproduction: individual coproduction, group coproduction, and collective coproduction.	Citizens could participate in the coproduction in the form of individuals or groups (e.g., community associations). Collective forms of coproduction are more important because of their larger impact (p. 62).
Anderson and Clary (1987)	Coproduction of emergency medical services between citizen volunteer groups, government agencies, and private emergency response firms.	Citizens are coproducers in the form of groups (volunteer groups). Professional/regular producers are government agencies and private firms (ambulance firms)
Davis and Ostrom (1991)	Coproduction between student parents and schools provided an alternative arrangement besides hierarchy and market solutions.	Coproducers are student parents, while the professional or regular producers of education are either hierarchies (public school district system) or markets (private schools).
Joshi and Moore (2004)	Institutionalized coproduction is “the provision of public services (broadly defined, to include regulation) through	Citizens could participate in the production process in different

	regular, long-term relationships between state agencies and organized groups of citizens, where both make substantial resource contributions” (p. 1).	forms (individuals, groups, or communities).
Brandsen and Pestoff (2006), and Pestoff et al. (2006)	Coproduction could be segregated into three different but related concepts: (1) co-governance, an arrangement that allows the third sector to participate in the planning and delivery of the service formerly or normally produced by public service professionals; (2) co-management where third sector organizations produce services in collaboration with government agencies; (3) co-production, would be the arrangement where individual citizens produce their own services in full or part with public service professionals.	The third sector comes under various other names, such as the voluntary sector, the (private) non-profit sector, the social economy, civil society, all with slightly different defining characteristics, and with a large degree of overlap. When we refer to the third sector, we include all those groups and organizations grouped under other labels, accepting that it is a ‘loose and baggy monster’ (Kendall and Knapp 1995) without trying to cage it in.
Bovaird (2007)	User and community coproduction is “the provision of services through regular, long-term relationships between professionalized service providers (in any sector) and service users or other members of the community, where all parties make substantial resource contributions” (p. 847).	It particularly focuses on users, volunteers, and community groups as coproducers, recognizing that each of these groups has a quite different relationship to public sector organizations and that other stakeholders, too, may play coproduction roles.
Alford (2009)	coproduction is “any active behavior by anyone outside the government agency which, (1) is conjoint with agency production, or is independent of it but prompted by some action of the agency; (2) is at least partly voluntary; and (3) either intentionally or unintentionally creates private and/or public value, in the form of either outputs or outcomes” (p. 23)	
Osborne and Stokosch (2013)	Consumer co-production results from the inseparability of production and consumption during the service encounter and focuses upon the engagement of the consumers at the operational stage of the service production process in order to balance their expectations and experience of the service. The aim is <i>user empowerment</i> . Participative co-production results from the intention to improve the quality of	Co-production does not challenge the basic premises of public administration, because it can only occur at the behest of, and controlled by, service professionals (p. 34). Individual users may well require support from mediating structures within civil society in order to achieve the impact of participating in future planning.

	<p>existing public services through participative mechanisms at the strategic planning and design stage of the service production process. These mechanisms include user consultation and participative planning instruments. The aim is <i>user participation</i>.</p> <p>Enhanced co-production results from combining the previous operational and strategic modes of co-production in order to challenge the existing paradigm of service delivery. The aim is <i>user-led innovation</i> of new forms of public service.</p>	<p>Enhanced co-production addresses the needs of the collectivity rather than solely the individual but through improving existing service deliveries rather than challenging them.</p>
Alford (2014)	<p>Coproduction could be explored from the co-producers side and the production side. On the coproducer side, a private company, nonprofits, individual citizens, volunteers could be different types of actors. On the production side, there are multiple factors that drive the coproduction.</p>	<p>Any actors involved in the coproduction such as citizens, volunteers, nonprofit organizations, NGOs, and public sector organizations are important coproducers. There may be logic problems since different types of actors may not be compatible with each other. There is a need to use a contingent approach to see their relationships.</p>
Poocharoen and Ting (2015)	<p>co-production is not a steady-state but a process or a set of actions by actors involved. Co-production is not simply a platform for people's views. Rather, it is a venue where non-government organizations and individuals, together with public service professionals, can utilize their practical skills to provide a public service and consume its benefits relevant to them. (p. 590).</p>	<p>Public service professionals, and non-regular coproducers such as nonprofit organizations and individuals.</p>
Brandsen and Honingh (2016)	<p>Coproduction is "a relationship between a paid employee of an organization and (groups of) individual citizens that requires a direct and active contribution from these citizens to the work of the organization (p. 429).</p>	<p>There are many types of coproduction and types of coproduction can be distinguished based on the extent to which citizens are involved in the design of services that they individually receive and whether the coproduction concerns core services of the organization or complementary activities.</p>



Loeffler and Bovaird (2016)	Co-production is “public services and citizens making better use of each other’s assets and resources to achieve better outcomes or improved efficiency” (p. 1006).	Users and community
Nabatchi et al. (2017)	Coproduction was defined as an umbrella concept that captures a wide variety of activities that can occur in any phase of the public service cycle and in which state actors and lay actors work together to produce benefits (p. 769). A 3x4 typology of coproduction was created based on the three levels of coproduction (individual, group, collective) and 4 phases of the service cycle (commissioning, designing, delivery, and assessment).	State actors are (direct or indirect) agents of government serving in a professional capacity (i.e., the regular producers) including contracted nonprofits, for-profits by governments; lay actors are members of the public serving voluntarily as citizens, clients, and/ or customers (i.e., citizen producers). (p. 769).

Scholars have also provided different typologies of co-productions based on different dimensions (core elements). Generally, as shown in Table 2, these dimensions can be summarized as different stages of policy formulation or service production (when), what forms of citizen involvement (who), what types of services are produced (tangible or intangible), and what values are created through co-production (e.g., efficiency, effectiveness, democracy, and public safety).

**Table 2. Analytical and Theoretical Dimensions of Co-production**

<b>Theoretical dimensions of coproduction</b>	<b>Varieties</b>
Stages of policy formulation and service production	Services production process (policy implementation and service delivery); service design and planning; innovation (challenge existing paradigm of service delivery)
Forms or levels of citizens involvement	Individual citizens, citizen groups, the third sector organizations (represented by community service organizations).
Citizen-state (public sector professionals) relationships	Citizens are invited, required, or rejected to participate in the production process (voluntarily or involuntarily).
Types of services	Tangible and intangible services
Created values (benefits)	Individual-, group-, public values/benefits; instrumental values and normative values

This analysis provides a summary of the core elements and theoretical dimensions of co-production theory and how they have evolved over time. However, no matter how co-production had evolved and broadened, the essence is still about citizens' involvement in the production process of public services or goods with state professionals.

*Strengths and weaknesses.* In the production and delivery of public services, actors from different sectors are interdependent, and public value generated by the private sector but consumed by the public demonstrates that the degree of publicness of each sector can also be extended (Alford, 2016). No matter who participates in the production and delivery process, a public service-dominant logic (PSDL) is embedded in co-production research. Although theoretically discussed at individual-, group-, and organization levels, several co-production review articles (Fusco et al., 2020; Sicilia et al., 2019; Voorberg et al., 2015) have pointed out that empirically, many co-production studies only focus on individual-level efforts in producing public services with other government officials.

Co-production has strengths in explaining individual-level citizen participation in the service production process to meet special needs, particularly, active and voluntary citizen participation. Second, it provides a way to leverage additional resources to public service delivery. Third, it also emphasizes that public value can be co-created during the co-production process of public services (Eriksson, 2021; Osborne et al., 2021; Voorberg et al., 2015).

However, co-production has weaknesses in the following aspects. First, although a PSDL is necessary, a public problem may not exist or be shared by all producers. That

is, a co-production study does not explain whether the existence of a public problem is the precondition of public service production. Co-production can be activities that fulfill the policy implementation process, such as citizens cooperating with policy enforcement officials to stay at home and distancing to avoid mass infections during the COVID-19 pandemic (Zhao & Wu, 2020). Moreover, it can be a process wherein citizens contribute their resources (time, energy, creativity, and ideas) in different ways to improve their lives, such as citizens joining neighborhood watches to improve their community safety (Van Eijk & Steen, 2016).

Second, explaining why organizations participate in the service-provision process but not in the actual production process is insufficient, particularly, when local governments have capacity limitations in solving public problems and responding to public needs. Different from individual-level co-production, an organizational-level co-production of public services is more difficult to initiate and coordinate, but once initiated, it is more influential on solving problems since organizations have more capacity than individuals.

Third, many empirical co-production studies have emphasized voluntary or active participation of service users, which cannot sufficiently explain why some organizations are passive or reluctant to participate in the service provision process, particularly when co-provision of public services is a solution to a shared problem.

Fourth, whether co-production is for a temporary purpose, or it is preserved as a long-term arrangement after the establishment have not been answered sufficiently by current co-production studies.

These weaknesses reveal that micro-level co-production activities operated by individual citizens have less negotiation power with formal authorities because their participation channels and accessibility are controlled by formal authorities (Farr, 2018; Mulvale et al., 2019; Williams et al., 2020). Once the latter rejects citizen participation in the service production process for reasons of high transaction costs and low resource contribution or shut down their participation channels, micro-level co-production becomes extremely difficult if not impossible. Furthermore, the power dynamics between professional producers and citizen co-producers determine that oftentimes, citizen co-producers are those who have resources, and their participation may benefit them but make those who have no resources or channels to participate more vulnerable.

Co-creation is a concept that has overlapped with co-production but recently has a problem orientation and has focused more on the value aspects that citizens bring to the participation process to create, design, plan, and decide in the production and delivery of public services.

### **Co-creation Theory**

In PAM research, co-creation is originally regarded as a value dimension that is co-created by co-producers when they interactively engage in the service production and delivery process (Osborne, 2018). A systematic literature review conducted by Voorberg et al. (2015) revealed that “co-creation and co-production are closely linked. Some regard co-creation as co-production and some mention co-production while it refers to co-creation” (p. 1340).

Co-creation is a concept that has a long history in private sector studies (Ramaswamy & Ozcan, 2018; Spohrer & Maglio, 2008). In business research, co-creation is associated with many diverse topics and application areas, including but not limited to design and development of new goods and services; collaboration with users as innovators; partnerships between firms; efforts of users in customizing products to their needs; co-production; and the participatory roles of consumers, communities, knowledge, learning, and solutions within business networks (Ramaswamy & Ozcan, 2018).

Although a consensus on the definition of “co-creation” has not been reached, many business scholars have emphasized the *creative feature of co-creation through interaction*. In many co-creation business studies, scholars typically only use the term of co-creation in the literature without defining it, and many times, co-creation refers to value co-creation (Saarijärvi et al., 2013; Ranjan & Read, 2016; Galvagno & Dalli, 2014; Alves et al., 2016). Notably, value co-creation also follows the service logic but with a more macro perspective that focuses on understanding how co-creation occurs among different service systems (Alves et al., 2016, p. 2). In this context, co-creation occurs whenever the resources of one system integrate with those available in other service systems, contributing to the overall systemic wellbeing and portraying these service systems as configurations of value comprising people, technology, and value propositions. A good example is the creation of automobile, which needs to integrate different service systems (metal components, hardware, technicians, etc.). To date, the key points of co-creation (e.g., multiplicities of actors, interactions between actors, and values created by actors) are being crystallized.

A recent definition of co-creation was provided by Torfing et al. (2019), which was borrowed and further developed by PAM scholars. They defined co-creation “a process through which two or more actors in the public, private or voluntary sector attempt to solve a shared problem, challenge, or task through a constructive exchange of different kinds of knowledge, resources, competencies, and ideas that enhance the production of public value in terms of visions, plans, policies, strategies, regulatory frameworks, or services, either through a continuous improvement of outputs or outcomes or through innovative step-changes that transform the understanding of the problem or task at hand and lead to new ways of solving it” (p. 802). On the basis of the “ladder of participation” proposed by Arnstein (1969), Torfing et al. (2019) developed “a ladder of co-creation,” which has five rungs (pp. 804–805).

In this dissertation, I focus on the fifth rung of co-creation-like activities committed by US universities when managing natural, technological, and biological disasters of different scales. I define these activities as university co-provision of public services, which are in the forms of coordinating resources, co-creating solutions, and co-providing public services that may occur on different stages of disaster management.

Seeing through the above definition, I find that mainly **individual-level collaboration** efforts are addressed in co-creation, as well as the creative aspects of these efforts.

The strength of co-creation is that it captures the **plurality** of public and private actors to solve public problems, challenges, and tasks and the **innovative potential** that emerges when different actors aim to **solve shared problems** by stepping out of their comfort zone and engaging in the processes of mutual and transformative learning

(Torfing et al., 2019, p. 803). Co-creation also challenges the new public management paradigm, which regards citizens (groups) mainly as customers but overlooks their knowledge, resources, and capability in decision making and solving problems.

In the current empirical studies on PAM areas (Baptista et al., 2020; Bentzen et al., 2020; Criado et al., 2021; Rebelo et al., 2020), co-creation theory has been applied widely in three contexts: public problem solving (e.g., ending homelessness in a city), public service provision (e.g., childcare), and public regulation (e.g., water management). These contexts highlight civic individuals and organizations that within communities have resources and knowledge to participate in the decision-making process, public service production and delivery process, and the governing process of public goods.

Co-creation has advantages in solving public problems and producing and delivering public services by engaging public, private, and nonprofit local actors of various forms. First, co-creation can advance innovation (Alves, 2013; Lee et al., 2012). Engaging different actors to solve problems can facilitate the identification and framing of public problems and developing solutions from various perspectives. In this process, innovation and democratic legitimacy can be enhanced.

Second, co-creation breaks down the barriers to multisectoral collaboration, particularly blurring the division of sectors as private, public, and nonprofit (or the so-called third sector; Conteh & Harding, 2021). Instead, the sites of co-creation occur become platforms or so-called arenas for different actors to initiate activities together to combat problems and challenges (Ansell & Torfing, 2021).

Third, co-creation adds a value layer to the production and delivery of public services by engaging different forms and levels of citizen engagement (J. Bryson et al.,

2017; Haug & Mergel, 2021). That is, co-created value is guaranteed in terms of identifying efficient and effective solutions to public problems, increasing democratic legitimacy, and strengthening social cohesion.

Co-creation is not without risks. First, many scholars have argued that co-creation may lead to biased participation that favors the most extreme and or advantaged groups with resources. Second, accountability issues are another classical issue caused by the participation of non-elected actors and lack of formal and transparent decision making and monitoring (Papadopoulos, 2007; Torfing et al., 2019). Third, its overlap with co-production increases the ambiguity and unclarity of both concepts, which creates barriers in understanding and explaining their distinctive strengths in explaining social phenomena.

In the following, I compare the definitions of these “*co-*’s” and provide classic examples to have a better understanding.

### **Integrating Co-production, Co-creation, and Other “*Co-*’s”**

In the PAM field, co-production and co-creation scholars usually use some other concepts to describe the collaboration efforts contributed by multiple actors, including co-management, co-governance, collaboration, and partnerships, particularly, public–private partnerships. Their definitions and foci must be listed to know their similarities and differences.



**Table 3. Definitions of “Co-’s”, Foci, and Examples**

<b>Concepts</b>	<b>Definitions</b>	<b>Foci</b>	<b>Examples</b>
Co-production	Osborne et al. (2016): co-production was defined as “the voluntary or involuntary involvement of public service users in any of the design, management, delivery and/or evaluation of public services” (p. 640).	occur at different stages of the public service cycle. service users could participate in different forms; participation could be voluntary/involuntary; public service logic	Parents are involved in their children’s schools (Bifulco & Ladd, 2006). Citizens participate in the neighborhood watch to improve community safety (van Eijk, 2018).
Co-creation	Voorberg et al. (2015): public co-creation is the involvement of citizens in the initiation and/or design of public services (1347). Torfing et al. (2019): co-creation was defined as “a process through which two or more actors in the public, private or voluntary sector attempt to solve a shared problem, challenge, or task through a constructive exchange of different kinds of knowledge, resources, competences, and ideas that enhance the production of public value in terms of visions, plans, policies, strategies, regulatory frameworks, or services, either through a continuous improvement of outputs or outcomes or through innovative step-changes that transform the understanding of the problem or task at hand and lead to new ways of solving it” (p. 802).	Creative features; social innovation; co-creation as value; multi-actors; problem-solving oriented; target group; citizen entrepreneur;	Citizens initiate or design a project (e.g. youth care provision) to create outcomes that are specific to the preferences of the target group (W. Voorberg et al., 2017);
Co-management	Brandsen and Pestoff (2006) adapted based on Osborne and McLaughlin (2004): Co-management refers to an arrangement, in which third-sector organizations produce services in collaboration with the state (p. 497).	Third-sector organizations participation; Relationship between the third-sector organization and the state; The purpose is to produce services.	Nursing homes, hospitals, housing associations participate in producing Dutch elderly care services with municipal authorities (Brandsen & Hout, 2006).
Co-governance	Brandsen and Pestoff (2006) adapted based on Osborne and McLaughlin (2004): Co-governance refers to an arrangement, in which the third sector participates in the planning and delivery of public services (p. 497).	Third-sector organizations participation; planning and delivery stage of public service.	Charitable organizations organize and facilitate user involvement in National Health Service governance, in which citizens play a key role in the overall planning, management, and delivery of the genetics pilot program (G. P. Martin, 2011).
Collaboration	Agranoff and McGuire (2003): collaboration is a process of facilitating and operating in multi-organizational arrangements to solve problems that cannot be solved or solved easily by single organizations (p. 4).	Collaboration is a purposive relationship designed to solve a problem by creating or discovering a solution within a given set of constraints (e.g., knowledge, time, money, competition, etc.); inter-organizational level efforts; intergovernmental networks; inter-organizational efforts.	State and local government-nongovernmental organization collaboration in economic development (AGRANOFF, 2005).
Cooperation	Agranoff (2006): Cooperation refers to the act of working jointly with others, usually to resolve a problem or find a corner of activity (p. 56)	Occasional or regular; occur within, between, or outside formal organizations. focus on the activities of individuals who represent organizations working across their boundaries.	In a Swedish context, universities, companies, and the local government are actively involved in each other’s development work in new ways, shared

	Gulati et al. (2012): inter-organizational cooperation refers to the joint pursuit of an agreed-on goal(s) in a manner corresponding to a shared understanding about contributions and payoffs (p. 6)		resources, and increased the potential for innovation (Lundberg & Andresen, 2012).
Coordination	Gulati et al. (2012): Coordination is the deliberate and orderly alignment or adjustment of partners' actions to achieve jointly determined goals. (Note: in Gulati et al. (2012), cooperation and coordination were regarded as two facets of collaboration when partners build allies).	The outcome can be characterized by efficiency, the relative cost of designing and operating coordination mechanism, and by effectiveness, the degree to which coordination efforts actually produce the desired alignment or adjustment of action. Involves the specification and operation of information-sharing, decision-making, and feedback mechanisms in the relationship to unify and bring order to partners' efforts and combine partners' resources in productive ways. Coordination seeks to ensure that partners' efforts "click" and yield the desired outcomes with minimal process losses (Gulati et al., 2012, p. 12).	Public, private, and nonprofit organizations use information technologies to coordinate and communicate information to achieve effective communication and decision-making goals in responding to September 11, 2001 (Kapucu, 2006).
Partnership	Reynaers (2014): public-private partnership (PPP) was described as "an umbrella term for all types of public-private cooperation, whether highly formal and hierarchical or informal and horizontal", which has many variations such as long-term infrastructure contract (p. 41).	In early public administration and management (PAM) studies (Bloomfield, 2006; Ghore, 2001; Teisman & Klijn, 2002), PPP was used as a governance scheme, in which there is an intensified interaction between public and private partners, however, there is little joint decision making and continuity in cooperation. In practice, the successful implementation of PPP requires an exchange of information between actors and a willingness to look for solutions on a mutual basis (Teisman & Klijn, 2002).	Private companies partner with local governments on financing infrastructure projects (Hodge & Greve, 2007).

From Table 3, several findings can be summarized. First, co-production and co-creation overlaps on many stages that citizens (as service users) are involved in public service provision—both can be at the design, production, and delivery stages of public services. Although empirical studies that discussing the roles of organizations in co-producing and co-creating public services is emerging, the dominant empirical studies of co-production and co-creation studies still focus on individual level activities.

Co-management and co-governance focus more on the participation of third-sector organizations in the public service provision process but at different stages. Particularly, co-management can be regarded as **organization-level participation** in the

**production** of public services, whereas co-governance is more focused on organization-level participation in the **planning and delivery** of public services. In short, co-production and co-creation still focus on individual-level citizen participation in the whole public service provision process, whereas co-management and co-governance focus on organization-level (narrowly defined) co-production and co-creation of public services.

Furthermore, Table 3 reveals that the current research on co-production, co-creation, and collaboration has focused on multi-actor activities that provide public services but may serve different goals and have different preconditions. For example, in a broader sense, the goal of co-production and co-creation is to provide a specific public service to meet target group needs, whereas collaboration aims to solve a shared problem that cannot be solved by a solo organization, which does not necessarily involve producing a public service but may involve coordinating resources and cooperating among multiple organization-level actors. Coordination and cooperation are two facets of collaboration. The partnership is more based on contracts between private and public sectors, which may not involve a shared problem either.

The blurring boundary between co-production and co-creation increases the complexity and ambiguity in explaining their strengths and weaknesses (Osborne et al., 2016; Voorberg et al., 2015; Windrum et al., 2016). Greatly overlapped also increases the difficulty to apply them in appropriate contexts.

In this dissertation, I prefer to be more conservative and take a step back by using their narrower definitions to have a better understanding of both. On the basis of their original definitions and essences that remained after years of expanding and evolving, I

regard co-production as the citizen participation in the production process of public services, which follows an input–output logic. Co-creation is regarded as citizen participation in the design and planning process of public services, which requires citizens to contribute their creativity to drive social innovation.

The delivery of public service is separated from the design, planning, and production processes to have a better understanding of who the actors of service delivery are and what resources are needed in this process.

According to a definition provided by IGI Global, public service delivery is the “mechanism through which public services are delivered to the public by local, municipal, or federal governments”<sup>2</sup>. However, many scholars have not explained the relationship between public service delivery, public service provision, and public service production; oftentimes, they are used interchangeably (Cheng, 2019; Fledderus et al., 2015; Joshi & Moore, 2004; Kurian & Dietz, 2013; Powers & Thompson, 2008).

Alford and O’Flynn (2012) claimed that service delivery is “not quite the same thing as implementation and is typically used to describe the provision of outputs, such as welfare benefits, school classes, or roads, rather than of outcomes, such as mitigation of poverty, improved literacy or road safety” (p. 8). Thus, service delivery includes the provision of services to the clients and to government agencies.

In this dissertation, I also adopt a conservative approach and define, public services delivery, in a narrow sense, as the last step of public service provision, which means public services are sent to and received by the citizen clients in different ways.

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<sup>2</sup> See <https://www.igi-global.com/dictionary/public-service-delivery/33101>

This step can be realized by actions initiated by citizens actors, professional actors, or both. Notably, many types of public service may have no products but only have processes to offer their customers (Gronroos, 2007). For example, social work, healthcare, education, economic, and business support services are “public services” but not concrete “public products,” which are delivered to the public through directly interactions with citizen clients (Osborne et al., 2013). Some public services may have concrete public products to deliver to citizen clients but may not be produced directly by public sectors, such as critical infrastructure systems. Therefore, dividing the whole public service provision process into specific stages and investigating who the actors are, what resources are invested, what values are created in each stage, and how to evaluate the effectiveness and efficiency of each stage will provide a deeper understanding of state–society interactions at different stages of public service provision and accurately improve the public service quality at different stages. The relationship among co-creation, co-production, and co-delivery of public services is described in Table 4, in which a public service logic (Osborne, 2018) is embedded.

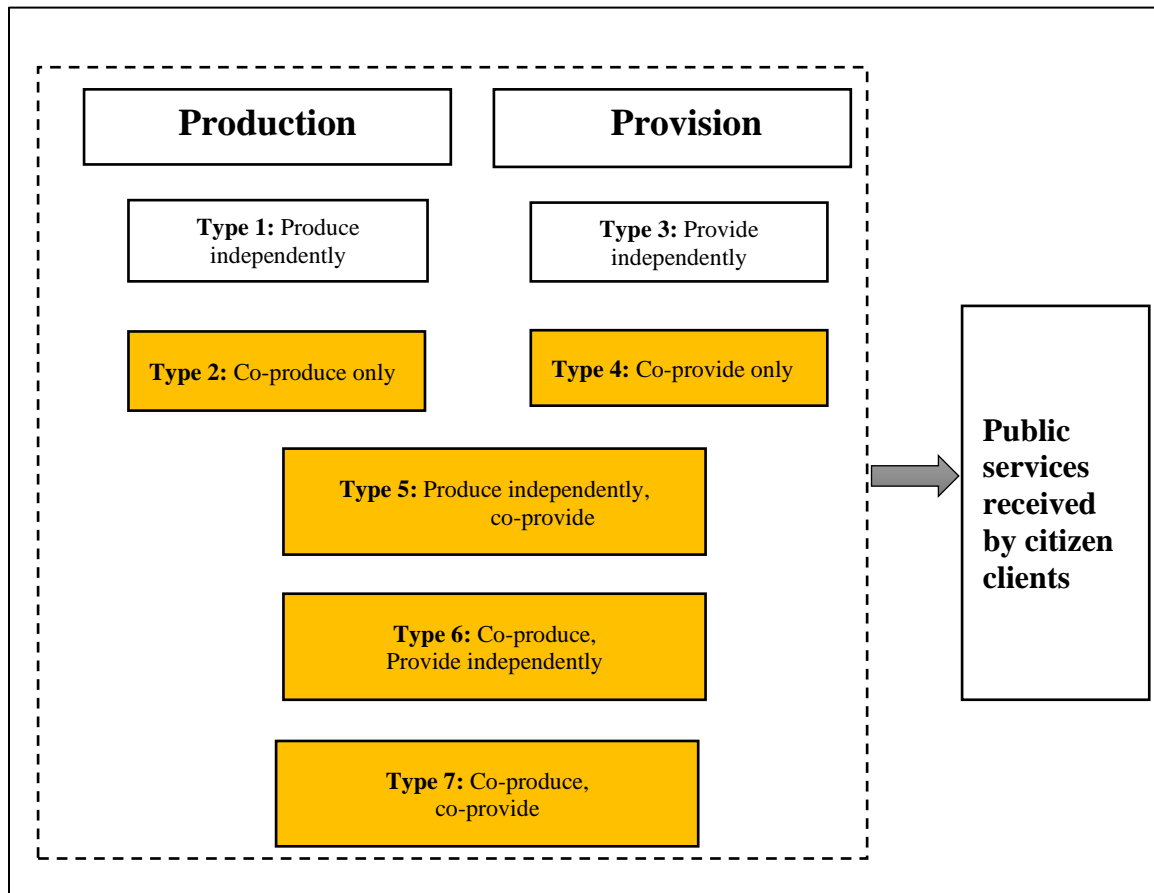
**Table 4. A Re-conceptualization of “Co-” s with Two Dimensions: Analytical Levels and Service Provision Stages**

		Public service provision (broad sense)		
		Public service provision stages		
Analytical levels	(Meso-level) Organization-level participation	Co-governance	Co-management	
	(Micro-level) Individual-level citizen participation	Co-creation	Co-production	Co-delivery
		Designing, planning, initiating, entrepreneurship	Producing a product as output after investing various inputs.	Sending out or distributing public services to citizen clients

As shown in Table 4, a broad sense of public service provision includes the design, production, and delivery processes of public services to citizen clients. A narrow sense of public service provision is more about providing public services to citizen clients by interacting directly with them, which is closer to public service delivery (Alford & O’Flynn, 2012).

On the basis of the narrower definitions of the production and the provision of public services discussed above and assuming that there exists a linear public service logic (i.e., the production of public service is prior to its provision) between them, we can expect that the roles that organizations participate in the public service production and provision processes can be described, as shown in Figure 1. Generally, organizations can take up one of the following seven types of roles.

**Figure 1. Public Services Received by Citizen Clients: Different Types**



**Type 1: Produce independently.** Some organizations only participate in the production process of a specific public service independently (not with other actors) but are not involved in its provisioning process to citizen clients.

**Type 2: Co-produce only.** Some organizations participate in the production process with other organizations but are not involved in its provisioning process to citizen clients.

**Type 3: Provide independently.** Some organizations do not participate in the production process of a specific public service but provide this service independently to citizen clients.

**Type 4: Co-provide only.** Some organizations do not participate in the production process of a specific public service but co-provide this service with other organizations to citizen clients.

**Type 5: Produce independently and co-provide.** Some organizations produce public service independently but co-provide it to citizen clients with other organizations.

**Type 6: Co-produce and provide independently.** Some organizations co-produce public service with other organizations but provide it to citizen clients independently.

**Type 7: Co-produce and co-provide.** Some organizations co-produce as well co-provide public service with other organizations to citizen clients.

### **Co-provision Theory: Beyond Co-production and Co-creation and Focusing on Resource Allocation and Capacity Building**

In this dissertation, in a broad sense, I define co-provision of public services as the conceptualization, design, and provision of public services by an organization to solve a significant service capacity limitation. This definition has its origins back to the 1980s–2000s, in Ferris (1984), Weschler and Mushkatel (1987), Brudney and Warren (1990), and Powers and Thompson (1994). Particularly, in Ferris (1984), co-provision was defined as “the voluntary involvement of citizens in the provision of publicly provided goods and services or close substitutes” (p. 326). Brudney and Warren (1990) defined co-provision as “the involvement of volunteer citizens in decisions and policy making that determine what goods and services should be supplied, in what amounts, and to whom” (p. 50). From these definitions, co-provision also has a value element (who will benefit).



In my dissertation, I expand the definition to nongovernment organizations and broaden its scope by including service design

Consistent with Ferris (1984) and Weschler and Mushkatel (1987), a core difference between co-provision and co-production is that co-production involves the participation of citizens (of different forms) in the actual production process of services, that is, the combination of their inputs (time, energy, and skills) with those of public officials to yield a service or output. However, co-provision is related to citizens (of different forms) and organization donations of human capital, budgets, space, facilities, or other types of resource that constitute resources for the public sector. A good example is that many universities have actively coordinated with government agencies to use campus parking lots and stadiums to provide testing and vaccination services to the whole community, but many of them do not involve the production of test kits or vaccines (Rahn, 2020).

Therefore, co-provision essentially focuses on resource allocation relationships between citizens of various forms and state agencies, whereas co-production addresses a joint production process between citizens and state agencies based on the input–output logic. As Ferris (1984) claimed, “co-production could be an alternative arrangement for public service provision in times of fiscal constraint, the key consideration is whether or not the voluntary citizen actions of different forms directly: (1) reduces the amount of resources that the public sector must commit to maintaining a given service level, or (2) increases the service level that can be obtained with a given amount of public sector resources” (p. 325).

In this dissertation, co-provision is a concept developed based on the classic (micro-level) definition provided by Ferris (1984); however, it has elements overlapped with and borrows from co-production and co-creation (see Tables 3 and 4). It borrows the PSDL from co-production, the problem-solving orientation from co-creation, and focuses on **meso-level** resource mobilization and distribution activities committed by organizations. It can also be expanded to macro-level service provision activities conducted by networks of organizations, countries, or political and economic unions (e.g., European Union). For example, a million doses of COVID-19 vaccines provided to the African Union were donated by the US<sup>3</sup>, China<sup>4</sup>, and other countries, which aimed to help reduce the spread of COVID-19 infections among African countries. Given the scope and space of this dissertation, I focus on the meso-level co-provision of public services conducted by organizations.

The relationships among co-production, co-creation, and co-provision can be described in Tables 3 and 4. Similar to “co-creation” and “co-production,” the “co” side of “co-provision” addresses the collaborative interaction in networks or partnerships among organizations from different sectors (Osborne et al., 2013; Osborne & Strokosch, 2013; Torfing et al., 2019). However, the “provision” side of “co-provision” emphasizes that as a solution to solve service capacity limitations, public service provision can be realized through collaborative interactions (e.g., channel resources, knowledge, expertise,

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<sup>3</sup> See <https://www.gavi.org/news/media-room/us-donated-vaccine-deliveries-africa-set-begin-first-deliveries-planned>

<sup>4</sup> See <https://www.bloomberg.com/opinion/articles/2021-10-21/china-should-step-up-vaccine-diplomacy-in-africa>

and assets among several stakeholders). Therefore, in “co-provision,” the existence of a problem and a problem-solving orientation is assumed, and a PSDL is embedded as well.. Different from “co-production,” “co-provision” does not meet the special needs of some citizens or some social groups but secures the benefits of involved organizations and beyond through mobilizing resources from these stakeholders.. However, different from dominant co-production and only emerging co-creation studies, co-provision research focuses on (nongovernment) organization-level rather than individual-level activities that aim to complement local governments’ service capacity limitation. Furthermore, the goal of co-provision is to solve a shared problem faced by the co-providers and other stakeholders.

Notably, different from “co-creation,” “co-provision” does not necessarily indicate that the co-provided services are creation or social innovation that have never occurred before. The co-provision of public services can be a result that is based on previous formal and informal agreements and mutual-aid plans among stakeholders or only initiated immediately and innovatively when emergencies and crises occur. A normal situation is that when universities hold some large-scale festivals and events (e.g., football games), to effectively prepare for and respond to potential emergencies (e.g., chaos, injuries, and unpredictable threats), university police department typically provides health and safety services through collaborating with local hospitals, local police, fire department, and security companies<sup>5</sup>. Another extreme case is when

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<sup>5</sup> See a case here: <https://www.businessinsider.com/iowa-fans-wave-childrens-hospital-new-tradition-2017-9>

universities are affected severely by pandemics, such as H1N1 and COVID-19, to protect the safety and health of all students, faculty, staff, and other community members of residing cities, many universities have collaborated with local government agencies (e.g., public health department), volunteering organizations, hospitals, and private companies to provide testing and vaccination services to the general public (Petinaux et al., 2009; El Masri & Sabzalieva, 2020).

In addition, the problem does not need to be a public problem that affects the whole society, but it should essentially influence the benefits of an organization, and its impact may go beyond and evolve into a community-level, or even a whole-society-level problem. A representative but unfortunate case is the Virginia Tech shooting that occurred on April 16, 2017. Thirty-two students and faculty members were killed and twenty-five were wounded, which became the deadliest school shooting in modern US history (Vieweg et al., 2008). Although it occurred on a campus of Virginia Tech, fears, psychological distress, and sense of insecurity increased and spread among not only students and faculty but safety review were also conducted across the Commonwealth of Virginia, the nation, and the world (Deisinger & Scalora, 2016). Using a pilot study, Wigley and Fontenot (2010) found that crisis managers losing control of the message provided by citizens might be a reason that they had an incorrect judgment of the shooting and did not respond quickly and effectively after the shooting occurred.

### ***A Typology of co-provision of public services***

I created a typology of co-provision of public services based on two dimensions. The first dimension is whether one organization's co-provision of public services is for a

short-term purpose or is it created as a long-term arrangement? The second dimension is whether the co-provision of public services is a proactive or reactive response to problems of an organization or social problems that affected community benefits?

On the basis of the two dimensions, I segmented the co-provision of public services into four quadrants. Each quadrant depends on what the purpose of co-provision is (spectrum of short term to long term) and to what extent is co-provision proactive. Four types of co-provision can be generalized.

Type I is the proactive and long-term co-provision, which is termed *agile co-provision*. It describes a situation that to solve a potential shared problem, an organization has actively created a *long-term* arrangement to co-provide public services with other organizations. Notably, agile co-provision implies that an organization has created the processes, tools, and training and has allocated resources to enable it to respond quickly to the needs that emerged from shared problems.

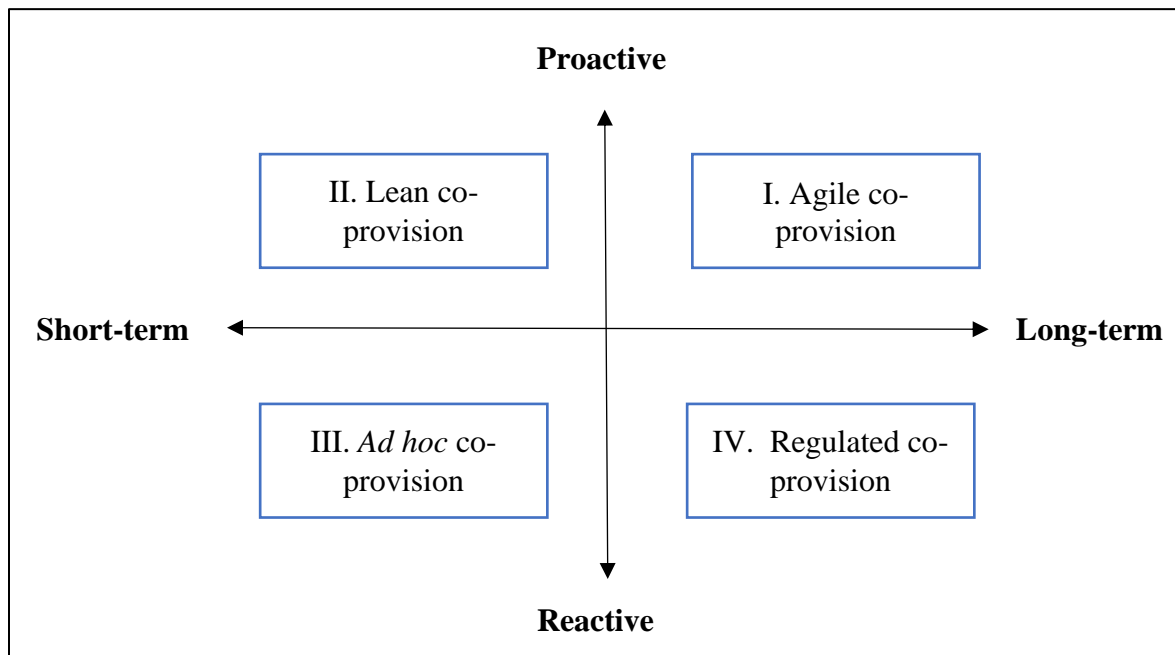
Type II is the proactive but temporary co-provision, which is termed *lean co-provision*. It depicts a situation that to solve a potential shared problem, an organization has actively created a *short-term or temporary* arrangement to co-provide public services with other organizations. Inspired by lean production (Shah & Ward, 2007; Jasti & Kodali, 2015), lean co-provision addresses maintaining service productivity, improving resource utilization, and maintaining service quality, which follows a “do more, with less” philosophy.

Type III is the reactive and short-term co-provision, which is termed *ad hoc co-provision*. It refers to a situation that to solve a shared problem, an organization has decided to set up an *ad hoc* arrangement to co-provide public services with other

organizations. This type of co-provision arrangement would be terminated after the problem became less severe or eliminated.

Type IV is the reactive and long-term co-provision, which is termed *regulated co-provision*. It illustrates a situation that to solve a shared problem, an organization is required to establish a *long-term* arrangement to co-provide public services with other organizations.

**Figure 2. A Typology of Co-Provision of Public Services**



*Application fields of co-provision of public services*

Co-provision of public services can be used in many situations. However, disaster management provides a good research context because, oftentimes, local governments do not have sufficient capacity to promptly respond to disasters independently. Conversely, the severe consequences of disasters, such as the disrupted operations of service systems,

push many nongovernment organizations to participate in disaster responses through collaborating on resources, assets, and information and providing disaster services to complement the service capacity gap of local governments.

In this dissertation, I focus on exploring the factors and performance of university co-provision of public services to respond to general disasters and the COVID-19 pandemic. This response could be proactive or reactive based on the timing of disasters and the COVID-19 pandemic that occurred to the university and their response plan. From university action report, we can also see whether universities regard providing public health services to the public as a short-term strategy or long-term arrangement which has established processes and resources to support it.

By integrating problem-solving process (Fung, 2015; Weber & Khademian, 2008), disaster management phases (May, 1985; Weber & Khademian, 2008), and place-based interactive arenas (Sørensen & Torfing, 2015; Torfing et al., 2019), I develop an integrative theoretical framework for understanding university responses to disasters of various types.

According to Weber and Khademian (2008) and Fung (2015), solving problems through multisectoral efforts need to go through three stages: problem definition, administration, and resolution. The managerial perception of problems is related to how a problem is identified, defined, and then administered, and eventually solved. Conversely, in this dissertation, managerial perception of the disaster-caused problem can be a *capacity gap problem*, which describes a situation that managers assess and realize that their organizational capacity in service provision cannot possibly meet the variety and volumes of social needs caused by disasters (F. Zhang et al., 2018). It can also be a

*psychological (sense of community responsibility (SOC-R)) problem* (Boyd & Nowell, 2020; Francis et al., 2012), which depicts a situation that in front of disasters, different levels of managers' SOC-R toward satisfying disaster-caused social needs will affect their different strategies to cope with and respond to disasters.



## CHAPTER 3

### RESEARCH DESIGN: A MIXED METHOD APPROACH

This dissertation utilizes a research design consisting of a two-stage data gathering process to answer the above research questions and examine hypotheses. Mixed-methods research has the advantage of combining the strengths of quantitative and qualitative methods, thereby facilitating a deep understanding of the research question by using triangulation and reducing the problems associated with common source bias (Creswell & Clark, 2017; Hendren et al., 2018).

The sequence in which the qualitative data and quantitative data are collected is also important (Cameron, 2009; Mele & Belardinelli, 2019). Since studies of the disaster service co-provision have rarely explore in the field of public administration and management, I assume that public service co-provision in a disaster and emergency management context may have different measures and mechanisms from public service co-provision in other normal contexts. Thus, I adopted a two-stage research design as shown in Figure 3.

For the first data collection stage, I conduct a small number of case studies through in-depth interviews of emergency management leads from five American universities and their government counterparts. The five universities selected are: Arizona State University (ASU), the University of California at Santa Barbara (UCSB), the Virginia Polytechnic Institute and State University (Virginia Tech), and the College of Charleston (CofC) and the Kennesaw State University (KSU). This is a small purposive sample for in-depth case examination. These universities were selected

because of variation across four dimensions of analytic interests: student population size and diversity, geographic location (both urban and non-urban communities), educational types (different levels of research activities, graduate education), and predominant hazards relevant to geographic areas (e.g., extreme heat, hurricanes, extreme weather). The goal of first stage qualitative research is to improve our understanding of general disaster perceptions, experiences and responses of Subject Matter Experts (SMEs) in the emergency management field from both American Universities and government agencies (including state, regional and local government agencies). In total, 36 interviews of 34 SMEs<sup>6</sup> were conducted during 2021-2023 following an interpretivist approach (Lin, 1998; Nowell & Albrecht, 2019). This is **Study 1**.

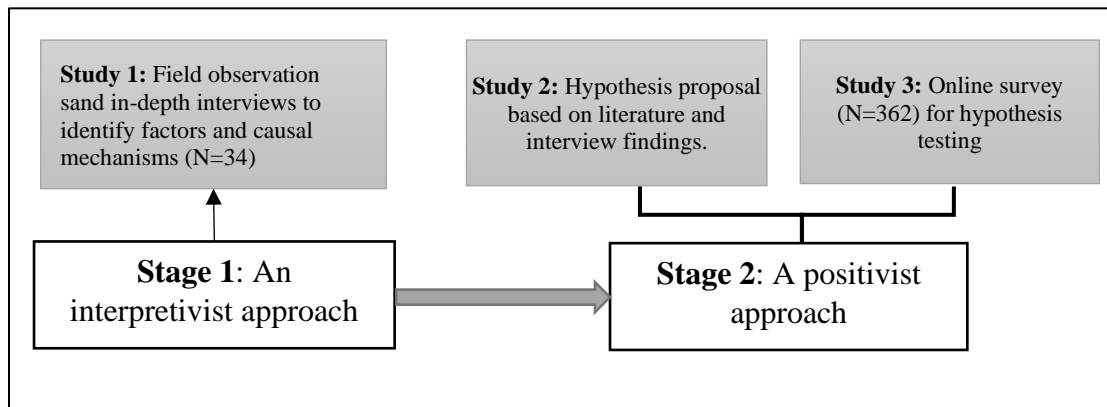
During the second stage, I aim to explain and examine the causal mechanisms underlying the effects of disaster experiences, university characteristics and SMEs' individual characteristics on their disaster service co-provision decisions and outcomes. Two studies were designed to achieve this goal. In **Study 2**, I propose hypotheses based on the literature and findings drawn from the in-depth interviews and field work. Combining potential rationales identified from both the interviews and the literature offers certain advantages. First, this approach can take the specific-contextual factors identified in the interviews into consideration, which are typically unaddressed by the literature (Munce et al., 2020; Hendren et al., 2022). As Hendren et al. (2022) note, leveraging qualitative strands of research can help “answer ‘how’ questions, focus on

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<sup>6</sup> Two participants were interviewed more than once given the rich information they wanted to offer. Also, given the nature of their work, two emergency call occurred that had interrupted the interviews and lead to rescheduling.

participant perspectives, provide context, add nuance to quantitative findings, develop measures and concepts, increase the credibility of findings, and unravel inconsistencies” (p. 10). This approach also facilitates the development and design of survey items and questions aimed at measuring the key constructs, examining their validity, and testing hypotheses in **Study 3**. Following a postpositivist/pragmatic approach (Murphy, 1994; Whetsell & Shields, 2015), I conduct statistical analysis to examine the hypotheses based on 362 valid survey responses and generate causal inferences from the findings of the two stages of studies.

**Figure 3. Research Design Strategy: Stages and Approaches**



For the second stage, I conducted a national survey of emergency management leads in US universities. I developed a survey instrument using the project objectives and the analysis of the interviews and case studies data. At the same time, I assembled a national sample frame of 1401 university emergency management leads and other relevant university personnel who are in a position to respond. Their contact information (i.e., phone, address, and email) was collected from publicly accessible university websites. I also recruited participants using standard methodology and an IRB approved

protocol. The goal of the national survey is to examine and generalize our understandings of the roles of American universities in the management of disasters and the current COVID-19 pandemic. This two-staged research was approved by the ASU IRB prior to actual implementation.

### **Stage 1: In-Depth Interviews**

#### ***Interview consent form***

Interview Consent for Participants 18 years old or older

We are contacting you with respect to a study being conducted by researchers at Arizona State University. The purpose of the project is to conduct a national level study of how universities in the United States not only conduct emergency management practices internally for risk and threats on campus, but also might collaborate with external partners as well. Further, we would like to understand how your university, or your organization has dealt with the COVID-19 pandemic and its challenges, and whether or how those efforts might relate to future refinement of emergency management practices at the university.

Your participation in this interview is voluntary. You can decline to be interviewed, decline to answer particular questions, or end the interview at any time. You can also ask that the interview not be used in our research, even after we have finished. In order to make sure we capture your responses accurately for the research, we would like to audio record this interview using Zoom. The recording will be maintained on a secure internal password protected server at Arizona State University. We will remove your name and all identifiers from the file name and we will not identify you in any way. You are also free to decline the recording.

The interview will take approximately 30-60 minutes, depending on your availability. There are no known risks or direct benefits to you from participating. However, the emergency management community will benefit from this research by gaining a better understanding of the role universities play in managing emergencies and disasters.

If you have any questions about the research study or about your participation in the study, you may contact the project team leaders – Dr. Eric Welch (ericwelch@asu.edu) or Dr. Brian Gerber (brian.gerber@asu.edu) – at any time.

If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

Before we begin the interview, we will ask you if you have read and understood this consent statement. We will go over any questions you have. We will ask you if you agree to continue with the interview and if you agree that we record the interview.

Once I start recording the interview, I will ask you again.

Thank you. We look forward to talking with you.

### ***Interview protocol***

The case study interviews of the university personnel (i.e., the SMEs with responsibilities for and knowledge of university work efforts in this domain) noted above consist of a recorded 45–60 minutes interview using a semi-structured interview instrument. These are remote interviews using the Zoom application that is commonly accessible for remote conversations and meetings. I also get permission from two groups of participants (university and non-university emergency management experts) before I turn on the “record” option. Participants can reject and change their mind at any time. The recording will be maintained on a secure internal password protected server at Arizona State University. I also clarify that I would remove their names and all identifiers from the file name and would not identify them in any way. They are also free to decline the recording.

### ***Semi-structured interview questions***

The interview instrument I ask the following topics of all university personnel:

1. Please explain your position at the university and the formal role you might have in some aspect of emergency planning or preparedness, campus safety, or any potential role in assisting in an emergency or crisis situation at your university.
2. In terms of [fill in university name] decision-making authority for emergency planning and authority over incident management, please explain the set of units

- involved and the typical review authority for planning tasks and products and decisions over incident response operations if an emergency occurs on campus or at a campus event.
3. Related to both planning actions and coordination of assets for incident response, please explain available resources at the university and how external partnerships are structured (e.g., working with local police or fire in preparing for a large event on campus).
  4. In contrast to more routine or standard emergency preparedness efforts, please explain [insert university name] COVID-19 related activities. What did the university do in terms of internal management of the health risks for students, faculty and staff, and how did the pandemic response compare to other emergency or crisis response or preparedness efforts? i.e., were those actually similar, dissimilar, or what? Please explain any similarities or dissimilarities.
  5. What have been key lessons for your university [insert university name] from COVID 19 response actions? And beyond internal emergency management issues, have you built any new external partnerships that might be maintained beyond this pandemic situation? Please explain any relevant lessons here.
  6. Finally, we would like to ask you for an assessment of current emergency management capabilities at your university, how or whether capabilities have changed in the past year because of the pandemic, and what you might see as likely future actions in working with external partners on emergency or disaster management issues in general.

The case study interviews with non-university partners (e.g., state or local emergency management officials) are shorter and more focused in nature. It takes approximately 30–45 minutes interviews, using a semi-structured interview format.

Those subjects are asked the following four key questions:

1. Please explain your position in [give organization or agency name] and general work responsibilities in the area of emergency preparedness or response. And in those work efforts, have you, or your agency, had any working relationships with personnel from [fill in university name]? Could you identify and explain the nature of communication and coordination with [fill in university name]?
2. What are the predominant threat and hazards issues in your community? And in managing risk overall, does your agency place an emphasis on building stakeholder partnerships? In other words: in terms of coordination with a stakeholder such as [fill in university name], how important is that to general emergency preparedness and emergency response capabilities to your organization?
3. Apart from general natural or technological hazards, could you tell me how your agency worked with key community stakeholders on the COVID-19 pandemic response? What were some of those specific response actions that might have involved partnerships with key community stakeholders? Was there any contact with [fill in university name] on any pandemic response issues?
4. From the pandemic, has your agency taken away any key lessons about working with community stakeholders in general? And in terms of working with [fill in university name], how important might that coordination relation be? And what is

the likelihood of building continued working relationships with [fill in university name] moving forward?

## **Stage 2: Online Survey**

### ***Sampling frame***

The sampling frame for national survey among SMEs is assembled through three steps. Specifically,

#### **Step 1: I Identify 888 universities/colleges using 2018 Carnegie Classification of Institutions of Higher Education<sup>7</sup>, and the distribution is as below:**

- 418 universities from Group 1: all doctoral universities (418 universities)
- 228 universities from Group 2: master programs (685 in total).
- 182 universities from Group 3: Baccalaureate Colleges (575 in total).
- 50 universities Group 4: Baccalaureate/Associate's Colleges (151 in total)

Notably, despite the 418 doctoral universities, all other 470 universities/ colleges will be selected using a stratified sampling strategy, which would consider the distribution of the regions, sizes, residential or not. Furthermore, this sample frame does not include associate's college and special focus institutions for three reasons: (1) small colleges usually do not have environmental health and safety department given their majors and programs provided, (2) their college-level management teams do not have clear division of work; and (3) small size colleges have poor website design and low

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<sup>7</sup> See specific link here: <https://carnegieclassifications.acenet.edu/>



information transparency. It is difficult to get the information from their websites that this research requires.

**Step 2: Collect 3 department heads' names and contact information of all 888 universities**

- University police department head (typically chief of police), who are responsible for public safety issues.
- Director of environmental health and safety department (sometimes it is the vice president) who oversees research safety.
- Director of enterprise risk management (sometimes, it is called chief risk officer, risk manager) who is responsible for university-level risk evaluation and decision-making.

Notably, these department heads may have slightly different titles given upon their designed organizational structures. For example, a university/college may have a public safety department, but police, EHS, enterprise risk management may be three divisions within the public safety department. Sometimes, enterprise risk management is integrated into environmental health and safety.

However, since this research focuses on the above 3 departments, and I regard them as 3 functional units regardless their specific organizational or structural relationships. After 4 months of collection and double check, in total 1401 department heads' contact information (emails and office phone number). This result leads to each university/college has averagely less than 2 contacts for survey, mainly due to small universities/colleges may not have an EHS department, and or risk managers'

information is less publicly accessible. Links to their contact information also is kept for future research.

**Step 3: assemble a sampling frame and integrate it with institutional information**

In this step, to reduce common source bias (Andersen et al., 2016; Favero & Bullock, 2015; Meier & O’Toole, 2013) generated from relying on one dataset, I integrated survey dataset with another two sources of institutional information:

1. 2018 Carnegie classification of higher education
2. US. Census bureau statistics

Descriptive data analysis and hypotheses testing results will be reported in Chapter 5.

## CHAPTER 4

### QUALITATIVE CASE STUDY FINDINGS: UNIVERSITY ROLES IN DISASTER SERVICE CO-PROVISION

#### **Institutional Information and Disaster Experiences of Selected Universities/Colleges**

In the previous chapter, I have intentionally selected five universities for case studies: ASU, UCSB, Virginia Tech, KSU, and CofC. The reason behind choosing these particular universities/colleges is the variation they exhibit across four dimensions of analytical interest: the size and diversity of the student population, their geographic location (urban and nonurban communities), types of education offered (different levels of research activities and graduate education), and the predominant hazards relevant to their geographic areas (e.g., extreme heat, hurricanes, and severe weather).

#### ***ASU: “We need to be ready before COVID-19 spreads to us”***

ASU is among the largest universities in the U.S. with more than 73,000 undergraduate and graduate students from all 50 U.S. states and more than 120 countries<sup>8</sup>. ASU is an **R1** university, signifying extremely high research activity<sup>9</sup>. U.S. News and World Report recognizes ASU as the country’s most innovative school, and it

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<sup>8</sup> See specific information here: <https://goglobal.asu.edu/international/about-asu-arizona#:~:text=About%20ASU%20%26%20Arizona&text=ASU%20is%20among%20the%20largest,and%20more%20than%20120%20countries.>

<sup>9</sup> See specific information here: <https://carnegieclassifications.acenet.edu/carnegie-classification/classification-methodology/basic-classification/>

ranks at the top nationally for sustainability and global impact<sup>10</sup>. Given its geographic location, ASU experiences emergencies and disasters, such as extreme heatwaves, power outages in the summer (Rajput et al., 2022), and wildfires that frequently affect air quality and water supply systems in the greater Phoenix area (Broadbent et al., 2020; Zhu et al., 2023).

Concerning the COVID-19 pandemic, the first case in Arizona (and the fifth in the U.S.) was an ASU student who returned from Wuhan, China in January 2020<sup>11</sup>. Given the large student population and the rapid spread of COVID-19, ASU began managing the pandemic as early as January 2020<sup>12</sup>. ASU President Michael Crow<sup>13</sup>, speaking as a guest lecturer in an undergraduate class, said that when the situation in Wuhan worsened in 2019, he knew it would eventually reach the U.S., prompting ASU to prepare accordingly.

ASU **Biodesign Institute**<sup>14</sup> proactively communicated with President Crow to design and manufacture COVID-19 saliva testing kits, leveraging its expertise, knowledge, and resources.

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<sup>10</sup>See specific information here:

[https://www.asu.edu/about#:~:text=Consistently%20recognized%20by%20U.S.%20News,impact%20\(Times%20Higher%20Education\).](https://www.asu.edu/about#:~:text=Consistently%20recognized%20by%20U.S.%20News,impact%20(Times%20Higher%20Education).)

<sup>11</sup>See specific information here: <https://www.azcentral.com/story/news/local/arizona-breaking/2020/01/26/first-case-coronavirus-reaches-arizona-fifth-person-infected/4582588002/>

<sup>12</sup> <https://eoss.asu.edu/health/announcements/coronavirus>

<sup>13</sup> PAF 311 Leadership and Change, October 26, 2022. Instructor: Dr. Barry Bozeman.

<sup>14</sup> See specific information here: <https://biodesign.asu.edu/>

*UCSB: “When COVID-19 and wildfires hit the city at the same time”*

UCSB is a leading large public research university (**R1 university**) that also provides a comprehensive liberal arts learning experience. Located in Santa Barbara, UCSB has about 26,000 students, with 25%–49% of degree-seeking undergraduates living on campus<sup>15</sup>.

On March 15, 2020, five UCSB students were required to quarantine after coming into contact with a confirmed case in San Diego<sup>16</sup>. In May–September 2020, Santa Barbara experienced multiple wildfires, including the Hollister Fire, Scorpion Fire, Drum Fire, and San Antonio Fire, which burned over 2,300 acres of land<sup>17</sup>.

UCSB’s Department of Environmental Health and Safety (EHS) had to deal with COVID-19-related issues (e.g., supply of PPEs and hand sanitizers, and classroom hygiene), as well as air quality issues caused by the wildfires. During the pandemic, UCSB’s Department of EHS experienced a directorship turnover, and the Campus Emergency Management and Mission Continuity took on the EHS’s responsibilities. In addition, at the early stage of the pandemic, the UCSB student health director retired but was rehired given his expertise and already established connections with other community stakeholders<sup>18</sup>.

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<sup>15</sup> <https://carnegieclassifications.acenet.edu/carnegie-classification/classification-methodology/size-setting-classification/#four-year-large-primarily-residential>

<sup>16</sup> [https://www.noozhawk.com/1st\\_confirmed\\_case\\_of\\_coronavirus\\_reported\\_in\\_santa\\_barbara\\_county/](https://www.noozhawk.com/1st_confirmed_case_of_coronavirus_reported_in_santa_barbara_county/)

<sup>17</sup> <https://www.fire.ca.gov/>

<sup>18</sup> Note: These information was collected from interviews.

***Virginia Tech: “Our lab can design testing kits to help our health department”***

Virginia Tech is a large public land-grant institution (R1 university) that offers about 280 undergraduate and graduate degree programs to more than 37,000 undergraduate, graduate, and professional students across the commonwealth; it manages a research portfolio of more than \$556 million<sup>19</sup>. The main campus, which is located in Blacksburg, Virginia, has a **rural setting**. About 25%–49% of degree-seeking undergraduates live on campus, and at least 50% attend full time.

On March 27, 2020, Virginia confirmed its first COVID-19 case, involving a male student living off-campus. Given the rural setting, SMEs at Virginia Tech recognized that their local Public Health Department had limited capacity for timely testing services. However, their Molecular Diagnostic Lab<sup>20</sup> can design its own testing kits and distribute to the whole community.

In addition to the COVID-19 pandemic, Virginia Tech typically experiences extreme weather events, such as winter snowstorms and tropical storms. The mass shooting in 2007, which resulted in 32 deaths, prompted the university to enhance its emergency preparedness, planning, and communication functions and develop strong partnerships with community stakeholders (Barker & Yoder, 2012; Davies, 2008). The previously established partnerships between Virginia Tech’s Emergency Management

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<sup>19</sup> <https://www.vt.edu/about/facts-about-virginia-tech.html>

<sup>20</sup> <https://fbri.vtc.vt.edu/research/research-centers/molecular-diagnostics-lab.html>

Department<sup>21</sup> and Virginia Department Emergency Management <sup>22</sup>, Virginia Department of Health<sup>23</sup>, and other community stakeholders (e.g., the Near Southwest Preparedness Alliance) in various disaster and emergency situations facilitate a quick and strong collaborative response to COVID-19.

***KSU: “At least we can provide our campus as a testing site”***

KSU is a large public university (R2 university: high research activity) with more than 41,000 students in Georgia and two campuses in the Atlanta **Metropolitan Area**. It is **primarily a nonresidential university**, with fewer than 25% of degree-seeking undergraduates living on campus and/or fewer than 50% attending full time (including exclusively distance education institutions)<sup>24</sup>.

On March 12, 2020, KSU announced campus closures and moved classes online, in accordance with the University System of Georgia guidelines. In April 2020, under the direction of Governor Brian Kemp, the Georgia National Guard selected KSU as the location for a new drive-thru COVID-19 testing site. The testing site was operated by medical personnel from Augusta University<sup>25</sup>, the County Department of Public Health, and other community stakeholders.

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<sup>21</sup> <https://emergency.vt.edu/>

<sup>22</sup> <https://www.vaemergency.gov/>

<sup>23</sup> <https://www.vdh.virginia.gov/>

<sup>24</sup> <https://carnegieclassifications.acenet.edu/carnegie-classification/classification-methodology/size-setting-classification/#four-year-large-primarily-nonresidential>

<sup>25</sup> <https://www.kennesaw.edu/news/stories/2020/covid19-testing-site-kennesaw-state.php>

*CofC: “We rely on local government to provide testing services given our small capacity”*

CofC is a master’s college with about 10,000 students who benefit from a small-college atmosphere combined with the advantages and diversity of a mid-sized, urban university<sup>26</sup>. It is a medium-sized, primarily residential college located in Charleston City, South Carolina. About 25%–49% of degree-seeking undergraduates live on campus, and at least 50% attend full time<sup>27</sup>.

In March 2020, CofC announced the suspension of in-person classes after spring break due to the COVID-19 pandemic. In addition to the pandemic, CofC faces annual hurricane threats<sup>28</sup>.

### **Recruitment of Interview Participants and Settings**

My initial case study focuses on SMEs at ASU, with interview participants introduced by Dr. Brian Gerber, who has strong connections in the field of emergency management. For training purposes, the first set of Zoom interviews was conducted by Dr. Brian Gerber, Dr. Eric Welch, and myself. Once I became familiar with the interview process and acquired relevant skills, I began conducting Zoom interviews independently.

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<sup>26</sup><https://cofc.edu/about/#:~:text=Over%2010%2C000%20undergraduates%20and%20approximately,mid%2D-sized%2C%20urban%20university>.

<sup>27</sup> <https://carnegieclassifications.acenet.edu/institution/college-of-charleston/>

<sup>28</sup> <https://today.cofc.edu/2019/09/01/cofc-closes-campus-starting-monday-sept-2/>



A “snowball” technique was utilized to recruit interview participants (Atkinson & Flint, 2001; Raworth et al., 2012). Specifically, I first contacted university SMEs via email to inquire about their willingness to be interviewed and availability. If they responded, I immediately scheduled a Zoom call and sent out the interview consent form (approved by ASU IRB) before the scheduled date. Before and after clicking the Zoom recording button, I asked for their consent to be recorded. During the interview, I also inquired if they could introduce new participants for interviews, especially experts they had collaborated with in COVID-19 service provision. Many contacts were provided and interviewed at a later stage.

**Table 5. Descriptive Information of Interviewees**

<b>Case selection</b>	<b>University Name</b>	<b>Number of interviewees</b>
	ASU	7
	CofC	6
	KSU	6
	VT (Virginia Tech)	8
	UCSB	7
<b>Gender</b>	<b>Female</b>	<b>Male</b>
	14	20
<b>Affiliation</b>	<b>University/college personnel</b>	<b>Government/non-university Personnel</b>
	23	11
<b>Interview time</b>	<b>Longest</b>	<b>Shortest</b>
	153 minutes	24 minutes

Overall, 36 interviews of 34 participants were conducted during 2021–2023, with an average interview time of about 47 minutes. One SME was interviewed three times, totaling 153 minutes, due to the wealth of information she was willing to provide. Another SME was interviewed twice because he held responsibilities as an emergency manager and an environmental health and safety director. The shortest interview lasted

24 minutes. Interviews were video recorded if consent was obtained; otherwise, detailed notes were taken.

Among the 34 SMEs, 15 were female, and 19 were male; 11 worked directly for government agencies, 1 was a director of an emergency management nonprofit, and 22 were university/college employees. The interview sample was slightly overrepresented for university/college perspectives. However, given that this dissertation focuses on university roles in disaster service co-provision, gaining insights from university/college employees is beneficial. First, it helps develop a comprehensive understanding of the university departments involved in the COVID-19 response and service provision and how internal coordination activities were managed. Second, it aids in cross-validating facts and services emphasized by each participant. Lastly, this approach offers an opportunity for university/college employees to cover more activities related to collaboration with government counterparts in the disaster service provision process.

### **Coding Procedures**

Interview transcripts, field notes, and interview notes were iteratively coded following a thematic content analysis approach (Braun & Clarke, 2006; Kuckartz, 2013; Kuckartz & Rädiker, 2019) using MAXQDA software.

Initially, I closely read each interview transcript and notes to gain an overview of the text and identify patterns, common themes, and recurrences that emerged in the data. For example, at the organizational level, I noted that most university interviewees emphasized their willingness to help local governments with large-scale COVID-19 testing services and timely sample analysis if they believed their university *had the extra*

*capacity*. Thus, the university's capacity to fill the local government service capacity gap is the primary factor driving universities/colleges to participate in disaster service co-provision.

Furthermore, universities/colleges may engage in various stages of disaster service co-provision depending on *their specific resources*. For example, large universities (e.g., ASU and Virginia Tech) that have the capacity (especially a strong biology department) to design their own testing kits and establish a lab to analyze testing samples, or those with large parking lots/stadiums, would participate in more stages of service co-provision. Universities/colleges lacking these facilities/programs but with a nursing program would organize their students and faculty to volunteer in COVID-19 testing service co-provision. Thus, the extent and means through which universities/colleges participate in disaster service co-provision are somewhat determined by their overall capacity level and resource types.

At the individual level, *personal characteristics* of university/college employees, such as their sense of community responsibility and stress level/burnout/fatigue, would affect their commitment to disaster service co-provision. Some interviewees mentioned that they had to quit their jobs during the pandemic due to health issues. In addition, whether university SMEs had established strong *partnerships with community stakeholders prior to COVID-19* also influenced their participation in COVID-19 testing service co-provision.

By the end of the coding stage, it became evident that university SMEs' perceptions of COVID-19 severity and impacts, their organizational capacity, individual characteristics, and previous partnerships would affect their service co-provision with

community stakeholders. These codes were then grouped based on core themes and subthemes. In this context, I concentrated on the evidence and potential causes of university disaster service co-provision and categorized these elements into different dimensions and factors. These dimensions and factors are the themes and subthemes (as shown in Table 6) that informed the design of the survey instrument used in the subsequent study.

**Table 6. Themes and Subthemes in MAXQDA Coding**

<b>Broader categories</b>	<b>Themes</b>	<b>Subthemes</b>
service co-provision conditions	university capacity	knowledge and expertise
		facilities and logistical system
		medical human resources
		PPEs
	local government service capacity gap	human resources shortage
		medical resources shortage
		insufficient facilities and logistical system
		PPEs shortage
Emergency Incident Experiences	frequency, risk level, and major concern	previous emergency incidents frequency
		level of disruption
		incidents of primary concern
managerial characteristics	situational awareness, connections	Managerial risk perception
	service motivations	old partnerships
organizational characteristics	organizational level risk decision-making process	sense of community responsibilities
		decision-making structure
specific disaster service co-provision	COVID-19 testing service co-provision	scope and representativeness of participants
		testing kits designing
		testing kits manufacturing
		testing kits operations and distribution
		testing samples collection and analysis

## Findings of Case Studies

In this section, I summarized the findings derived from thematic coding. Anonymous direct quotes are included to support the themes and subthemes.

### *University capacity is critical to participate in disaster service co-provision*

Service provision needs resources, materials, and human capital to design, manufacture, distribute, and deliver to clients in need. During times of disaster, the large scale of service needs, disrupted supply chains, and weakened logistical support may hinder the service provision process. For example, American government's response to Hurricane Katrina in 2005 was considered the greatest failure in disaster relief history (Gheytanchi et al., 2007; Katrina, 2006). Part of the reason is related to bureaucratic intra- and inter-agency conflicts, such as competition for scarce budgetary resources and fragmentation between federal system and local governments (Parker et al., 2009).

**Insufficient disaster service capacity** is a fundamental problem that government agencies face during disaster responses. *One reason* is that government agencies may not have accurate forecasts of the trends and losses caused by emergencies or disasters, as well as the scale of services they need to provide to the affected population. This is particularly true for small governmental agencies with limited human capital, which are always overwhelmed by the large amount of public service needs they must address. One interviewee pointed out,

*I worked well to 17 hours every single day. I didn't get additional staff to help support my role a year until we almost did vaccinations... we tried to do as best we could, but you know, especially when we were developing so much stuff. I had to develop a whole virtual*

*EOC<sup>29</sup> element that we didn't have. So how are we going to track this data? How are we going to be virtual? We didn't have that... I had a small team doing that, and then, once vaccination came around, that became our whole world. (UCSB\_4, 04042023)*

Another employee from the public health department stated that when the COVID-19 pandemic began in China, they already realized how fast it would spread to the U.S. However, their department was not entirely prepared to deal with all the resources, supplies, and services required for an effective COVID-19 response.

*So, one of my jobs, as a regional epidemiologist, is to ascertain if testing is approved, appropriate to go to the state lab. So, for the entire region, and I did not have my team at this time. I was working 18 hours a day, and 120 hours a week, consistently. Everybody would reach out to me, it might be a hospital, it might be the health department, and had to be criteria met before we could approve a test. So, I worked with all of the hospital systems, of which there are four large ones in southwest Virginia and many smaller hospitals in the region. And we would try to determine approvals for testing. But because of the larger population, centers had more people that met the criteria, that limited testing capability, because our hospitals weren't as large. (VT\_5, 05092023)*

*So as the laboratory was gearing up, we had a shortage of testing capability in southwest Virginia. The testing went largely on the population centers and the larger hospitals. (VT\_5, 05092023)*

**Universities' capacity and the specific types of resources** they possess enable them to participate in disaster service co-provision with local government agencies and other community stakeholders. Specifically, large research universities with biology research programs and centers capable of designing COVID-19 testing kits played a crucial role in the early stages of the pandemic. For example, ASU and Virginia Tech took the lead in developing testing kits using their own labs, research resources, and talented faculty and scientists.

*The Virginia Department of Health conveyed to me and my friends there that their strategy for controlling the pandemic and the region would not work. Because when they were*

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<sup>29</sup> The Emergency Operations Center. The EOC is the centralized location of emergency response and recovery support operations during incidents.

*testing individuals... It will take between 7 and 10 days to get results. With that delay it wouldn't be able to do any intervention that could isolate the person that was infected and prevent further infections. So, I kind of decided that the only way to help the Health Department was to develop an in-house testing. This. like that received authorization by the eighth. the by the FDA and try to implement it in the region. So that's what we did; me and a couple of really talented postdocs and a colleague of mine. We developed a test, an in-house test very flexible that was with multiple samples. (VT\_4, 04282023)*

In the case of ASU, political issues were involved and somewhat hindered the COVID-19 response and service provision process. During the first few months of the pandemic in Arizona, the Arizona Department of Health Services' response was somewhat affected by Trump's visit<sup>30</sup>. However, the ASU President and faculty recognized the severity of the pandemic's impact on the normal operation of ASU and student health, and decided to take immediate action.

*Before we were doing COVID testing, because that took some time to ramp up. The ASU president not only just anticipatory, but like, I would say that that we were always looking for how we could be resource in the community. So how what can we do to help others? I would say, after that the university and the research enterprise set up the house (house-in testing project), help stand up. Early on, it was like we did stuff with APS and some of the essential services. So, we help do testing at those locations. And I think as that started to grow, we were asked to do more and more. So once the capacity was possible, we started expanding across the state. (ASU\_5, 05122022)*

For **small universities** with limited capacity on these aspects, they **are more likely to be the service “receivers” rather than “(co-)providers”** as their counterparts with large scale of resources. Many small teaching universities/colleges that do not have technical support to move classes online or lack financial resources were temporarily or even permanently closed during the COVID-19 pandemic (Burki, 2020; Coyne et al., 2020). These universities/colleges may not be able or manufacture their own testing kits

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<sup>30</sup> <https://abcnews.go.com/Politics/1st-major-trip-months-president-trump-travel-battleground/story?id=70493551>

or other services, but they also tried their best to cooperate with government agencies and other stakeholders in distributing services to students and other community members.

*It was not clear to me that the campus had a good emergency management plan. We had the former director, like I think it was in 2009 and they had developed a plan around now and went away. And then that kind of five years later, there's a lot of staff changes. Yeah, their protocols were outdated. And so, it was a matter of kind of bringing everything back up to the speed they have they will they had a good system for lots of things. (CofC\_3, 06232022)*

Providing university/college facilities and sites for conducting county- or city-level testing services for all citizens is a good example of the service provision scope of these small universities/colleges.

*We've worked very closely with the University of South Carolina... We've been offering direct testing and vaccination sites on campus for like every week since vaccines started and certainly since testing started, and so we've become like a site for that because of our location. (CofC, 05112022)*

### ***Previous partnerships facilitate university–government disaster service co-provision***

Universities/colleges may have established strong partnerships with government agencies and other community stakeholders during previous emergencies or disasters. These existing partnerships have advantages in addressing new emergency or disaster concerns. First, these stakeholders may have developed emergency response routines through regular training, workshops, and seminars.

*Because we have campuses in LA DC, Polly West downtown mayo, like everywhere, almost. So we wanted to have seminars, so people would know the responders would know what they'd be getting into, from a broad perspective of the different kinds of hazards like I mentioned, so animal biological, chemical, and radiological. And those (training) were very successful, but we do we do things like that, quite often. We also have tabletop exercises, we just set up active shooter to our active shooter tabletop with leadership, the Emergency Operations Center, everyone who could potentially respond. So we do a lot of drills, a lot of exercises and a lot of planning. (ASU\_5, 05122022)*



Previous working experiences and connections of university emergency management SMEs also played a critical role in establishing new liaisons when the COVID-19 pandemic occurred. University emergency managers or police chiefs who have transitioned from government agencies may still maintain close connections with their former colleagues and departments. When new emergencies/disasters occur, they can quickly reach out to them and mobilize the necessary resources.

*I worked for seven chiefs over there, Charleston PD during my 43 plus years. And my last 15 or so we've really spent in kinda like what you would say in special operations where I was in charge of many special events for the police department to include the Cooper River Bridge run, which is one of the largest 10k races in the world. You know, after being a Charleston PD all these years, my rolodex is still good, so to speak. I still have many friends and law enforcement partners that I have for all those years over there. So I rely heavily on our contacts of Charleston PD. (CofC, 05252022)*

These existing partnerships can help reduce coordination costs, quickly identify needed resources and information, and develop timely response strategies.

*The main one, as you would expect, was local (county) public health. So, in the past, we worked well with them. We met regularly with them, so they were our primary collaborators. The chief epidemiologist for the county was a wonderful person, we knew on the first name basis well before COVID. And the director and the assistant director I worked with as well. They supported our operation, and quite quickly they would call and ask us to help with their operation. (KSU\_1, 03272023)*

### ***Efficient internal coordination facilitates external coordination in disaster service co-provision***

When universities/colleges coordinate with external stakeholders, such as government agencies and nonprofit agencies, in providing disaster services, the smoothness and efficiency of their internal coordination across different departments is important. Particularly, providing disaster services requires strong and sustainable supply chain management and logistical support ( Madu & Kuei, 2014; Negi & Negi, 2020).

Regarding COVID-19 testing service provision and PPE procurement, at the early stage, to what extent organizations can mobilize/purchase related medical resources and PPE globally is a considerable challenge for their survival (Gunessee & Subramanian, 2020; Handfield et al., 2020; Sodhi & Tang, 2021).

Large universities are more likely to obtain these resources and support through their research centers, global alumni associations, and their long-lasting collaboration with professional disaster relief organizations.

*We did have quite a few layers of things that were available that did help some of the supply chain side, because when things got to be very much where everyone was reacting, supplies were a little more difficult to get, so we were still not having the easy time getting them. But we had our extra cushion of things that we had stored for a while, and you know that was kind of our process before COVID. Also, our staff was trained again over and over again (ASU\_7, 03302023)*

*PPE, which obviously we know that was a major consideration, because PPE was very difficult to get a hold of the coalition at the top, we had some strategic reserves of personal protective equipment, which in March of 2020, we deployed that to our (Georgia) health system to prepare them because they were unable to get what they needed because the supply chain had been disrupted. And most of those leads had dried up particularly because the international production of PPE was being stopped or embargoed coming from Asia principally. So, our healthcare facility lost their ability to get supply chains, configural and PPE, we had a strategic view of it, and that we provided to our facilities. (VT\_8, 05192023)*

When planning for (co-)providing COVID-19 testing services, large universities/colleges coordinated with their supply chain teams and biomedical centers to design testing kits and distribute them to the community. Their research centers or labs with analytical capacity might also provide sample analysis services, such as those offered by ASU and Virginia Tech.

*So my role is really looking at how each department, college and university as a whole is able to maintain their critical functions. And those can vary by department, as you can imagine. So, each department has identified their own critical function, and the resources needed to maintain those functions, if there were any kind of emergency or disaster that occurs. So, it can range from, you know, cybersecurity type of situation to a building flooding, or, you know, fire in a building. If any of those incidents, any incident occurs, and that building is no longer able to be the building is no longer functioning. How does*

*that department or college maintain their critical functions? And it's also not just about the building itself. (ASU\_6, 05122022)*

Universities/colleges also needed to quickly assemble a COVID-19 leadership team, which included representatives from different departments. If these departments or units had previously worked together to address other emergencies, the efficiency level of their communication and coordination would affect the outcomes of their new disaster service co-provision.

*Communication between your leadership team and your response team is very important. Setting clear goals and clear objectives is important, sometimes not always easy. Because we didn't know whether you have the right expertise, or if you bring in the right expertise into your leadership. (VT\_1, 04072023)*

***Individual-level managerial perceptions and sense of community responsibility matters for disaster service co-provision***

The way emergency managers perceive the severity of disasters and the related consequences on their organizations and the whole community influences their response strategies. In the early stage, university SMEs who believed that COVID-19 would significantly affect their campuses and were concerned about their resource levels for preparing necessary PPEs or services were the ones who quickly reached out to external stakeholders.

*I worked with an epidemiologist, who had left his federal job, where he worked on the virus Ebola. At that time, he was a modeler for CDC but also worked at ASU. He saw this coming obviously. In January 2020, we had a conversation and he told me what we need to get ready for. And then in the ASU space, we recognized we needed to immediately start gathering... based on all the modelling work. We all do so in January we started to nod at each other and keeping a running kind of focus here. (ASU\_1, 04232021)*

University SMEs who are concerned about the health and wellbeing of the entire community are also more likely to take action to mitigate impacts.

*I don't know how much you know about our region, but we are in a very rural area. By the University I mean, the University is an island on the whole. The Health Department has only a few employees. We have 2 hospitals with no regional hospitals, with maybe like 30 ICU beds. Virginia Tech is a university with 50,000 students in a region that has 1 million people. And we were no priority for any kind of Covid response. Clearly, we have no Boston. We are not LA. We are not Miami. We are not Chicago. So, as you can imagine, this was worrisome. It was very worrisome for me. I decided that the only way to make sure that this doesn't transform in the perfect storm that is goanna end up with a lot of people there, was to take action. (VT\_4, 04282023)*

## CHAPTER 5

### DRIVERS OF UNIVERSITY CO-PROVISION OF DISASTER SERVICES

#### **Research Context: Impact of the COVID-19 Pandemic on Higher Education**

This dissertation uses the COVID-19 pandemic as the disaster management context. From its initial outbreak in China in 2019, COVID-19 has spread rapidly, and infected 219 million people and caused 4.55 million deaths worldwide. By September 2021, more than 42 million infections and 672,000 death cases were recorded in the U.S.<sup>31</sup>.

The COVID-19 pandemic has also disrupted higher educational institutions considerably. The severity and impact scope of the COVID-19 pandemic on higher educational institutions include but not limited to interruption of teaching and research, decline in admission rate, and threat to the safety and health of students and faculty (Burns et al., 2020; Fox et al., 2021).

Given the varied impacts of the COVID-19 pandemic across universities of different sizes, capacities, regions, and types, universities may take different response strategies. Some prestigious colleges that survived two World Wars and the Spanish flu were ultimately forced to shut down due to the financial strains brought about by the pandemic<sup>32</sup>. Other universities were unable to effectively control off-campus student

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<sup>31</sup> CDC source: <https://www.cdc.gov/coronavirus/2019-ncov/index.html>.

<sup>32</sup> See <https://www.thedenverchannel.com/news/education/back-to-school/colleges-nationwide-are-permanently-closing-because-of-the-pandemic>.

behavior, relying heavily on city officials, property managers, national organizations, and the students themselves to reduce risky behaviors that could increase the spread of COVID-19<sup>33</sup>. Nevertheless, some universities collaborated with local health agencies to offer public health services (e.g., testing and vaccination) to students, faculty, staff, and local community members (Goddard, 2021).

This dissertation focuses on universities that provide testing services with other organizations, such as local government agencies and community organizations, to all members of the community. Given the timing of the provided services, some universities may take a proactive approach to provide COVID-19 testing services. For example, in his talk on October 26, 2021<sup>34</sup>, ASU President Crow stated that the university was agile and highly proactive during the early stages of COVID-19 when the severity was high in China but not yet present in the U.S.; ASU designed, produced, and provided its own testing kits to not only ASU students, faculty, and staff, but also to all community members through partnership with government agencies<sup>35</sup>. However, smaller institutions might lack resources and need to depend upon their local government for aid to conduct COVID-19 testing.

The factors that drive organizations' co-provision of public health services are similar to those that facilitate co-production and co-creation. However, in a crisis

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<sup>33</sup> Texas universities blame off-campus parties for rising COVID-19 cases, but few are disciplining students. See <https://www.texastribune.org/2020/09/08/texas-universities-coronavirus-parties/>

<sup>34</sup> President Crow gave a talk to undergraduate class PAF 311 on October 26, 2021, and I asked him questions about ASU response to COVID-19.

<sup>35</sup> <https://research.asu.edu/asu-hits-milestone-1-millionth-covid-19-test>

management context, I want to emphasize more on how organizations frame the problem brought by health crisis: Is it framed as a capacity gap problem that either universities or local government agencies may not have sufficient resources to provide services solely to meet social needs, or is it a psychological sense of community responsibility problem that managers with different levels of sense of community responsibility will regard disasters differently? Problem framing affects the likelihood of co-provisioning with other organizations. Other drivers and factors include established partnerships and organizational factor decentralization of decision-making structures. How these factors affect university co-provision of public health services to respond to the COVID-19 pandemic is elaborated in this section.

### **Literature Review and Hypotheses**

Organizations with physical assets often engage in interactions and communications, which entail the exchange of information, resources, and knowledge, ultimately creating various interactive arenas and platforms for stakeholders to collaborate and take collective actions (Sørensen & Torfing, 2019). These arenas and platforms can be designed through formal institutional arrangements (e.g., mutual-aid agreements) or through informal connections among stakeholders based on their previous collaboration history (Kapucu & Garayev, 2013). In this dissertation, these interactive arenas are referred to as institutional and relational arenas. A third type of interactive arena emerges from the structural design, whereby a functional unit within an organization is structurally designed as a component of another organization (J. M. Bryson et al., 2006). In this situation, a natural connection or collaboration between the

two organizations is established and necessary. For example, many police departments within universities are also full-service public law enforcement agencies and have the authority to enforce state and federal laws within the limits imposed by the state and federal constitutions and judicial rulings<sup>36</sup>. This dissertation highlights the interactive features of the three types of collaboration, treating them as mechanisms, arenas, or platforms that foster and facilitate various co-provision activities (Grandori, 1997; Claggett & Karahanna, 2018).

*Disaster impact, local government capacity, and co-provision of public services*

**Disaster characteristic: Severity.** The literature reveals that various elements affect how organizations react to disasters. Such elements include ongoing changes in the ecological system (Folke, 2006; Rockström et al., 2009); the types, scopes, and durations of disasters (Howe et al., 2014; Linnenluecke et al., 2012; Whiteman et al., 2013); and their frequency and severity (Chakraborty et al., 2005; Dolan & Walker, 2006; F. Zhang et al., 2018). All these elements contribute to organizations' experiences with disasters and influence their judgment of organizational capacity, as well as their coping strategies.

Organizations that have experienced many frequent or severe disasters may develop a strong sense that their organizations may not be able to handle the damages caused by such events and deliver public service as usual. For example, many small-size universities cannot handle biological disasters, such as H1N1, and shut down temporarily during the epidemic (Ekmekci & Bergstrand, 2010). From a resource dependence

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<sup>36</sup> See the introduction of ASU police department: <https://cfo.asu.edu/police>.



perspective, organizational fragility may drive those organizations to obtain resources and aid from other organizations by forming strategic alliances or initiating coordination actions in terms of human resources, tasks, and operations (Comfort, 2002; Hillman et al., 2009; Simo & Bies, 2007). In this manner, organizations can buffer the uncertainties brought about by immediate and future hazards, share the risks with other organizations, and ensure successful operations. Therefore, I hypothesize the following:

**H1:** Severe COVID-19 impacts on campus increases the likelihood and scope of organizations' co-provision of public services with other organizations as a response.

**Managerial perception of problems.** Problem definition is critical to identify solutions, mobilize resources, assign responsibilities, and create rationales that authorize some policy solutions over others (Coburn, 2006; Schneider et al., 2014). Problem definition has argued services as the overture to policymaking, as an integral part of policymaking, and as a policy outcome (Weiss, 1989). When a problem is framed as a capacity gap problem that requires the coordinated efforts of multiple stakeholders to increase the overall response capacity of local communities, it will increase the chance that co-provision efforts will address disaster-caused social needs (Boyd & Martin, 2020).

**H2:** University managers that perceive their local government having lower capacity in responding to disaster service needs are more likely to participate in disaster service co-provision.

**Established partnership, internal coordination activities, and disaster service co-provision.** The manner in which university managers perceive the strengths and cohesion of partnerships with other community stakeholders previously built affects their

assessment of their university capacity in responding to disaster service needs (Gunessee & Subramanian, 2020; Syahrir et al., 2015). When new disasters or emergencies occur, these established partnerships can aid in accelerating response plans, reduce communication costs, and quickly identify and mobilize required resources.

As indicated by interviewees, during the COVID-19 outbreak, they clearly knew where to acquire PPEs and utilize their “old connections” to obtain the latest information. Regarding participating in disaster service co-provision, established partnerships are also important in allying “old” and “new” ties because networks exhibit inertia when evolving (Collet & Hedström, 2013; T.-Y. Kim et al., 2006).

Given this, I hypothesize that:

**H3:** University managers who have established partnerships with external stakeholders are likely to participate in disaster service co-provision.

Service provision needs strong and sustainable logistical support, which usually requires smooth and frequent internal coordination within the organization. Public service production also indicates that during service design, planning, manufacturing, and delivery, internal coordination within involved organizations and stakeholders is critical (Alford, 2009, 2014; Altay et al., 2009). The reason is that in each stage, identifying not only the sources from which resources can be obtained but also those who should be held responsible or accountable for any failures is necessary to avoid future breakdowns. For example, in some universities with many functional departments or units that have not collaborated previously, a disaster’s occurrence can pose challenges. The time and effort needed for these entities to familiarize themselves with internal coordination processes may impede their ability to engage in external coordination in service co-provision.

Given this, I hypothesize that:

**H4:** Universities/colleges' internal coordination activities increase their disaster service co-provision with external stakeholders.

Multiple factors can affect how emergency managers perceive and frame the nature of emergency events. The impact scope and severity of disasters affect how managers judge their organizational capacity and the resources needed for addressing the situation (Riad et al., 1999; Smith, 2006; F. Zhang et al., 2018). From a community psychology perspective, when managers realize that the impacts of disasters affect the whole community and their organizations do not have sufficient capacity to handle them solely, they may regard the consequences of these incidents as problems needing societal attention. For example, the high spread rate of COVID-19 makes almost all emergency managers regard it as a problem that requires multisector efforts (Tsai & Wilson, 2020), whereas incidents, such as injuries during group sports, are more likely to be regarded as internal problems that universities can handle with their own capacities. Furthermore, when managers have a strong sense of community responsibility, they feel obligated to help citizens, address social needs, and work toward collective wellbeing (Cooper et al., 2020).

From a problem-coping perspective, the nature of a problem an organization faces determines the strategy it will use to address it (Callan & Dickson, 1993; Daviter, 2017; WALKUP, 1997). According to Davite (2017), when dealing with complex policy problems, organizations can cope, tame, or solve them. Among these approaches, when university managers regard the emergency event as “public” after assessing its influence scope, severe consequences, and organizational capacities, co-providing public services

with other organizations to solve it becomes a competitive option for several reasons. First, co-provision of public services reduces the difficulty, pressure, and capacity gap of universities caused by providing services solely (Rush et al., 1995). Particularly, when addressing large-scale disasters with many uncertainties and complexities, such as the COVID-19 pandemic, many universities lack sufficient information and resources to predict its trend or solve current health problems faced by all community members. However, universities have assets, such as large parking lots and stadiums, which can be used to organize COVID-19 testing and vaccination events.

Therefore, I hypothesize the following:

**H5a:** University managers who have a strong sense of community responsibility are likely to co-provide public health services with other organizations.

**Risk decision-making structure and disaster services co-provision.** The organizational structure of risk decision-making influences the outcome of disaster operations. The structure of decision-making affects, who (particularly, subject matter experts or not) will participate in the decision-making process, what activities university managers will take to respond and whether they will coordinate with other stakeholders. When disasters occur, a decentralized decision-making structure allows university emergency managers to exercise discretion to cope with problems (Kapucu et al., 2010).

Before and during times of emergencies and crises, sharing information across agencies is critical for involved organizations to make timely decisions and responses. A decentralized decision-making structure enables emergency managers to obtain more information from outside stakeholders and the general public, which increases their

comprehensive understanding of the scope, severity, and impacts of emergencies and disasters (Comfort & Wukich, 2013).

Facilitating the exchange and interpretation of relevant information is important for improving situational assessment, decision making, and implementing appropriate actions for addressing risks. The failure to obtain immediate information about the campus shooter at Virginia Tech was cited as an important reason why the police failed to realize the severity of the situation inside the educational building and adequately prepare and respond to the incident (Wigley & Fontenot, 2010).

Furthermore, a decentralized decision-making structure provides opportunities for other stakeholders, such as local community organizations, to participate in the process of disaster preparedness and responses. That is, a decentralized decision-making process of an organization makes it possible for university managers to collaborate with other organizations in different ways to deal with risks and impacts brought by emergencies and disasters.

Thus, I hypothesize the following:

**H5b:** University managers who perceive that their university has a decentralized risk decision-making structure are more likely to co-provide disaster services with other organizations.

**Managerial sense of response efficacy and disaster service co-provision.** How university managers evaluate their response efficacy in addressing new disasters affect the scope and propensity of service co-provision. University managers who think that their organizations have sufficient resources and information to respond to disaster service needs are likely to participate in service co-provision. This self-evaluated

response efficacy may be developed through established partnerships with other community stakeholders or through their improved response plans (Lam, 2006; Lewis et al., 2010; X. Zhang et al., 2017).

Hence, I hypothesize the following:

**H5c:** University managers who think that their organization has a high response efficacy are likely to participate in disaster service co-provision.

***Risk decision-making structure, established partnership, response efficacy, and sense of community responsibility***

In addition to the aforementioned mechanisms of how organizational and managerial characteristics affect university disaster service co-provision, I am also interested in how organizational features affect managerial problem framing during disaster response. Particularly, how organizational-level risk decision-making structure affects managerial framing/understanding of the distribution of resources and responsibilities within their communities? This question is important in disaster response practices yet remains inadequately explored in academic studies.

In my dissertation, I hypothesize that a decentralized risk decision-making structure can affect university managers' sense of community responsibilities. The reason is university managers who can participate in the risk decision-making process usually have a good evaluation of their university resources and situations, knowledge of their response capacity, and awareness of their partnerships (Heath et al., 2018; Slovic et al., 2005). This situational awareness is developed through their information exchange and processing during the risk assessment and decision-making process.

Studies have demonstrated that places, communities, and social capitals play critical roles in disaster response strategies (DeYoung & Peters, 2016; Paton & Irons, 2016). Emergency managers who have a strong place attachment show responsible behaviors to protect their communities (Cox & Perry, 2011; Gifford, 2014; Lewicka, 2011). When university managers believe that their organizations can sufficiently respond to disaster service needs, either through their own resources or partnership with other stakeholders, they are likely to take up more community responsibilities.

Thus, I hypothesize that:

**H6a: Indirect Effect 1.** University managers who perceive that their university has a decentralized risk decision-making process are more likely to have a high level of self-evaluated response efficacy, which leads to a high level of sense of community responsibility.

Furthermore, established partnerships can affect university managers' evaluation of university response efficacy and thus drive them to take up more community responsibilities, because established partnerships are valuable resources and allies when new disasters or emergencies occur. Well-maintained partnerships can boost emergency managers' confidence in the overall response plan and capacity. From the perspective of network inertia, although external contextual change interrupts how network actors interact with one another, the long-established "strong ties" will resist to change in favor of an emphasis on identifying beneficial content effects of networks (T.-Y. Kim et al., 2006, p. 704), because relationship-specific routines and cultures have been institutionalized between these actors. It is particularly the case in an emergency management scenario because actors in these established networks have developed their

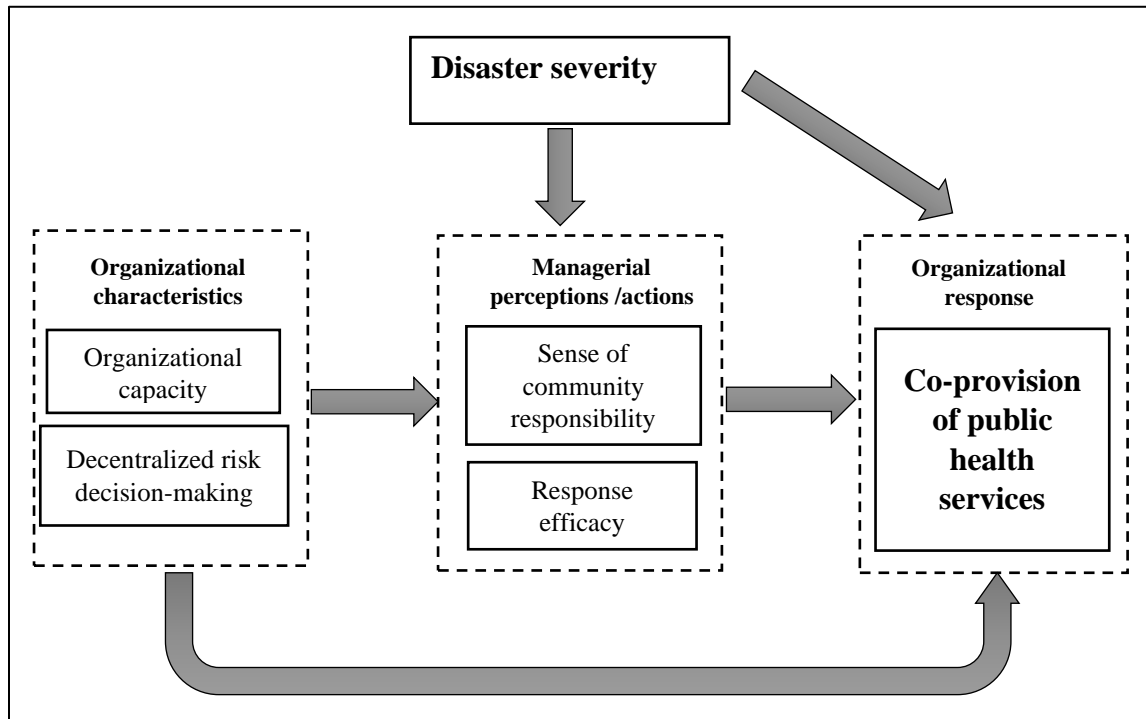
response plans and resource distribution strategies through training and drill or actual emergency response (Kapucu et al., 2009; McCabe et al., 2013). These established partnerships will help them assume community responsibilities when disaster occurs. Thus, my second indirect hypothesis is:

**H6b: Indirect Effect 2.** University managers who have more established partnerships are likely to have a high level of evaluated response efficacy and are thus willing to take up community responsibilities.

The overall theoretical framework of this dissertation is depicted in Figure 4. To test the above hypotheses, I developed a survey instrument based on interview findings and literature, which was distributed among university emergency managers nationally. Detailed survey administration is described in the following section.



**Figure 4. A Theoretical Framework of Relationships between Disaster Severity, Organizational Characteristics, Managerial Perceptions/Actions, and Co-provision of Public Services**



**Survey Data Collection: Instrument Design and Administration**

*Development of survey instrument*

After the first sets of interviews were conducted, I developed a general sense of how and why universities/colleges participated in COVID-19 testing service co-provision. Given how interviewees describe disaster situations, motivations, and factors of individual- or organizational-level contribute to their service provision decision-making process, service distribution efforts, and outcomes, I developed a survey instrument to cover these aspects.

From November 2022 to March 2023, this survey instrument experienced many rounds of revision to incorporate the interview findings. The final version of the survey instrument consists of **six sections**.

**Section 1: Background.** This section asks the survey participants' primary work unit, areas of responsibilities, and unit engaged activities.

**Section 2: Emergency Incident Experiences and External Partnerships.** It focuses on investigating universities/colleges previous emergency or disaster experiences and their external partnerships in their community or state. This set of questions aims to identify how previous disaster experiences and partnerships affected the respondents' COVID-19 responses and service co-provision status.

**Section 3: COVID-19 Impact and Service Provision.** This section focuses the period from the spring of 2020 to the first half of 2021; the impact of COVID-19 to universities/colleges; the services these universities/colleges provided (e.g., COVID-19 testing services, vaccination services, organized volunteers for contact tracing, meal services, and expertise or professional guidance on public health management mitigation efforts for COVID-19). Specifically, this section determines the process these universities participate in the COVID-19 testing services (e.g., designed test kits, manufactured test kits, provided sites and space for testing services, distributed or processed test kits, collected testing samples, and analyzed and reported testing data). Universities/colleges' reliance on local government in providing these services and organizational support received from these universities/colleges were also asked.

**Section 4: Internal and External Coordination Activities to Provide COVID-19 Services.** This section focuses on the specific internal and external activities the

universities/colleges committed in 2020–2021, including planning, monitoring, communicating, and delivering COVID-19-related services. External stakeholders were also asked to be specific in this section.

**Section 5: Workplace Characteristics and Behaviors.** This section addresses how individual-level sense of community responsibilities and organizational-level risk decision-making structure affect service co-provision activities.

**Section 6: More About You.** This section generally asks the participants’ work experience (years), unit size, gender, and race.

### *Survey administration*

The final version of the survey instrument was uploaded to Sawtooth Software for dissemination. In February–March 2023, three rounds of pretest were conducted among ASU students, faculty, and two university emergency managers. Language and clarity issues were addressed given pretest participants’ feedback.

On March 14, 2023, the survey was formally sent out to the participants using a mail merge tool for Gmail<sup>37</sup>. A survey invitation letter like below with assigned unique username and password was sent out.

March 14, 2023
Dear {{names}},
On behalf of the School of Public Affairs at Arizona State University, I would like to invite you to participate in a research project through our <a href="#">Center for Emergency Management and Homeland Security</a> . This research project seeks to understand how institutions of higher education collaborate with local governments in response to various types of natural and human-made disasters including, but not limited to: hurricanes, floods, snow emergencies,

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<sup>37</sup> Yet Another Mail Merge. <https://yamm.com/>

cybersecurity breaches, mass shootings, and pandemics. To gather this information, we are asking participants to complete a survey entitled: *U.S. Universities and Colleges: Campus Emergency and Disaster Management Practices and Incident Experiences*.

You have been identified as a potential participant given your role in emergency management and preparedness, incident management, and/or student affairs within your institution. Even if your responsibilities may only be indirectly related to emergencies or disasters, we are interested in your perspective, as the goal of this research is to understand the full range of effects and actions across institutions of higher education.

This survey will take about **15 minutes** to complete. We know you are extremely busy providing valuable public services, and would truly appreciate the time it would take you to respond to the survey. Your responses are confidential and findings will only be reported in the aggregate.

Below you have been assigned a unique and confidential personal username to complete the survey. Please note the username consists of only lowercase letters. You can copy and paste for easy use.

**Username:** {{Username}}

**Password:** {{Password}}

To access the survey, please go to:

<https://UnivEmergResp2023.sawtoothsoftware.com/login.html>

The survey will remain open through **Saturday, March 25, 2023**.

If you have any questions, please contact me at [suyangy1@asu.edu](mailto:suyangy1@asu.edu).

Kind regards,

**Suyang Yu**

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PhD Candidate, Project Manager

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(602) 496-0566

<https://cemhs.asu.edu>

Center for Emergency Management and Homeland Security

Center for Science, Technology and Environment Policy

Arizona State University

Given the participants' feedback, I later removed the required password from the survey to increase the response rate. The participants recommended me to contact the

DRU list<sup>38</sup> manager and share the survey link in the list to obtain more response. Another invitation letter was sent to the DRU list but with the username **uniem**, and the participants were asked to specify their university name in later question for matching.

Three reminder letters were sent out separately on March 21, April 11, and April 27, 2023. The survey was closed on May 31, 2023. In total, 443 responses were obtained, including 310 complete responses and 133 incomplete ones. After removing pretest responses among students and faculty and responses that answered less than one-third of all questions, 362 valid responses were kept for final analysis. Among these responses, 87 were obtained from the DRU list using “uniem,” and other 275 were from the pre-collected and assembled sample frame using assigned unique usernames. Given that the participants identified in the sample frame may also be members of the DRU list, the overlap between the two participant pools make this survey frame essentially convenient.

The rough response rate is 25.8% assuming that all the participants from the DRU list were also identified in the preassembled sample frame<sup>39</sup>. The minimum response rate is 19.63% assuming that 87 participants from the DRU list were not identified in the preassembled sample frame<sup>40</sup>.

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<sup>38</sup> The DRU Network is a peer-to-peer network that provides simple resources intended to increase communication, coordination, and collaboration among university emergency management practitioners around the world; it can be used to make campuses disaster-resilient. This list is managed by the University of Oregon. <https://app.smartsheet.com/b/form/d5cedfec285c4061bbcf41fc3b950239>

<sup>39</sup>  $362/1401=25.838\%$ .

<sup>40</sup>  $(362-87)/1401=19.628\%$ .

### *Descriptive data of survey participants*

The 362 participants are from 248 universities/colleges. Some universities may have more than three respondents due to varied structures and authorities across functions of emergency management, environmental health and safety, risk management, public safety, and facility operations. Large research universities may have more departments and units to cover these functions than small institutions.

Table 7 shows the distribution of the survey participants' work units. Emergency management unit, environmental health and safety unit, and university police are the three units that have most responses, which is consistent with the preassembled sample frame. Among the 37 participants who specified other units, roles include the Assistant Vice President of Public Safety who answers for the university's emergency management, police department, facility department, and emergency medical services; those involved in a combined police and safety office; those involved in combined risk, environmental health, safety, and emergency management roles; and contracted security for the university and health services.

**Table 7. Distribution of Participants' Work Units**

	<b>Work Unit Name</b>	<b>Frequency</b>	<b>Percent</b>	<b>Cumulative Percent</b>
1	University/college police	77	21.27	21.27
2	Emergency management or emergency preparedness office	93	25.69	46.96
3	University/college fire department or Fire Marshal's office	12	3.31	50.28
4	Risk management, insurance, and/or audit	31	8.56	58.84
5	Facilities management and related operations	10	2.76	61.60
6	Environmental health and safety	89	24.59	86.19
7	General university administration (e.g., student affairs)	5	1.38	87.57
8	University/college Information & Technology office	5	1.38	88.95
9	An academic program at a departmental, school or college level	3	0.83	89.78
10	Other. Please specify:	37	10.22	100.00
Total		362	100	

Table 8 presents the distribution of participants' responsibility areas. Among all the listed responsibility areas, emergency management or preparedness, campus safety, and environmental health and safety are the top 3 areas that most participants indicated. Among other responsibility areas not listed but indicated by the participants were business continuity, information management and disaster recovery, college-level safety and risk management, community safety training, risk compliance, emergency medical, fire and sprinkler testing, general risk management and insurance, sports and special event planning, security technology, and occupational safety.

**Table 8. Distribution of Participants' Responsibility Areas**

	<b>Responsibility areas</b>	<b>Frequency</b>	<b>Percent</b>
1	Campus safety, including policing or fire response functions	169	0.47
2	Environmental health and safety (including biosafety)	143	0.40
3	Emergency management or preparedness	233	0.64
4	University/college financial risk management	42	0.12
5	Facilities management or facilities risk management	53	0.15
6	University/college administration for student affairs	7	0.02
7	Information & Technology support, security and related services	10	0.03
8	Academic degree programs, instruction or management or both	4	0.01
9	Other. Please specify:	39	0.11

Table 9 lists the activities that the participants' units typically engaged in. Among all the listed activities, emergency planning, training, responses, and mitigation were the ones that conducted most frequent by the participants' units. Other activities not listed but indicated by the participants included disaster recovery and FEMA reimbursement, emergency warning systems, environmental compliance, outreach to university community, state sheltering, and audit of business continuity. These activities are generally relevant to the different phases of emergency/disaster management at either the unit- or university-level, and even beyond.

**Table 9. Engaged Activities of Participants’ Units**

	Unit activities	Frequency	Percent
1	Planning for emergencies on university/college campuses	309	0.85
2	Training university personnel for emergency situations (including emergency exercises)	282	0.78
3	Incident response or executive leadership in campus emergencies	294	0.81
4	Risk or hazard mitigation	280	0.77
5	Emergency communication (e.g., mass messaging to staff or students)	238	0.66
6	Building/facility safety	263	0.73
7	Information and technology security, innovation, and/or related services	43	0.12
8	Continuity of operations planning	224	0.62
9	Liaison or point of contact to external community partners in emergency management or first response	233	0.64
10	Other. Please specify	16	0.04

***Variables and description***

**Dependent variable. COVID-19 testing service co-provision.** To identify the scope and procedures of testing services that universities/colleges participated in, the survey respondents were interrogated.: *Regarding COVID-19 testing services provided at your university, did your university or college generally engage in the following activities? (Select all that apply)*

- Designed test kits.
- Manufactured test kits
- Provided sites and space for testing services.
- distributed or processed test kits
- Collected testing samples.
- Analyzed and reported testing data.
- None of these

This variable is also a **count variable**. The participants who only selected “None of these” were scored 0, and all the other items were summed up for each participant, thereby ranging from 0 to 6.

**Independent variables. COVID-19 impact** is one key independent variable. To measure the impact of COVID-19 on university/college campus, the participants were asked to choose from the list. *“During the first year or so of the pandemic (roughly the*



*time period: Spring 2020 through the first half of 2021), did your university or college take any of these actions? (Please check all that apply)”.*

- Enacted a full or partial campus shutdown for some period of time.
- Provided health information to address concerns for students/faculty/personnel.
- Changed instructional delivery mode by moving all or most classes online.
- Provided students/faculty/personnel with PPE resources (e.g., masks, hand sanitizer)
- Established common-space requirements, such as masking rules or quarantine rules.
- Improved technology resources to support faculty/staff work from home.
- Made housing arrangements for on-campus students with particular assistance needs.

It is a **count variable** that summarizes all the impacts each participant selected.

**Local government capacity** before providing COVID-19-related services is measured by one question.: *“We would also like to understand how much your university or college works with and/or relies on local government in your community (i.e., city or county government) to provide general emergency response resources, expertise, or services when a community-scale emergency or disaster occurs (e.g., flooding, winter storms). We are asking about this in general – separate from the COVID-19 pandemic experience.*

*Please indicate, when a community-scale emergency or disaster occurs, to what extent does your university/college rely on local government to help manage the needs at your campus specific to the hazard incident?”.* Options are including: (1) No reliance at all; (2) Low level of reliance-we are able to handle most needs internally; (3) moderate level of reliance-We count on city or county for assistance in a number of areas, but also have resources to handle many issues internally; (4) High level of reliance-Our internal resource are limited, so we count on city or county (or state) agencies for operational assistance with most needs. It is regarded as a **continuous variable**, in which “No

reliance at all” indicates that the local government has an extremely low capacity, whereas “high level of reliance” indicates that the local government has extremely high capacity.

**Universities/colleges’ previous partnership** was measured BY one question: “*Separate and distinct from the COVID-19 pandemic, we would like to ask you which community partners are most relevant to your university or college emergency or disaster preparedness or risk management? (Select all that apply)*”

- City-level government agencies (e.g., emergency management, public health, police or fire)
- County-level government agencies (e.g., emergency management, public health)
- State-level government agencies (e.g., emergency management, public health, police or fire)
- Federal level government agencies (e.g., FEMA, CDC)
- Nonprofit organizations (e.g., state or local VOAD members, faith-based organizations)
- Private sector firms (e.g., regular service contract partners)

This is a **count variable** calculated by summing up the external partners each participant selected.

**Internal coordination activities within universities/colleges** to provide COVID-19 related services were measured by one question: “*In the same 2020-2021 time period (roughly the first year or so of the pandemic), for your primary work unit, which of the following activities were most important when working with other administrative units at your university/college? (Please select all that apply)*”

- **Planning** for COVID-19 testing and vaccination services
- **Monitoring** COVID-19 infections and testing/vaccination needs.
- **Communicating** COVID-19 testing and vaccination services information to students, faculty and personnel
- **Logistical supplies** for operating COVID-19 testing and vaccination services.

- Delivering COVID-19 testing and vaccination services in different places. It is a **count variable** that sums up each of the participants' selected items.

**University/college's decentralized decision-making structure** is a latent variable, that measured by one question: "*Based on your understanding or experience, in general, what level of influence do the following institutions or individuals exert over university-level decision-making regarding the management of emergencies/disaster risks?*" (1=no influence, 2=mild influence, 3=moderate influence, 4=strong influence, 5=very strong influence).

- Facilities management and operation units
- Office of corporate risk management
- Emergency management units (e.g., university police department, environmental health & safety department).

**Managerial response efficacy** is a latent variable, which is measured by one question: "*please think about the types of disaster services (e.g., sheltering, medical services, etc.) your university/college might provide in general emergency or disaster situations (not just COVID-19 issues) or helps provide to both your campus and to the broader community.*"

*We would like to ask: to what extent do the following factors influence your university/college's decisions over providing disaster services with key partners? Please answer to the best of your knowledge and in general consideration of your university/college overall, not just your specific division or unit.*" (1=not at all, 2=low extent, 3=moderate extent, 4=high extent, 5=very high extent).

- Our university/college has adequate capacity (knowledge, technical skills, resources) to provide these services.
- Our university/college is willing to collaborate with external stakeholders to provide these services.

- Our university/college has maintained strong partnerships with external stakeholders before COVID-19.
- Our university/college has developed effective risk reduction plans.

**A sense of university community responsibility** is also a latent variable, that measured by asking the participants to indicate their level of agreement or disagreement with each of the statements. (1=strongly disagree, 2=somewhat disagree, 3= average, 4=somewhat agree, 5=strongly agree).

- People in my unit feel that our university/college should address university/college-wide safety and security concerns first.
- People in my unit do not mind taking extra time to address university-/college-wide emergency related needs.
- People in my unit are willing to help university/college-wide community to express their voices and needs.

**Control variables** of university/college-level characteristics and individual characteristics are also included. University/college-level control variables are including: public university or not (binary variable, 1=public, 0=private but not for profit); medical school (binary variable, 1=there is a medical school affiliated to the university/college; 0=no medical school affiliated); university size (categorical variable, 1=very small, 2=small, 3=medium, 4=large, 5=very large); residential (categorical variable, 1=primarily nonresidential, 2=primarily residential, 3=highly residential); locale (binary variable, 1=urban setting, 0=other types of setting such as suburb, town, and rural). These control variables are sourced from the 2021 Carnegie Classification of Institutions of Higher Education through matching with the university names that indicated by survey participants.

**Control variables of Individual-level characteristics** such as gender (binary variable, 1=female, 0=male), and participants' race/ethnicity (binary variable, 1=White

alone, non-Hispanic, 0= other races/ethnicities, which include Hispanic; black or African American alone, non-Hispanic; Asian alone, non-Hispanic; Native Hawaiian and other Pacific Islander alone, non-Hispanic; Some other race alone, non-Hispanic; and Multiracial, non-Hispanic), and participants' work experiences (numeric, in years) are also included.

The descriptive statistics of these variables are as shown in Table 10. The mean scale of the COVID-19 testing service co-provision, COVID-19 impact on campus, internal coordination activities, decision-making structure items, sense of university community responsibility items, and university size are negatively skewed. However, local government capacity, established partnership, whether studying in medical school, gender, and work experiences are positively skewed. The relatively high standard deviations for these measures demonstrate adequate variability in the data, allowing for further analysis.

**Table 10. Descriptive Statistics of Key Variables**

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
COVID-19 testing services co-provision	302	0	6	3.23	1.607	-0.246	0.140
COVID-19 impact	304	0	7	5.81	0.930	-4.493	0.140
local government capacity	316	1	4	2.59	0.648	0.207	0.137
previous partnership	316	1	6	2.90	1.245	0.515	0.137
internal coordination activities	301	0	5	3.09	1.682	-0.316	0.140
managerial response efficacy_1	322	1	5	3.50	0.977	-0.131	0.136
managerial response efficacy_2	321	1	5	3.82	0.966	-0.536	0.136
managerial response efficacy_3	321	1	5	3.82	1.029	-0.643	0.136
managerial response efficacy_4	320	1	5	3.50	0.953	-0.177	0.136
decision-making structure_1	292	1	5	3.48	0.898	-0.296	0.143
decision-making structure_2	288	1	5	3.28	1.008	-0.251	0.144
decision-making structure_3	294	1	5	3.99	0.909	-0.728	0.142
Sense of university community responsibility_1	296	2	5	4.26	0.813	-0.701	0.142
Sense of university community responsibility_2	297	1	5	4.15	0.946	-1.037	0.141
Sense of university community responsibility_3	296	1	5	3.76	0.866	-0.341	0.142
public university or not	342	0	1	0.68	0.466	-0.796	0.132
medical school or not	342	0	1	0.33	0.470	0.738	0.132
university size	341	1	5	3.42	0.776	-1.142	0.132
residential	336	1	3	2.02	0.776	-0.031	0.133
locale_urban	342	0	1	0.67	0.472	-0.710	0.132
gender	286	0	1	0.24	0.426	1.238	0.144
race_White	290	0	1	0.81	0.390	-1.621	0.143
work experiences (years)	283	1.0	45.0	15.799	10.6960	0.694	0.145

## Survey Data Analysis and Hypothesis Testing

Hypothesis testing was divided into two categories. First, I adopted a negative binomial regression approach to test the direct effects of local government capacity, university risk decision-making structure, managerial perceptions of response efficacy, sense of community responsibility on the scope, and propensity of their university disaster service co-provision. Second, I used a structural equation modeling (SEM) approach to test the hypotheses of indirect effects.

### *Factors contributing to COVID-19 testing service co-provision*

Given that the dependent variable, COVID-19 testing service co-provision, is a count variable, negative binomial regression was adopted (Hilbe, 2011). To specify the effects of different types of variable, a stepwise approach was used. In Table 11, Model 1 only includes the effects of COVID-19 impacts and three variables to measure organizational capacity, namely, local government capacity, established partnership, and internal coordination activities. In Model 2, in addition to the aforementioned key variables, five organizational-level control variables were also included. In Model 3, three additional individual-level control variables (i.e., participants' gender, race (Caucasian or not), and work experience) were added. Model 4 included three key variables related to managerial perceptions (i.e., sense of university community responsibility, decentralized risk decision-making structure, and response efficacy).

**H1** assumes that severe disaster impacts will increase university disaster service co-provision. The results in Models 1–4 support this hypothesis. The results in Model 4,

showing that the effect of COVID-19 impacts on university COVID-19 testing service co-provision is significantly different from zero ( $p < 0.05$ ). The coefficient of COVID-19 impacts is 0.171, indicating that when the impact of COVID-19 on campus increases by 1 unit, the scope and propensity of university participation in COVID-19 testing service co-provision increases by 18.65%.<sup>41</sup>

**H2** postulates a negative relationship between local government capacity and university disaster service co-provision. The results in Models 1–4 support this hypothesis. University emergency managers' assessment of local government capacity in responding to different types of emergency/disaster risk prior to the COVID-19 pandemic will affect their propensity and scope of participating in COVID-19 testing service co-provision. The results in Model 4 show that the effect of local government capacity on university COVID-19 testing service co-provision is significantly different from zero ( $p < 0.05$ ). The coefficient of local government capacity is  $-0.086$ , which indicates that when local government capacity increases by 1 unit, the scope and propensity of university participation in COVID-19 testing service co-provision decreases by 8.24%.<sup>42</sup>

**H3 and H4** posit that established partnership and internal coordination activities are associated with university COVID-19 testing service co-provision. The results in Model 1 support H3, indicating that the effect of established partnership on university COVID-19 testing service co-provision is somewhat significantly different from zero ( $p < 0.10$ ). The coefficient of established partnership is 0.036, indicating that when

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<sup>41</sup> The exponent of 0.171 returns 1.186491.  $(1.1865 - 1) * 100\% = 18.65\%$ .

<sup>42</sup> The exponent of  $-0.086$  returns 0.917594.  $(1 - 0.91754) * 100\% = 8.24\%$ .

established partnership increases by 1 unit, the scope and propensity of university participation in COVID-19 testing service co-provision increases by 3.67 %<sup>43</sup>. However, after including organizational- and individual-level control variables and managerial perception variables in Models 2–4, this coefficient becomes insignificant. The effects of internal coordination activities on the scope and propensity of university COVID-19 testing service co-provision is significantly different from zero ( $p < 0.001$ ) across the four models. The coefficient in Model 4 is 0.061, implying that when university internal coordination activities increase by 1 unit, the scope and propensity of their COVID-19 testing services increases by 6.29%<sup>44</sup>.

**H5a**, **H5b**, and **H5c** assume that managerial perceptions of community responsibility, risk decision-making structure, and response efficacy are positively associated with university disaster service co-provision. However, the results in Models 1–4 do not support these hypotheses.

These results and findings reveal that disaster impacts, organizational capacity built through established partnerships, internal coordination activities, and local government capacity are critical factors that may affect the scope and propensity of university disaster service co-provision. Particularly, the negative association between local government capacity and university disaster service co-provision demonstrates that when disaster occurs and a service capacity gap is identified by nongovernmental stakeholders, they are motivated to participate in service co-provision. Thus,

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<sup>43</sup> The exponent of 0.036 returns 1.036656.  $(1.036656 - 1) * 100\% = 3.67\%$ .

<sup>44</sup> The exponent of 0.061 returns 1.062899.  $(1.062899 - 1) * 100\% = 6.29\%$ .



nongovernmental stakeholders' participation in disaster services is not without any conditions, corresponding to the theoretical gap proposed in Chapter 2.

**Table 11. Negative Binomial Regression Results**

DV= COVID-19 testing (co-)provision		model 1 (NB Regression)			model 2 (NB Regression)		
		estimate	s.e.	p-value	estimate	s.e.	p-value
disaster impacts	COVID-19 impacts	0.192***	0.072	0.008	0.194***	0.071	0.006
organizational capacity	local government capacity	-0.099**	0.041	0.015	-0.077*	0.041	0.060
	previous partnership	0.036*	0.021	0.092	0.035	0.022	0.114
	internal coordination	0.080****	0.017	0.000	0.072****	0.017	0.000
managerial perceptions	sense of university community responsibility decentralized risk decision-making structure response efficacy						
organizational-level control variables	public university or not				-0.012	0.078	0.874
	medical school				0.123**	0.056	0.029
	university size				0.059	0.048	0.212
	residential locale_urban				-0.004	0.046	0.931
individual-level control variables	gender						
	race_White_1						
	work experience (years)						
	intercept	-0.074	0.444	0.868	-0.349	0.489	0.475
N		282			282		
Akaike (AIC)		1115.513			1048.432		
Bayesian (BIC)		1134.032			1084.851		
Sample-size Adjusted BIC		1118.175			1053.141		
DV= COVID-19 testing (co-)provision		model 3 (NB Regression)			model 4 (NB Regression)		
		estimate	s.e.	p-value	estimate	s.e.	p-value
disaster impacts	COVID-19 impacts	0.169**	0.071	0.017	0.171**	0.071	0.016
organizational capacity	local government capacity	-0.088**	0.042	0.037	-0.086**	0.042	0.040
	previous partnership	0.033	0.023	0.156	0.034	0.024	0.155
	internal coordination	0.061****	0.017	0.000	0.061**	0.017	0.000
managerial perceptions	sense of university community responsibility decentralized risk decision-making structure response efficacy				0.070	0.081	0.388
organizational-level control variables	public university or not	-0.042	0.083	0.616	-0.046	0.083	0.575
	medical school	0.138**	0.057	0.016	0.138**	0.058	0.016
	university size	0.059	0.049	0.223	0.061	0.049	0.211
	residential	-0.011	0.049	0.823	-0.011	0.049	0.821
	locale_urban	-0.01	0.059	0.862	-0.011	0.059	0.855
individual-level control variables	gender	0.013	0.063	0.835	0.017	0.063	0.793
	race_White_1	0.024	0.076	0.749	0.023	0.076	0.758
	work experience (years)	0.007***	0.002	0.005	0.007***	0.002	0.005
	intercept	-0.204	0.474	0.666	-0.225	0.484	0.642
N		257			257		
Akaike (AIC)		958.545			7250.954		
Bayesian (BIC)		1004.683			7424.858		
Sample-size Adjusted BIC		963.469			7269.514		

\*p<0.10, \*\*p<0.05, \*\*\*p<0.01, \*\*\*\*p<0.001. Unstandardized coefficients are reported.

***Decision-making structure, managerial perceptions of response capacity, and sense of community responsibility***

An SEM approach was adopted to test the relationships between disaster impacts and managerial perceptions of response capacity, sense of community responsibility, and risk decision-making structure.

Given that the key variables of interest included multidimensional scales, prior to testing the main effect hypotheses, I conducted a confirmatory factor analysis (CFA) to ensure the discriminant validity of the study measures. I used MPlus 8.4 to conduct the CFA using maximum likelihood as the estimator and the bootstrapping approach (1000 times). The CFA results in Table 12 indicate a good model fit based on root mean square error of approximation (RMSEA=0.056 with 90% CI [0.036, 0.075]), comparative fit index (CFI=0.961), Tucker–Lewis index (TLI=0.946), and standardized root mean square residual (SRMR=0.042,  $\chi^2$  (32)=64.307, p value=0.0000). The fit indices met the general cutoff points for the measurement model (RMSEA  $\leq$  0.08, CFI  $\geq$  0.90, TLI  $\geq$  0.90, and SRMR  $\leq$  0.08; Byrne, 2013). All the latent variables also have good reliability because their standardized factor loadings are mostly greater than the threshold value of 0.500 (Ford, MacCallum, & Tait, 1986).

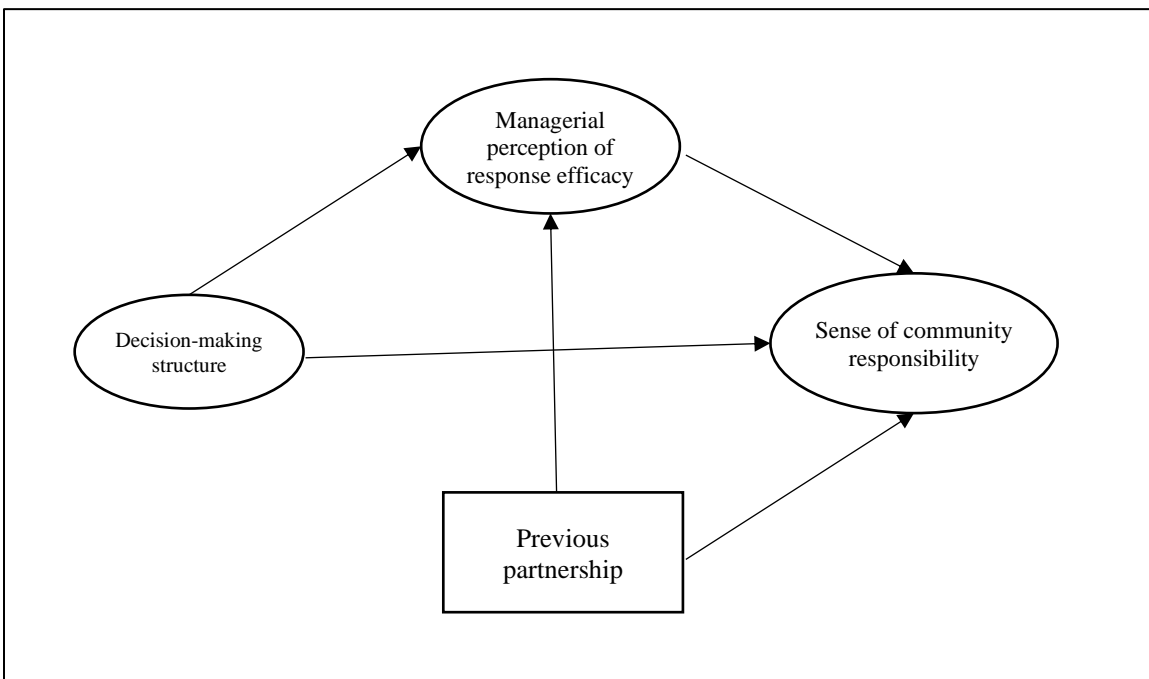
**Table 12. Measurement Model (CFA)**

	Estimate	S.E.	P-Value	R square
<b>Sense of university community responsibility (Cronbach's Alpha=0.578)</b>				
Sense of university community responsibility_1	0.507	0.071	0.000	0.257
Sense of university community responsibility_2	0.738	0.084	0.000	0.545
Sense of university community responsibility_3	0.465	0.066	0.000	0.216
<b>decision-making structure (Cronbach's Alpha=0.709)</b>				
decision-making structure_1	0.832	0.054	0.000	0.692
decision-making structure_2	0.624	0.056	0.000	0.39
decision-making structure_3	0.576	0.068	0.000	0.331

<b>managerial response efficacy (Cronbach's Alpha=0.835)</b>				
managerial response efficacy_1	0.694	0.045	0.000	0.481
managerial response efficacy_2	0.818	0.029	0.000	0.669
managerial response efficacy_3	0.757	0.046	0.000	0.573
managerial response efficacy_4	0.726	0.045	0.000	0.526

Figure 5 depicts the two indirect effects of decision-making structure and established partnership on university managers' sense of community responsibility, in which managerial perception of response efficacy is a mediator variable.

**Figure 5. A Conceptual Framework of the Relationships between Risk Decision-Making Structure, Managerial Perception of Response Efficacy, Previous Partnership, and Sense of Community Responsibility**



I employed SEM to test the main effects of risk decision-making structure and established partnership on university managers' sense of community responsibility, and the mediating effect of managerial sense of response efficacy. SEM has advantages with respect to examining models that include latent and observed variables. SEM is regarded

as a useful approach in “dealing with measurement error and can estimate the amount of variance that is attributable to a common method” (Favero & Bullock, 2015, p. 303).

Indirect effects were tested via SEM using MPlus 8.4. The fit indices’ results are as follows: RMSEA=0.033, 90% CI=[0.012, 0.049], CFL=0.953, TLI=0.935, SRMR=0.048, and  $\chi^2(104)=133.361$ . Therefore, this model fits the data well.

**Table 13. SEM Model Results**

variable names	model 1 (DV1= sense of community responsibility)			model 2 (DV2= response efficacy)			model 3 (DV3= previous partnership)		
	Estimate	S.E.	P value	Estimate	S.E.	P value	Estimate	S.E.	P value
response efficacy	0.152**	0.073	0.038						
decentralized risk decision-making structure	0.162**	0.065	0.013	0.335***	0.102	0.001			
previous partnership	-0.018	0.027	0.502	0.098***	0.036	0.007			
public university or not	0.072	0.083	0.387	0.054	0.129	0.676	0.322	0.219	0.141
medical school or not	-0.012	0.067	0.858	-0.021	0.103	0.840	0.058	0.178	0.744
university size	-0.011	0.042	0.783	0.047	0.075	0.528	0.028	0.12	0.815
residential	0.018	0.047	0.706	0.042	0.077	0.586	-0.101	0.134	0.451
locale_urban	0.029	0.081	0.720	-0.144	0.108	0.184	-0.166	0.174	0.342
gender	-0.047	0.071	0.505	-0.057	0.101	0.577	-0.037	0.175	0.831
race_White	0.054	0.079	0.492	-0.097	0.122	0.427	-0.402*	0.204	0.049
work experiences (years)	0.000	0.003	0.930	0.007	0.004	0.107	0.011	0.008	0.148
R square	0.228**			0.204***			0.056*		

Notes: 1. \*p<0.10, \*\*p<0.05, \*\*\*p<0.01, \*\*\*\*p<0.001; 2. n=257; Unstandardized standard errors and unstandardized coefficients are reported.

The results in Model 1 show that response efficacy (unstandardized B=0.152, SE=0.074, p<0.05) and decentralized risk decision-making structure (unstandardized B=0.162, SE=0.065, p<0.05) have significantly positive effects on university managers’ sense of community. Regarding response efficacy, decentralized risk decision-making structure (B=0.335, SE=0.102, p<0.01) and established partnership (unstandardized B=0.098, SE=0.036, p<0.01) also have significant positively effects on it.

**Indirect Effects 1 and 2** hypothesize that response efficacy plays a mediating role between two sets of relationships: decentralized risk decision-making structure and university managers’ sense of community responsibility, as well as established partnership and university managers’ sense of community responsibility. The results in Table 14 support these indirect effects hypotheses. Specifically, managers’ evaluated

response efficacy effectively mediates the effect of decentralized risk decision-making structure on their sense of community responsibility (standardized B=0.095, 95% CI= [0.041, 0.200]) and the effect of established partnership on their sense of community responsibility (standardized B=0.049, 95% CI= [0.016, 0.118]). However, the latter indirect effect is only significant at the  $p < 0.10$  level.

**Table 14. Indirect Effects Hypotheses Testing Results**

<b>Effects from decision-making structure to sense of community responsibility</b>					
	<b>Estimate</b>	<b>S.E.</b>	<b>P value</b>	<b>lower</b>	<b>upper</b>
Total	0.399****	0.101	0.000	0.240	0.564
Total indirect	0.095**	0.043	0.026	0.041	0.200
Specific indirect 1					
Decentralized risk decision-making structure->response efficacy->sense of community responsibility	0.095**	0.043	0.026	0.041	0.200
direct effect					
Decentralized risk decision-making structure->sense of community responsibility	0.303***	0.105	0.004	0.132	0.473
<b>Effects from previous partnership to sense of community responsibility</b>					
	<b>Estimate</b>	<b>S.E.</b>	<b>P value</b>	<b>lower</b>	<b>upper</b>
Total	-0.010	0.080	0.902	-0.132	0.131
Total indirect	0.049*	0.027	0.077	0.016	0.118
Specific indirect 1					
previous partnership-> response efficacy-> sense of community responsibility	0.049*	0.027	0.077	0.016	0.118
Direct effect					
previous partnership-> sense of community responsibility	-0.059	0.083	0.479	-0.202	0.071

\* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ , \*\*\*\* $p < 0.001$ ;  $n = 257$ . Standardized coefficients are reported.

## Findings and Discussion

In this chapter, I proposed six sets of hypotheses about the relationships between disaster impacts, local government capacity, university-level internal coordination activities, and established partnerships and managers' sense of community responsibility and evaluated response efficacy on their university's scope and propensity to participate in disaster service co-provision. I also hypothesized how managers' evaluated response

efficacy can mediate the relationship between decentralized risk decision-making structure/or established partnership and their sense of community responsibility.

Using survey data collected among 362 university emergency managers from at least 248 universities/colleges, I found that most of these hypotheses are supported. The findings and implications can be summarized as follows.

First, local government capacity is negatively associated with the scope and propensity of university disaster service co-provision. When the local government has lower service capacity in responding to huge disaster services needs, nongovernmental stakeholders, such as universities, will participate in service co-provision to fill that capacity gap. Nongovernmental stakeholders' service co-provision decisions and actions are not unconditional. Theoretically, this finding helps specify the preconditions of service co-provision theory, which is not clearly claimed by other theories (e.g., co-production, co-creation, co-delivery, and co-management theories). This finding corresponds to the theoretical gap identified in Chapter 2, which was addressed by the proposed co-provision theoretical framework. In practice, this finding also implies that during disasters or emergencies, nongovernmental stakeholders' participation in service co-provision is particularly important because local governments may not be able to address all service needs.

Second, university internal coordination activities can facilitate their external coordination in (co-)providing disaster services. This finding demonstrates the importance of having professional supply chains and logistical support for long-term service co-provision, particularly in a disaster management situation. How can communication be increased and needed resources and personnel across mobilized to

different departments and functional units quickly and smoothly when disasters or emergencies occur? How can it be guaranteed that all departments share the same and consistent principles and cultures in terms of building a disaster-resilient community? These questions need further discussion for university emergency managers.

Third, established partnerships that have been built during other disasters or emergencies can help reduce communication costs and other transaction costs when a new disaster occurs. These well-maintained partnerships are critical assets for universities to acquire needed information, resources, and materials and develop reasonable response plans with other partners. However, given the network inertia, university managers also need to be cautious with potential barriers that old partnerships or networks may create for dealing with new emergencies or disasters. Particularly, how can managers acquire needed information and resources from multiple channels, either “strong ties” or “weak ties,” and keep the accuracy and sufficiency of related disaster information? This issue needs attention from university emergency managers. Building a professional platform to collect disaster information and join professional associations, such that they can check the consistency and accuracy of information, can be an option.

Fourth, individual-level variables, such as managers’ sense of community responsibility and self-evaluated response efficacy, do not have significant relationships with the scope and propensity of university participation in disaster service co-provision. One possible reason for this is that disaster service co-provision is a critical decision made at the highest level of leadership, whereas university emergency managers may participate in the decision-making process but may not have the authority to make the final decision. In many cases, small universities/colleges may have no complete

functional unit that is responsible for making a response plan to disaster risks, such as the COVID-19 pandemic. It is their top-level leadership role assemble a temporary team to respond to disaster needs. Another possible explanation is that during disasters, most organizations need to prioritize the needs of their own organizations, such as university staff, faculty, and students' needs, rather than the whole community' needs.

Organizational missions and statements (Cochran & David, 1986; Ortiz, 2022) decide that universities are responsible for the safety and health of their students and personnel first. If they have extra resources and capacity to cover the needs of other groups and people beyond their own campus, then they may or may not take up extra roles in providing these services. How to accurately balance the capacity of universities and local government agencies during a disaster and how to distribute valuable resources across different stakeholders also deserves attention from university managers.



## CHAPTER 6

### DISCUSSION AND CONCLUSIONS

#### **Limitations**

This dissertation has limitations. First, regarding qualitative data, given that I only have the opportunity to interview university emergency management subject matter experts, who are typically of middle-level leadership, their authority in making final disaster response decisions may be limited. University/college presidents and provosts are typically the ones making final decisions; however, given their leadership roles, responsibilities, and busy schedules, scheduling interviews with them was extremely difficult. Nevertheless, university SMEs' perspectives of previous disaster response experiences and current COVID-19 disaster service provision experiences can still shed light on the implementation of disaster management plans.

Second, five case studies might not be enough to cover all critical aspects of university roles in disaster service co-provision. Given the time limit, although I interviewed more than 60 people from government agencies and 11 universities, I have to focus on five complete cases that consist of people from both sides. These cases did not cover states that were hit severely by COVID-19 at the early stage, such as New York and Florida. Thus, the qualitative findings might be biased.

Third, the survey data have a small sample size, which may cause validity issues. However, given the special nature of the survey participants and their work responsibility

and the difficulty in reaching out to them, this survey may have a good representativeness regarding the role of universities in emergency management field, which has been rarely studied.

Fourth, endogeneity issues and common source bias may be a concern. Hypothesis testing was conducted mainly with survey data, which may not point out the causal relationship between variables. Fortunately, the advantages of adopting a mixed method research design and conducting qualitative studies prior to a national survey can somewhat compensate for the disadvantages of cross-sectional data. In this manner, qualitative studies can indicate the potential causal mechanisms behind university disaster service co-provision. Furthermore, the common source bias was reduced by integrating the survey data with 2021 Carnegies classification data for each university or college.

### **Theoretical Implications**

This dissertation has profound theoretical implications. First, by summarizing and comparing the definitions, actors, and conditions of multiple “co-” theories (i.e., co-production, co-creation, co-delivery, co-management, and co-governance theories), I proposed a co-provision theoretical framework to recategorize the initial essences of these “co-” theories. Second, the theoretical framework of co-provision identified the preconditions that nongovernmental stakeholders participate in the service co-provision process. That is, a critical service capacity gap should be filled by the participation of nongovernmental stakeholders in providing needed public services.

Previous empirical studies based on the theories of service co-production or co-creation have not specified the differences between the two theories, and they have not

identified in what conditions nongovernmental stakeholders will participate in the service production/creation process. This gap causes theoretical confusion about which situations and which theory should be used. Furthermore, when these “co-” theories evolve simultaneously toward the same direction and same public administration and management field, identifying their theoretical gist and applying them into appropriate situations seems urgent and important. Thus, revisiting their original definitions, application scenarios, and specified actors, can help address this theoretical confusion and reorganize their relationships.

The proposed theoretical framework of service co-provision was also testified by qualitative and quantitative evidence. The condition that universities, as nongovernmental stakeholders, participate in the disaster service co-provision process is local government has limited capacity in responding to large-scale disaster service needs, whereas these nongovernmental stakeholders can fill the gap in different ways and at the different stages of service provision. Large universities that have medical schools and strong research expertise can design, manufacture, and distribute testing kits to the whole state (e.g., ASU and Virginia Tech). They can also provide testing sample analysis services to the local government and help build data report portals. Moreover, universities or colleges may only provide space and facilities for the local government to provide testing services to the whole community. It demonstrates that universities/colleges can play different roles and provide various resources at different stages of disaster service provision, either designing, manufacturing, distributing, or delivering. It also reveals the importance of specifying the specific stages of service provision, given that the needed resources and responsibilities are different at these stages.

## **Propositions For Local Governments**

Qualitative and quantitative findings also imply that local governments can improve their public service provision capacity through collaborating with nongovernmental stakeholders in the community.

### ***Integrating “old ties” and “new ties” for improving disaster services capacity***

For local government agencies, during disasters or emergencies, large scale of service needs may be overwhelming given the professional knowledge and time needed to produce services and distribute them. State or local governments can rely on their “old ties” to mobilize resources, information, and personnel across departments or functional units of emergency management, public health, hospitals, police, fires, or environmental health and safety. However, these “old ties” and their strengths may still be insufficient to address all service needs, particularly some disaster relief services requiring professional knowledge and skills. Creating “new ties” and integrating them with “old ties” can organize more needed resources. These “new ties,” such as large research universities, may have already established laboratories that can provide needed services.

### ***Enhancing disaster preparedness through proactive thinking and entrepreneurship***

Emergency management experts from universities and government agencies who have proactive thinking and entrepreneurship have made great efforts to improve disaster preparedness. When COVID-19 pandemic was spread in China but had not hit the states, many university presidents, emergency managers, and epidemiologists have realized that it could happen to them soon because of international travels. These universities and

government agencies thus started to purchase PPEs and other critical supplies globally earlier than many other institutions, leading to greater disaster preparedness.

***More organizational support to reduce burnout, fatigue, and disaster burdens***

Emergency managers, doctors, and public health personnel are the frontline workers that directly provide services and needed resources to citizens. However, the large scale of service needs and limited personnel who deliver services make each frontline worker take up extra responsibilities and tasks. Unfortunately, these critical service providers' wellbeing and health were not considered well. Public health department employees not only need to respond to public inquiry and make decisions about service distribution but also adapt to policy uncertainties caused by the ever-changing COVID-19 situation. These experts are burdened by policy requirements, a huge number of public needs, and tons of paperwork, which they need to go through when hiring extra employees or approving service needs. Organizational support, such as safe work conditions, necessary protective measures against COVID-19, and other support for personal needs (e.g., rest and communication with family), can help reduce fatigue and burnout.

**Future Studies**

In the near future, I want to use survey data to investigate how organizational support and managerial sense of community responsibility affect emergency managers' disaster burden experiences. I also want to use all 61 interviews to further develop and

expand service co-provision theory and empirically examine it by integrating with survey data analysis.

Furthermore, on the basis of the administrative burden literature, I want to conceptualize disaster burdens on frontline workers who provide disaster services. These people need to deal with the burdens and costs brought by disasters, such as health threat, mental stress, and learning costs, generated from newly required skills and knowledge. Moreover, providing disaster aid services to tons of clients and citizens in such a condition is stressful and onerous. However, current administrative burden studies have asymmetrically focused on citizens' burdensome experience when they take up policy benefits, and few of them have captured the burdens experienced by street-level bureaucrats who provide services to them. My future study aims to address this research gap. Furthermore, I want to send out the second wave of survey to university emergency managers to investigate their perspectives on university resilience and sustainability initiatives.

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APPENDIX A

IRB APPROVALS



EXEMPTION GRANTED

[Eric Welch](#)  
[WATTS: Public Affairs, School of](#)  
-  
[EricWelch@asu.edu](mailto:EricWelch@asu.edu)

Dear [Eric Welch](#):

On 4/7/2021 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	Universities as Disaster Management Stakeholders and Operational Assets: An Assessment of Current Practices in the United States
Investigator:	<a href="#">Eric Welch</a>
IRB ID:	STUDY00013704
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	<ul style="list-style-type: none"> <li>• Consent form (modification #2), Category: Consent Form;</li> <li>• Interview protocol (modification #2), Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);</li> <li>• University responses to COVID-19 and natural hazards (modification #2), Category: IRB Protocol;</li> </ul>

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation on 4/7/2021.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

If any changes are made to the study, the IRB must be notified at [research.integrity@asu.edu](mailto:research.integrity@asu.edu) to determine if additional reviews/approvals are required.

Changes may include but not limited to revisions to data collection, survey and/or interview questions, and vulnerable populations, etc.

Sincerely,

IRB Administrator

cc: Suyang Yu  
Brian Gerber  
Suyang Yu  
Eric Welch



APPROVAL: MODIFICATION

[Eric Welch](#)

WATTS-PA: Science, Technology and Environmental Policy Studies, Center for (C-STEPS)

-

EricWelch@asu.edu

Dear [Eric Welch](#):

On 3/7/2023 the ASU IRB reviewed the following protocol:

Type of Review:	Modification / Update
Title:	Universities as Disaster Management Stakeholders and Operational Assets: An Assessment of Current Practices in the United States
Investigator:	<a href="#">Eric Welch</a>
IRB ID:	STUDY00013704
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	<ul style="list-style-type: none"> <li>• Brian Gerber agreed to be new PI, Category: Other;</li> <li>• consent form, Category: Consent Form;</li> <li>• Invitation letter, Category: Recruitment Materials;</li> <li>• IRB protocol, Category: IRB Protocol;</li> <li>• Reminder letter , Category: Recruitment Materials;</li> <li>• survey instrument, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);</li> </ul>

The IRB approved the modification.

When consent is appropriate, you must use final, watermarked versions available under the "Documents" tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc: Suyang Yu  
Brian Gerber  
Suyang Yu  
Eric Welch