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## **Disaster Resilience in Self-Organized Interorganizational Networks: Theoretical Perspectives and Assessment**

Kyujin Jung<sup>1</sup>

*Building resilient community is often a complicated process to be gained by interorganizational collaboration. Since patterns of interorganizational relations among governments and sectors are constantly changing due to internal and external factors in the field of emergency management, understanding the dynamic nature of interorganizational collaboration is a critical step for improving a community's ability to bounce back from a catastrophic event. From two theoretical perspectives, this research aims to examine the essential role of working across levels of governments and sectors in building resilient community by focusing on sources of community resiliency and a strong commitment. The empirical evidence highlights the importance of studying resilience as a way to understand the motivation and incentive for organizations to work jointly during emergency response. The study of organizational resilience also draws attention for the importance of various forms of interorganizational collaboration such as formal and informal relations. It also highlights how local organizations can utilize their relations to seek resources without necessarily jeopardizing their ability to perform their core organizational functions.*

**Keywords:** Disaster resilience, emergency management, interorganizational network.

Local governments' ability to design strategies that improve their overall capacities to prepare and abilities to respond to disasters has several implications for the study of regional governance. Scholars in the fields of disaster research, urban politics, and public administration have published various articles on the topic (Paton, Millar, and Johnson, 2001; Carpenter, 2003; Comfort, 2007; Scheffer and Nes, 2007; Scheffer, 2004; Cox and Perry, 2011; Foster, 2012; Chandra et al., 2011; Rivera and Settembrino, 2012; Andrew et al., forthcoming). From a theoretical standpoint, there is a need to examine factors explaining the ability of local communities and governments to bounce back after a disaster, and how individual localities contribute to the overall ability of a region to return to normalcy. According to Tierney (2012: p.9), "research has increasingly focused on the conditions for and characteristics of resilience, on strategies for improving resilience, and on outcomes resulting from resilience-enhancing activities." For instance, in 2010, under the 2010 National Security Strategy, the concept of resilience has been strongly emphasized as a national

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goal. Under the Presidential Policy Directive 8 (National Preparedness), a new emphasis was placed in the need “for collaboration among governmental, private sector, and civil society institutions and organizations in achieving societal resilience” (Tierney, 2012: p.10).

The concept of community resilience not only captures the ability of a group of individuals (as well as organizations within that community) to effectively organize them, but also their capacity to minimize the consequences of disasters through joint preparedness planning. The topic also holds a tremendous promise for understanding a community’s capacities---as a set of strategies---for enhancing disaster readiness and response. The Community and Regional Resilience Institute (CARRI) –which “believes that a community’s resilience is measured by its sustained ability to prepare for, respond to, and fully bounce back from a variety of crises”– highlights the importance of identifying, assessing, and taking proactive actions in order to minimize the consequences of disasters and improve resilience in vulnerable communities. There have also been various measurements to identify the strengths and weaknesses of communities’ resilience including the Coastal Resilience Index (CRI) and Community Assessment of Resilience Tool (CART).

While much of the current research tends to focus on vulnerability and resilience in communities located in major metropolitan areas (Campanella, 2006; Berke and Campanella, 2006; Cutter et al., 2003; Tobin and Whiteford, 2002; Pfefferbaum et al., 2007; Norris et al., 2008), few have examined how organizations from various sectors within urban and rural communities respond to natural disasters. There has also been a limited number of empirical studies addressing the factors that explain the ability and capacity of organizations to minimize the consequences of natural and man-made disasters (Somers, 2009; Sherrieb et al., 2010; Norris et al., 2009; Rivera and Settembrino, 2012; Andrew et al., forthcoming). As noted by Kapucu et al (2012), one of the “challenge[s] in developing resilient communities is not only recognizing and anticipating the scope of damages, but integrating multiple agencies, jurisdictions and stakeholder groups in a response to a disaster (Ronan and Johnson, 2005; Pelling, 2003).” The ability of organization to respond and recover from disasters depends on their ability to coordinate joint activities and share resources across administrative and political boundaries (Ainuddin and Routray, 2012; Crichton et al., 2009; Andrew et al., forthcoming). In other words, interorganizational collaboration is an essential part of assessing resilience-related characteristics of a community.

This research provides a brief overview and assessment of the current state of research on community resilience. The conceptual frameworks employed by scholars in the various disciplines are examined together with factors explaining the ability of a community to rebound from disasters. The key dimensions of resilience are also discussed in relation to disaster recovery. The final section of the research outlines several topics for future research. This research highlights the importance of studying organizational resilience as a way to understand the motivation and incentive for organizations to work jointly during emergency response. The study of organizational resilience also draws attention for the importance of various forms of interorganizational collaboration such as formal and informal relations. It also highlights how local organizations can utilize their relations to seek resources without necessarily jeopardizing their ability to perform their core organizational functions.

## What is Resilience?

In the field of emergency management, resilience is a concept employed by scholars to understand the degree to which an individual, organization, and the community bounce back and return to normalcy after disasters. At the community level, the term “resilience” has been broadly defined as “the capability of a community to face a threat, survive and bounce back or, perhaps more accurately, bounce forward into a normalcy newly defined by the disaster related to losses and changes” (Cox and Perry, 2011, p.395). The National Research Council (NRC) provides a common sense definition, which emphasizes “the continued ability of a community to function during and following stress” (NRC 2010, p.3).

Following Andrew et al. (forthcoming, p. 1), resilience can be examined at the organizational level, which is defined as “the ability of organizations to work together in minimizing operational disruptions and coordinate critical resources across administrative boundaries to aid local communities.” This definition implies that interorganizational collaboration enables organizations to help others during disasters and, at the same time, perform core functions and cope with disasters. Consistent with the ICA framework, this conceptual definition also suggests that collaboration and the ability of organizations to cope with disasters depend on the willingness of individual organizations to internalize coordination costs contributing to organizational cohesiveness in emergency response (Jung, 2013, Andrew and Carr, 2013). It is assumed that organizational cohesiveness demands individual organizations to prepare for disasters as a collective in order to minimize their operational disruptions.

In New Zealand, a group of scholars under the Resilient Organizations Research Programme (RORP) from the University of Canterbury and University of Auckland, define the term organizational resilience as “the ability of an organization to survive a crisis and thrive in a world of uncertainty” (RORP, 2014). Foster (2012) also examines resilience at the organizational level with reference to economic shocks. By using the term High Reliable Organization (HRO) in the United Kingdom, Crichton et al. (2009, p.25) examine organizational resilience as the process to secure appropriate knowledge and resources available from both within its own organization and external actors and to incorporate critical resources into their emergency management system. McManus et al. (2008) assert that an effective disaster response operation can be enhanced by organizations with high levels of resilience in order to respond swiftly to victims and the affected community during catastrophic events.

Other scholars have defined the concept of resilience in multidimensional form: robustness, rapidity, resourcefulness, and redundancy (Bruneau et al., 2003; Norris et al., 2008; Andrew et al., forthcoming). First, the dimension of robustness refers to the capacity of a community to deal with disaster situations. Second, rapidity captures the speed by which organizations in a community can respond and recover from disasters. Third, resourcefulness is a complicated source of resilience since it implies that organizations must have the ability to transform internal and external resources into something of value (Bruneau et al., 2003; Norris et al., 2008). Lastly, the dimension of redundancy implies that collaboration facilitates the process of organizations pooling resources during emergency planning.

Moreover, the literature in the field of emergency management seems to focus on the ability of organizations to enhance resilience (Paton, Millar, and Johnson, 2001). To improve the

capacities of a community's response to disasters, Paton et al. (2001) argue that resilience should be conceptualized as a contingent planning strategy as opposed to a prescription for resilience. This is because the level of resilience varies considerably depending on the "all-hazards management" framework across sectors. In order to enhance resilience, Crichton, Ramsay, and Kelly (2009) provide key lessons from a range of emergencies that occurred in the United Kingdom and the United States. They highlight the importance of aligning shared vision throughout the emergency response system as well as ensuring capability and availability of resources within and beyond a single organization. Learning from and consulting with the public are also crucial components of capacity building (Crichton et al., 2009).

Chandra et al. (2011) in their technical report, illustrate that the main components of improving resilience are integration and involvement of various organizations such as public, private, and nongovernmental organizations in emergency planning, response, and recovery and effective risk communication for information and resource exchange. Enhancing organizational resilience seems to be closely connected to interorganizational collaboration and the ability of organizations to coordinate resources and communicate risks.

## **Theoretical Perspectives on Resilience**

Currently, there are two dominant theoretical approaches to studying resilience. The first approach frames the issues as social-ecological systems (Carpenter, 2003; Carpenter et al., 1999; Scheffer and Nes, 2007; Scheffer, 2004; Meijer et al., 1999; Scheffer et al., 1993). The second approach, relies much on institutions and governance derived from social science disciplines (i.e., psychology, anthropology, political science, and urban politics), which generally view resilience in terms of rules permitting and constraining social interactions. Both approaches tend to view resilience as either a set of attributes assisting a community to cope with disaster or an outcome reflecting the ability of a community to recover from external shocks.

### ***Social-ecological Systems Approach***

This approach reflects the various aspects of ecological systems. It is among the first perspectives to dismiss the idea that there is a pristine ecosystem and the goal of management should be to restore the systems in order for the ecosystem to return to its previous conditions (Martin-Breen and Anderies, 2011). Since the work of Berkes et al. (2003), they provided a shift in the perspective on resilience: from a pristine ecosystem approach to a social-ecological system (SEs) perspective.

The new approach extends the resilience research by focusing more on the social dimension of the ecosystem in order to understand the essential process that would lead to resilient organizations. Within the context of a social-economic configuration, the perspective provides insights on the different patterns of public and nonprofit organizations partnerships in the social-ecological system. It yields a rich description on the motivation and incentives for organizations to enhance their resilience within the eco-system. Nelson et al. (2010), utilizing the perspective, highlight the importance of cross-scale interactions between organizations and social context in three irrigation societies in the United States.

Most discussions based on the eco-system approach, according to Norris et al. (2008), tend

to focus on three dimensions: First, resilience is conceptualized as the ability of a community to rebound rather than an outcome (Brown and Kulig, 1996; Pfefferbaum et al., 2005). Second, resilience is conceptualized as an adaptability process rather than a static or stable ecosystem (Handmer and Dovers, 1996; Waller, 2001). Third, the literature also tends to focus on the “stressor,” including: characteristics or types of disasters (severity, duration, or/and level of surprise), individual’s response to the stressor, level of exposure, and/or vulnerability of the organization or community to the stressor. In fact, Quarantelli (1986) suggest that resilience should be examined as the effect of a disaster in term of demand-induced response (i.e., whether demands exceed capacities of the community to response to disasters). As for the adaptability process, studies using longitudinal data are mostly interested on the difference between recovery and resilience trajectories (Bonanno 2004; Flynn 1994). The assumption in this studies is that dysfunctions of the system are transient and temporary. As pointed out by Norris et al. (2008, p.135), “resilience rests on both the resources themselves and the dynamic attributes of those resources (robustness, redundancy, rapidity).”

### *Institutions and Governance Perspective*

A second approach adopts an institutions and governance perspective to capture various factors promoting resilience (Ostrom, 1990; Williams, 1998; North, 2009; Anderies et al. 2004; Janssen et al., 2007; Janssen and Anderies, 2007). In this approach, the concept of institutions is defined as the rules structuring interactions among organizations as a set of agents, and governance refers to the various forms of institutions and interorganizational structures that shape the process responsible for actions and inactions (i.e., processes facilitating decisions and actions that are taken by organizations) (Ostrom, 2006; Janssen and Anderies, 2007). Based on these perspectives, several lines of research can be identified (i.e., social vulnerability, social capital, social support and engagement, and grass-root participation in disaster planning).

Ostrom’s (2006) work on institutions, for instance, has a strong influence on this approach. The main argument focuses on the dynamics of interactions that could lead to the development of rules and principles purposefully designed for collective action. This perspective can also be used to explain organizational resilience over time. Approaching the topic of organizational resilience from this perspective brings attention to the important intangible values of formal and informal interactions such as trust, rights to organize, interorganizational arrangements, and rules governing decision-making. Scholars in the field of emergency management who are interested to capture the importance of citizen engagement in emergency planning and implementation have also adopted this approach (Berke and Campanella, 2006; Pfefferbaum et al., 2005).

The work presented by Pendall, Foster, and Cowell (2010) on regional resilience as a complex adaptive system essentially argues that a region goes through stages of recovery processes such as short and long terms recoveries that depend on the scale of disaster as well as the time, nature and magnitude of various challenges. They argue that a region should be viewed as being resilient if “it maintains or improves its performance on outcomes regardless of effort, process or starting point” (Pendall, Foster, and Cowell, 2010, p.83). The basic assumption is that a region’s capacity to return to normalcy depends on “coping mechanisms” – “region with low resilience cope poorly with system disturbance, filtering in the face of environmental, political, and economic blows” (Foster, unpublished, p.5).

Recently, Andrew et al. (forthcoming)—relying on the institutional collective action framework—examined organizations’ ability to bound back after a major disaster in Thailand and found that the nature of collaboration influences their perceived organizational resilience. They argue that the social cohesion embedded in local communities influences the ability of organizations to coordinate emergency response efforts, which in turns affect a community’s ability to bounce back faster after a major disaster. Their study also highlights policy implications that can help facilitate region administration to create disaster resilient communities and the need to develop social cohesiveness through synergistic inter-organizational activities carried out as disaster mitigation strategies.

### ***Determinants of Resilience***

While much progress has been made in thinking about resilience, a broad consensus on key factors explaining resilience has yet to be reached. In terms of community resilience, for instance, most of the progress has been made in identifying the abilities of communities to recover from disasters. Based on the institutional and governance perspective, the next section examines factors contributing to resilience, including: social vulnerability, social capital, social support and engagement, and grass-root participation in disaster planning.

The relationship between social vulnerability and resilience has received much attention in the disaster literature (Cutter et al., 2003; Tobin and Whiteford, 2002; Pfefferbaum et al., 2007; Norris et al., 2008). Flanagan and Gregory (2011) argue that during disaster events, socially vulnerable communities are more likely to be adversely affected by disasters, which lowers their level of community resilience. Norris et al. (2008) note that “differential risk is all the more striking from a global perspective because disasters are disproportionately likely to strike economically developing or poor countries (De Girolamo and McFarlane, 1996).” A longstanding presumption among scholars is that communities without adequate resources and/or with a higher level of social vulnerability are not only at greater risk for severe damages and victims but will also struggle to mobilize resources after disasters. Quarantelli (1994) also warned that industrialization and urbanization across communities and countries increase social vulnerability resulted from the devastated consequences of increasing disasters especially in developing countries.

Another important determinant of resilience is social capital. The relationship between resilience and social capital is based on the idea that communities make investments in social relations in order to gain access to information and resources. The interactions developed through a network of personal ties allow a community to gain social support and thus increases a community’s ability to cope with disasters. The tangible benefits can be realized when social support derived from such interactions can establish a sense of belonging (Uphoff 2000). Social capital is also important for providing access to resources and allowing communities to reciprocate support as well as transmit reliable information (Norris et al. 2008; NRC 2009). The information regarding actual or potential resources provided by communities offers significant advantages (Kapucu 2006; Kapucu et al., 2008). Norris et al. (2008) and Kapucu et al. (2010), for example, indicate that social capital based on credible information are preconditions that are crucial for community competence. It implies that competencies developed through interorganizational relationships can generate substantial benefits of joint efforts, articulateness, and participatory

decision-making at the organization level.

Under the umbrella of social capital, network structures have been considered as sources of community resilience. Goodman et al. (1998) argued that the presence of interorganizational networks enables communities to build mutual interactions and new types of association for cooperative decision-making processes. Schoch-Spana (2008) noted that an existence of interorganizational networks significantly has enhanced mutual trust among actors who need timely assistances. More specifically, Longstaff (2005) asserts that structural holes such as keystones or hubs within interorganizational networks play an important role in securing social capital. Despite structural benefits of clustered networks, there are conflicting views to social capital emerged from interorganizational networks. Allenby and Fink (2005) highlight the importance of redundancy for connective functions, suggesting that the efficiency of network structures may hinder community resilience if the structural holes disappear.

A third determinant is linked closely with the social capital argument—the importance of social support such as community engagement and citizen participation. Social support refers to voluntary interactions of individuals with actual assistance in “a web of social relationships perceived to be loving, caring, and readily available in times of need” (Norris et al., 2008, p. 138). Berke and Campanella (2006), for example, argued that resilience can be enhanced through the process of response and recovery planning where a more diverse population voicing their preferences help rebuild their community. Pfefferbaum et al. (2007) indicate that social support is a meaningful, deliberate, and collective action to remedy the consequences of disasters. That is, social supports serve an important function when individuals help similar others to make decision about appropriate behaviors (i.e., emergent norms) (Fritz and Williams, 1957).

Another important determinant is the engagement of community members in providing the social support. Community involvement is important because the pattern of mobilizing intangible resources generally correlates positively with community resilience (Norris et al., 2006; Berke and Campanella, 2006; Pfefferbaum et al., 2005). Maton and Salem (1995) argue that an empowered and engaged community is related to the presence of strong leadership and provided opportunities for members to play meaningful roles in supporting similar others during disasters. Moreover, Goodman et al. (1998) and Pfefferbaum et al. (2005) note that citizen participation such as mutual interactions and shared values is widely believed to be a key for community resilience, which requires active grass-roots leadership and local mobilization.

## **Empirical evidence**

The literature on resilience can be divided into qualitative and quantitative research. Qualitative studies involving the use of interviews and focus groups are extensively used in the social science disaster literature. One advantage of this type of research is that it provides detailed features about community preparedness (Ainuddin and Routray, 2012; Manyena, 2014), response and recovery (Crichton et al., 2009), and hazard mitigation (Joerin et al., 2012; Aldrich, 2012). These details can be useful to assess the effectiveness of factors that explain community resilience, and thus qualitative studies have been a good source of information to resilience research. Despite the usefulness of qualitative research, the generalization is limited by the notion that such studies have very selective sample sets. This then results in studies that are not generally comparable, and so



the ability to of researchers to conduct met-analyses across multiple cases is limited. The quantitative approach to resilience research has attempted to build direct measurements of factors to explain sources of resilience, which have been generally collected from surveys and demographical data sets.

### ***Qualitative research***

Crichton et al. (2009) identify recurring themes from lessons learned that can be widely applied to enhancing organizational resilience. By reviewing reports relating to seven disasters that have occurred in the United Kingdom, New Zealand, and the Netherlands, their research proposed eight recurring themes for enhancing resilience: (1) emphasizing the process of emergency preparedness; (2) understanding the reference accidents; (3) aligning the safety culture throughout emergency response systems; (4) understanding the purpose of command and control; (5) communicating with the public; (6) attending to welfare long term; (7) training responders in non-technical skills; and (8) assuring capability and availability of resources. These themes provide guidance to relevant parties within organizations such as emergency managers and technical assistants.

Ainuddin and Routray (2012) propose a framework to build the resilience of the communities prone to hazards and disasters by analyzing and reviewing the frameworks in the context of an earthquake prone area in Baluchistan. Based on the findings of an extensive research carried out on vulnerability and resilience assessment through a household questionnaire survey from 200 residents of Quetta city, their study found that a new framework for identifying community resilience can improve the community preparedness, awareness, and finally leading to community resilience at the local levels.

Joerin et al. (2012) compares the resilience of two communities in Chennai, India, which have similar exposure to natural hazards such as cyclones and river-based floods due to their close proximity to the sea. The results from a household survey that assessed the physical, social and economic resilience of individuals through a Climate-related Disaster Community Resilience Framework (CDCRF) show that people living in the vicinity of rivers and canals are at higher risk from impacts of floods compared to others. In addition, the results indicated that two communities in the study were not able to enhance their coping capacity due to their limited adaptive capacity. In collaboration with other stakeholders, community-driven participatory solutions were recommended for beneficial effects in enhancing the resilience of communities to climate-related disasters.

Aldrich (2012) presents a qualitative analysis of the ways in which social capital influences the pace and trajectory of post-disaster community recovery, and argues that social capital at the neighborhood level is an important asset to build resilience from a large-scale disaster. This research highlights that resilience is not a static descriptor of a community at a single point in time but is a process of development that occurs through concatenations of bonding, bridging, and linking networks by reviewing recovery efforts that followed the 1923 Tokyo earthquake, the 1955 Kobe earthquake, the 2004 Indian Ocean tsunami, and the 2005 Hurricane Katrina disaster.

Manyena (2014) argues that the traditional institution of chieftaincy in many parts of Africa could potentially offer lessons in the theory and practice of resilience to disasters, highlighting that the chieftaincy is the 'real' example of a resilient institution from which disaster resilience can

learn. By using the case study material from Zimbabwe, this research illustrates how the chieftaincy in Zimbabwe is continuously re-making, replenishing and adapting to the neo-liberal and post-Marxist agendas in order to remain relevant to the ever-changing socio-economic environment.

### ***Quantitative research***

Somers (2009) suggests a new paradigm that focuses on creating organizational structures and processes to build organizational resilience potential by measuring latent resilience in organizations. Specifically, a questionnaire including six factors capturing organizational resilience potential was used for the survey responded by public works directors in the Region VI of the American Public Works Association (i.e., the states of Arizona, New Mexico, Oklahoma, and Texas). The results show that community planning activities and managerial information seeking can explain latent resilience.

Sherrieb et al. (2010) attempted to measure the sets of adaptive capacities for social capital in the Norris et al. (2008) community resilience model with publicly accessible demographic indicators. By using Mississippi county data, they found support for correlations among their measure of communities' capacities that may predict a community's ability to bounce back from disasters.

Norris et al. (2009) examine the notion that resilience may be best understood and measured as one member of a set of trajectories that may follow exposure to trauma or severe stress by analyzing two large, population-based and longitudinal datasets collected after the 1999 floods in Mexico and the September 11, 2001 terrorist attacks in New York. The results in this research yield the strongest evidence for resistance, resilience, recovery, and chronic dysfunction, as these trajectories were prevalent in both samples.

Rivera and Settembrino (2012) propose a sociological framework of community resilience, which tests the effect of pre and post-disaster barriers and facilitators on resilience as a continuum of possible outcomes. By using social capital data from urban and rural communities in Central Florida, the study found that social trust as the source of community resilience are explained by race, gender, age, and income level and that overall most counties in both urban and rural areas reported similar high levels of social capital.

Andrew et al. (forthcoming), test the bonding and bridging hypotheses by using survey data collected during the 2011 Thailand floods. This research attempted to measure organizational resilience by using four dimensions: robustness, rapidity, resourcefulness, and redundancy, and found that the bonding strategy—which refers to organizations that closely collaborate with other organizations—has a positive effect on the perceived level of organizational resilience.

### **Discussion and Conclusion**

The conceptualized framework to studying resilience at the organizational level is still relatively new. Much of the current literature tends view resilience as either the capacities of a community or organization to prepare for disasters through joint planning, or as an outcome when responding to disasters or external shock. While the former reflects the importance of taking proactive actions in order to minimize the consequences of disasters, the later points to resilience as the performance

of an organization or community to withstand external shocks. While both conceptualizations of resilience present views that resilience can be studied through interorganizational and intergovernmental collaboration, they each have the following limitations.

First, on the issue of measurement, few empirical studies have been conducted at the organizational level to understand resilience, which makes it difficult to assess capacities of individual organizations and interactions among them. Even though organizational capacity (e.g., personnel and financial resource) can be objectively measured, organizational resilience cannot be captured solely by objective measures or attributes. This is because resilience, within the social-ecological systems, contains multiple feedback loops that interact in complex ways (Carpenter, 2003; Scheffer, 2004; Scheffer and Nes, 2007). While subjective assessments of resilience have been proposed and applied in field research, the reliability of the instrument is still not well tested.

Future research should explore the various ways to measure resilience such as quantitatively through primary data collection procedures as well as secondary data sources to best capture the concept of resilience. This line of work can contribute to the study of resilience and the performance of a community or organization. For example, it can reveal why certain organizations or communities are more resilient than others and thus, allow us to identify, assess, and weigh the strengths and weaknesses of a community's ability to respond to disasters.

Another limitation is on the issue of causality. In the social-ecological contexts of resilience, it is uncertain as to which factor is establishing an effect. For instance, in conducting research on resilience, it is difficult to separate the influence of institutions on the ability of organization to rebound from a major disaster without taking into account the dynamics of resilience. More recently, however, scholars have begun to pay attention on designing surveys and base their analysis using the social network analysis method. Others have emphasized the importance of processes and time dimensions in their analysis in order to test the causal relationship between patterns of interorganizational collaboration (i.e., sources of resilience) and the perception on organizational resilience.

Finally, future research should focus on outcomes of resilience over time, and thus building causality based on time points. This is because outcomes of resilience among organizations before, during, and after an event have not been explored nor measured to date. As reference to the four dimensions of organizational resilience, for example, its effectiveness has not been empirically tested. Although the dimensions developed by many scholars are intriguing, it has not been vigorously tested with a specific index over time. Future research should attempt to link factors before an event to tangible outcomes resulting from organizational resilience after the event.

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