Tweeting to (Selectively) Engage: How Government Agencies Target Stakeholders on Twitter during Hurricane Harvey

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The ability to manage a multitude of stakeholder relations has long been considered important for effective organizational crisis management. With stakeholder communication increasingly taking place on social media, however, it is less understood how organizations may selectively engage with multiple stakeholder groups ranging from citizens, nongovernmental organizations (NGOs), media, and businesses on this networked platform. Using Hurricane Harvey as a case study, the current study examines the stakeholder engagement practice on Twitter by 42 government and emergency management (EM) organizations across the three stages of this natural disaster. The analysis of the Twitter reply and mention networks suggests that government and EM organizations prioritize engaging with stakeholder groups including citizens, peer government agencies, and media during crisis. Stakeholder salience, indicated by a stakeholder's geographic location and online influence, is significantly related to the level of targeting activities on Twitter.

Keywords: stakeholder theory, crisis management, engagement strategies, multisector stakeholders

Social media have become an integral part of government-public communication (Tursunbayeva, Franco, & Pagliari, 2017). A recent survey indicates that 148 countries' national governments use at least one social media platform, such as Facebook and Twitter, for everyday government communication (United Nations E-Government Survey, 2016). During crises like emerging health epidemics and natural disasters, the ability for government to stay connected via social media is more pressing than ever. With crisis-related information seeking and dissemination increasingly mediated by social media (Austin, Liu, & Jin, 2012), government and emergency management (EM) organizations are therefore expected to harness these platforms to inform, mobilize, and coordinate action at various stages of a crisis (Houston et al., 2015).

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Date submitted: 2019–02–13

Although social media are often used by government agencies as a one-way, noninteractive communication channel to inform the public about crisis information (Graham, Avery, & Park, 2015), the networked feature of these platforms enables the formation of an ad hoc, multistakeholder communication network (Yates & Paquette, 2011)—that is, a communication network directed by government organizations to target and engage various stakeholders for crisis management. Defined as "any group or individual who can affect or is affected by the achievement of the organization's objective" (Freeman, 1984, p. 46), organizational stakeholders refer to a group of individuals or organizations that have a "stake" on issues or activities performed by the focal organization. In the current study, we refer to stakeholders as a multitude of individuals and organizations—ranging from average citizens, peer government agencies, news media, and corporations, to nonprofit organizations—that are affected by a crisis or that hold government organizations accountable for handling the crisis. When embedded in such a multistakeholder communication network, government organizations are not only in a position to optimize resource mobilization for disaster relief, but they are also expected to manage any discrepancies in crisis perceptions from different parties as well as diverging stakeholder expectations (Palttala, Boano, Lund, & Vos, 2012).

Recognizing the presence of multistakeholder influence on the crisis communication process, this study is one of the first to apply the stakeholder salience theory (Freeman, 1984; Mitchell, Agle, & Wood, 1997; Uysal, Yang, & Taylor, 2018) to explain public sector organizations' stakeholder management practices during a natural disaster, Hurricane Harvey. Hurricane Harvey severely struck the greater Houston area between late August and early September 2017, during which social media like Twitter were actively used by government and EM agencies for disaster management and stakeholder engagement. We posit that government organizations may implement a stakeholder engagement plan as predicted by the stakeholder theory (Freeman, 1984)—that is, making strategic selections about which stakeholders to engage. And such engagement decisions can be particularly influenced by the stage of a crisis, which makes certain stakeholders more salient than others. Stakeholder salience refers to the degree to which a stakeholder is perceived as prominent by the focal organizations, consisting of dimensions like urgency, power, and legitimacy (Mitchell et al., 1997). Instead of being a static attribute, the level of stakeholder salience is likely to vary across multiple crisis stages. To understand who the salient stakeholders are and how the salience of the same group of stakeholders may change over time, we first identify the variety of stakeholders engaged on Twitter via replies and mentions at pre-, during, and postcrisis stages. We then empirically test the relationship among stakeholder urgency, power, and the level of targeting activities, arguing that because public attention and organizational resources are both limited, the frequency and relative proportions of stakeholder targeting activities may reflect the varying levels of stakeholder salience as perceived by the focal government and EM organizations.

The rest of the study is organized as follows. First, we review the literature on stakeholder theory in the context of crisis management, hypothesizing that the salience of multiple stakeholders may change across different stages of a crisis. Second, we argue that the communication network constructed by government agencies on Twitter—through the use of mentions and replies—can be conceptualized as a form of proactive and reactive stakeholder management. Tweets were collected from 42 government and EM organizations' official Twitter accounts between August 21 and September 8, 2017. Findings and practical implications of using social media for stakeholder engagement are discussed in the end.

Stakeholder Theory and Multistakeholder Networks

Stakeholders are those who can make legal, moral, or presumed claims about an organization (Mitchell et al., 1997). It is therefore of vital importance for the focal organization to meet stakeholder expectations and manage various stakeholder interests from a business ethics, relationship management, and resource acquisition standpoint (see Scholl, 2001, for a comprehensive review of these perspectives).

Emanated from strategic management research, stakeholder theory was first developed in the corporate sector to explain how firms should engage in relationship building with various stakeholders (Freeman, 1984), and how a network of stakeholders may cast influence on organizational behaviors (Rowley, 1997). Recent application of the theory has been extended to the public sector, and it is argued that this theoretical framework is particularly compatible with the decision-making process in the context of e-government and relationship building (Flak & Rose, 2005; Scholl, 2001). Flak and Rose (2005), for example, contend that public governance can be conceptualized as the management of relationships and interests of societal stakeholders ranging from peer governmental agencies, external citizen stakeholders, and businesses, to nonprofit organizations. Under the backdrop of government budget cuts and the privatization of the public sector, the impact of societal stakeholders may loom larger when government agencies are increasingly expected to run like businesses (Box, 1999). Furthermore, the process of delivering public service entails collaboration with multisector organizations (Kim & Liu, 2012; Liu & Horsley, 2007), which situates government organizations within a multisectoral collaboration network on a daily basis. Within such a network, multiple and often conflicting stakeholder interests are constantly interrogated, negotiated, and prioritized by public sector organizations.

Organizations often need to strategically prioritize diverse stakeholder groups under resource constraints and other practical considerations (Mitchell et al., 1997). Existing literature provides multiple ways to identify and categorize stakeholder groups, such as dividing stakeholders into primary-secondary (e.g., Ulmer, 2001), internal-external (e.g., Goodpaster, 1991), cooperative-threatening (e.g., Savage, Dunkin, & Ford, 2004), or placing stakeholders on a continuum of power, legitimacy, and urgency (e.g., Mitchell et al., 1997). Among these typologies, one of the most used categories is primary versus secondary stakeholders. Primary stakeholders are those that have direct and formal relationships with the focal organizations, such as a firm's employees, suppliers, or clients (Buysse & Verbeke, 2003); whereas secondary stakeholders typically include societal groups or "pressure groups" (Fassin, 2009, p. 114) such as media, NGOs, and governmental regulators. These stakeholders do not directly engage in transactional relationships with the focal organization but can make moral claims (Ulmer, 2001).

The typology of primary-secondary stakeholders, however, is less applicable in the context of crisis management by public sector organizations. First, as government agencies are expected to serve all sectors of a society during a crisis, the dichotomy of primary-secondary stakeholders is not adequate to capture the complexity of various actors involved. Moreover, because stakeholder identification and categorization are heavily issue and context dependent (Roloff, 2008), an organization's secondary stakeholders during the regular time may well become primary stakeholders surrounding a specific issue or crisis.

Therefore, the current study adopts Roloff's (2008) concept of "issue-focused multi-stakeholder network" (p. 239) to conceptualize various stakeholders involved in a crisis. In such a network, actors from business, civil society, and public sectors come together to collectively contribute to the solution of a problem or social issue. Such multistakeholder networks have long been present in disaster reliefs around the globe, such as during the 2011 East Japan tsunami (Minato & Morimoto, 2012), the 2015 Nepal earthquake (Daly, Ninglekhu, Hollenbach, Barenstein, & Nguyen, 2017), and the 2013 typhoon in the Philippines (Lai, She, & Ye, 2019). Below, we discuss stakeholder management practices in the context of crisis in detail.

Stakeholder Management During Crisis

During everyday operations, organizations are typically more devoted to managing certain stakeholder relationships that directly impact their daily operations (Ulmer, 2001). However, crises may alter such dynamics. Alpaslan, Green, and Mitroff (2009) argue that crises may significantly shift the importance of key stakeholders compared with that of regular times. For example, the otherwise-dormant stakeholders, such as environmental NGOs and activist groups, gained salience when the oil company BP got involved in an oil spill crisis (Preble, 2005).

Indeed, the capacity for organizations to effectively engage different types of stakeholders plays a crucial role in crisis management across different stages of a crisis (Ulmer, 2001). During natural disasters, the eruptive situation can place severe strains on government organizations' ability to mobilize resources necessary for disaster relief. Crisis scholars argue that an organization's ability to manage crises depends largely on the accuracy of the focal organizations' knowledge concerning its stakeholder behaviors in the context of crises (Alpaslan et al., 2009). Such knowledge first includes the identification of specific stakeholders involved in a crisis and the understanding of how to prioritize these stakeholders based on their issue stance, influence, and urgency (McDonald, Sparks, & Glendon, 2010).

Managing stakeholder relations has long been considered resource intensive, as the building and maintenance of relationship calls for long-term investment in human and communication resources (Dozier, Grunig, & Grunig, 2013). Stakeholder theory posits that because such resource constraints as well as diverse stakeholder interests, organizations are not able to respond to the entire spectrum of stakeholders or every single stakeholder claim (Mitchell et al., 1997). Instead, organizations would selectively respond to stakeholders or their claims that stand out as "salient." Stakeholder salience thus may operate as an important mechanism that governs organizations' stakeholder management strategies.

Defined as the degree to which a stakeholder is prioritized over other competing stakeholders (Mitchell et al., 1997; Uysal et al., 2018), stakeholder salience is theorized to consist of the following three dimensions: urgency, power, and legitimacy. Urgency refers to the degree to which the claims made by the stakeholders "call for immediate attention" (Mitchell et al., 1997, p. 866), and this dimension encompasses both time sensitivity and location specificity in a sense that urgent stakeholder claims are likelier to contain specific time markers and come from stakeholders who are geographically proximate. Meanwhile, power refers to the ability of a stakeholder to cast control or to dominate the broader stakeholder communities. The power of stakeholders may derive from their ability to mobilize tangible social and economic resources, as well as their virtual influence powered by information and communication technologies (Jurgens, Berthon,

Edelman, & Pitt, 2016). Finally, legitimacy is defined as a perception that the actions of the stakeholder are "desirable, proper, or appropriate within some socially constructed systems of norms, values, beliefs, and definitions" (Mitchell et al.,1997, p. 866).

Studies have found that stakeholders with higher levels of salience, indicated by urgency, power, or legitimacy, are likelier to be prioritized by focal organizations in various contexts. For example, Uysal, Yang, and Taylor (2018) applied the stakeholder salience framework to examine corporate responses to shareholder activism surrounding environmental issues, and they found that the urgency of stakeholder requests, operationalized as stakeholder demand that contained a specific time frame for change, was a significant predictor of corporate responses to stakeholder activism. Mojtahedi and Oo's (2017) review of literature suggests that, in both proactive and reactive disaster management, the three attributes can help focal organizations better identify pivotal stakeholders and develop effective mitigation, preparedness, response, and recovery practices.

Having discussed the general theoretical principles of managing stakeholders during various stages of a crisis, the next section focuses on an emerging form of stakeholder management on the platform of social media, specifically Twitter, by utilizing the platform's networking capacity.

Conceptualizing Social Media-Based Stakeholder Engagement

Social media have increasingly been integrated as part of government organizations' crisis communication. A recent survey of 300 local government officials showed a highly receptive attitude of using social media for crisis management, and the level of social media used was positively associated with the ability to control a crisis as well as the evaluation of crisis responses (Graham et al., 2015). From the standpoint of online crisis information seeking, government organizational accounts like the Center for Disease Control and Protection remain as the top channel among the publics, highlighting the critical need for crisis managers to inform the public through social media and other online platforms (Freberg, Palenchar, & Veil, 2013).

More than a one-way channel for information broadcasting, the network feature of social media has been particularly noted for enabling interactive engagement between organizations and their stakeholders (Lovejoy, Waters, & Saxton, 2012; Taylor & Kent, 2014). On the platform of Twitter, specifically, Lovejoy and colleagues (2012) identified a number of ways in which organizations could use Twitter to engage stakeholders, such as using hyperlinks, replying to public messages, retweeting message to facilitate speedy diffusion, and using hashtags to building online issue communities. Saxton and Guo (2014) further refer to a range of online behaviors that are intentionally directed at specific stakeholders as "stakeholder targeting" (Saxton & Guo, 2014, p. 288), a strategic practice that aims to deliver curated content to a selected stakeholder group. As they explain,

> An organization's creation and delivery of web content represents a key component of the organization's stakeholder relations, and 'stakeholder management' . . . by targeting online content at specific stakeholders, an organization is signaling its commitment to [those] stakeholders in a visible way. (Saxton & Guo, 2014, p. 288)

The unique characteristics of Twitter enable organizations to target selected stakeholders through "mentions" and "replies," allowing an organization to intentionally engage with one or multiple users when composing a tweet. Although both practices involve the use of tagging (i.e., the use of @), Twitter replies and mentions represent two distinctive relations. Specifically, Twitter replies are best conceptualized as a flow relation, characterized by the exchange or transmission of information (Shumate & Contractor, 2013). In the context of social media–based disaster management, replies create a feedback loop for organizations to respond to stakeholder questions and requests, and to fulfil the public's information needs about the disaster. Such engagement practices thus create a shared conversation context, albeit in an ad hoc fashion that may not be available otherwise. The shared conversation context helps establish common ground, promote mutual understanding, and invite direct participation and contribution from the targeted stakeholders (Taylor & Kent, 2014).

Meanwhile, Twitter mentions, as they are less about reciprocal information exchanges, best indicate a representational relation (Shumate & Contractor, 2013) or "representational communication" (Shumate & O'Connor, 2010, p. 584). That is, such communication is not just intended for the other party directly involved in the action but also strategically positioned to signal to the greater public or the third-party stakeholders about interorganizational alliances, joint action commitment, or moral support. In disaster management, such effort can be particularly important to communicate accountability and mobilize action from the wider community affected (Doerfel, Chewning, & Lai, 2013).

Research Questions

Existing research proposes several recommendations for organizations using social media to manage stakeholder relations during crises. At the early stage of the crisis, it is of utmost importance to build rapport with a wide range of stakeholders (Heath & Gay, 1997; Ulmer, 2001; Veil, Buehner, & Palenchar, 2011). At this stage, social media like Twitter can be used to monitor stakeholder reactions and maintain active stakeholder engagement. During the actual crisis event, the organizational priorities may shift from information provision to direct resource mobilization, which has been found to rely heavily on existing partnership networks (Doerfel, et al., 2013). Veil and colleagues (2011) recommend disaster management organizations to partner with stakeholders, such as average citizens and peer collaborative partners, to provide real-time information sharing. At this stage, social media may also serve as an effective tool for organizations to coordinate among key stakeholders. At the postcrisis stage, the relationships with news media are particularly noted. Although it is important to remain accessible to media throughout the entire course of the crisis, the action of engaging both mainstream and alternative media can be particularly helpful in bringing community together after a crisis.

Based on the changing organizational priorities and crisis communication strategies outlined above, we posit that government organizations' stakeholder targeting practices on social media are likely to vary. Specifically, the life cycle of a crisis, commonly referred to as the three stages of crisis model and consisting of pre, during, and postcrisis (Houston et al., 2015), may influence stakeholder salience and the subsequent stakeholder targeting practices on social media. In the current study, the extent to which a group of stakeholders are prioritized by the focal organizations is examined through the frequency and the relative proportion of Twitter replies and mentions activities directed toward one group of stakeholders versus the

rest. We develop such an operationalization based on the following rationales. First, although social media arguably lowers the cost for organizations to reach and engage various stakeholders (Veil, Buehner, & Palenchar, 2011), the focal organizations still face resource constraints in the digital space. More frequent interaction with selected stakeholders on Twitter thus means that the focal organizations devote more time, communication space, and human resources to initiate dialogue and build relations with them. Second, public attention on Twitter is limited (Webster & Ksiazek, 2012). The number of tweets used to engage with one type of stakeholders presumably depletes the scarce public attention and organizational resources that could have been used to engage with another group of stakeholders.

Taken together, we propose the following two research questions to empirically assess how different stakeholder groups are prioritized by government agencies across different stages of Hurricane Harvey, and how the salience level of stakeholders may be related to the amount of Twitter targeting activities:

RQ1:   *Which group(s) of stakeholders are most engaged by government and EM organizations via Twitter replies and mentions across different stages (i.e., pre, during, and postdisaster) of Hurricane Harvey?*

RQ2:   *How is stakeholder salience related to the amount of Twitter replies and mentions sent by government and EM organizations across different stages (i.e., pre, during, and postdisaster) of Hurricane Harvey?*

Methods

Data Collection

The study included 42 government organizations that actively used Twitter's mentions and replies to engage stakeholders at pre, during, and postcrisis stages of Hurricane Harvey. According to the Federal Emergency Management Agency (FEMA, 2017), the official incident period was declared between August 23, 2017 and September 15, 2017. To capture the three stages of the crisis, August 21 through August 24, 2017 was categorized as the precrisis stage. It should be noted that although the tropical storm was formed on August 17, it did not enter public or media agenda until August 21, 2017, corroborated by the finding that almost no media coverage or social media discussion about the incident was found before August 21. The time between the landfall of Harvey on August 25 and September 1, 2017, was categorized as the during crisis stage. September 2 till September 8, 2017, the week after the major rainfall and flooding, was categorized as the postcrisis stage.

The final organizational list was compiled using the following steps. First, the authors identified all government organizations operating in the disaster-impacted regions, based on the disaster declaration map released by FEMA (FEMA, 2017). This produced a total of 74 government organizations, including 26 city governments, four county governments, one state government, three federal agencies, 25 first-responder organizations, and 15 Offices of Emergency Management (OEMs).

Among the 74 government organizations, 67 had an active Twitter presence during Hurricane Harvey. After obtaining those organizations' Twitter usernames, the authors used a customized Python script to collect tweets sent by the active organizational accounts via Twitter's public API. Then, Twitter Subgraph

Manipulator (Freelon, 2014), a Python module, was used to extract a social network based on Twitter mentions and replies. The module scans tweets that contain the @ symbol (which is the symbol for tagging users in mentions and replies) and constructs a network so that two users are connected when one user mentions or replies to (or is mentioned by or replied to by) another. Forty-two organizations from the sample were identified using Twitter mentions and replies during the study period. The remaining 25 organizations used Twitter for one-way broadcasting only and thus were excluded.

Across the three stages of the crisis, 24 active accounts sent 128 mentions or replies at precrisis stage; 39 active government organizations sent a total of 2,560 mentions or replies during the crisis; and 33 active government organizations sent 477 mentions or replies at the postcrisis stage. The unit of analysis was each unique individual stakeholder engaged via Twitter mentions or replies.

Measurements

Number of Replies of Each Stakeholder. The number of Twitter replies each unique stakeholder received from the selected government and EM organizations was collected for each disaster phrase. The average number of replies at predisaster stage was 1.10 (SD = .03), 1.67 (SD = 2.22) at during disaster stage, and 1.57 (SD = 2.27) at postdisaster stage.

Number of Mentions of Each Stakeholder. The number of Twitter mentions each stakeholder received from the selected government and EM organizations was collected for each disaster phrase. The average number of mentions at predisaster stage was 1.52 (SD = 1.46), 4.64 (SD = 14.09) at during disaster stage, and 1.79 (SD = 1.98) at postdisaster stage.

Stakeholder Urgency. Urgency of each stakeholder was measured by a dichotomous variable that indicated whether the stakeholder was geographically located in the state of Texas. Since natural disasters are highly location specific, it is plausible to assume that local stakeholders have higher levels of urgency than nonlocal ones. Approximately 54.6% (N = 740) of stakeholders that received Twitter replies were identified as local stakeholders (i.e., high urgency), whereas 73.1% (N = 207) of stakeholders receiving mentions were local stakeholders.

Stakeholder Power. Each stakeholder account's follower-following ratio was collected as an indicator of power. Although such a measure is not equivalent to other offline measures, such as prestige or the amount of resources stakeholders possess, it is still considered a valid proxy of online influence, which is often correlated with offline power (e.g., Anger & Kittl, 2011; Xu, Sang, Blasiola, & Park, 2014). Because of the uneven distribution of this variable, stakeholder power was further divided into four quartiles, where 1 represented the stakeholders who had the lowest 25% of follower-following ratio, and 4 represented those who had the highest 25% of follower-following ratio.[1]

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[1] The third dimension of stakeholder salience, legitimacy, was not operationalized, as it did not apply to stakeholders of public sector organizations.

Data Analysis

Profile analysis of Twitter users was first conducted to develop major stakeholder categories. A total of 1,838 stakeholder profiles were identified, and their public biographic information on Twitter was downloaded. To inductively develop stakeholder categories specific to the current disaster context, the authors first consulted the training material from FEMA's Emergency Management Institute (2017), including eight stakeholder groups ranging from (1) local, state and federal government agencies, (2) citizens, (3) media, (4) businesses and corporations, (5) educational institutions, (6) nonprofit and community organizations, (7) contractors, to (8) associations and other collaborative partnerships. During the pilot coding phrase, the authors further adapted the eight categories to fit the multitude of actors identified from the sample tweets, producing nine exhaustive and mutually exclusive stakeholder types as Table 1 shows.[2] Based on the final coding scheme, all profiles were hand-coded between two trained coders and achieved an acceptable level of intercoder reliability (Percent Agreement = 90.18%, Cohen's Kappa = .86). All coding discrepancies were reconciled after the two coders reached consensus.

Table 1. Codebook for Categorizing Different Stakeholder Types.

Stakeholder Type	Description
Media	• Mainstream media organizations–formal organizational accounts of media organizations that have a digital and nondigital presence • Online-only media organizations–blogs, news portals, websites, or journalistic entities • Media workers–including reporters, editors, producers, TV anchors, etc.
Nonprofits	• Official accounts of organizations of NGOs, nonprofits, advocacy groups, and any voluntary organizations • Individual accounts of people working in the voluntary sector
Weather experts or enthusiasts	• Weather channels, weather section of mainstream media outlets • Meteorologists, storm hunters/chasers, climate scientists, and self-proclaimed weather junkies • Weather service provided by government organizations (e.g., NWS)
Political and governmental actors	• The accounts of individuals or organizations who are known primarily for their relationship to legislative bodies, various (domestic and foreign) government agencies (e.g., police department, fire department, public works, OEM, etc.,) and public service providers (e.g., municipal infrastructure, public healthcare provider)
Celebrities & Athletes	• Musicians, sport teams, and athletes
Average citizens	• "Regular" people who do not belong to the other categories
Education	• Organizational accounts of schools, universities, libraries, and school districts • Individual accounts of teachers, professors, principals, superintendents, etc.
Businesses	• Individuals or organizations that provide business, product and commercial services, including private health-care providers and local facilities such as airports, event venues and convention centers
Others	• Private accounts • Deleted accounts

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[2] Weather channels were grouped together with weather experts and enthusiasts as the former's only function was to provide weather updates. They were distinguished from media, as the latter also served as "pressure groups" and built community via storytelling.

A total of 2,196 reply and 969 mention relationships were identified from all stakeholder targeting activities. To analyze how reply and mention relationships varied across different stages (RQ1), a series of cross-tabulations with chi-square tests and ANOVA were first conducted. To assess the relationship between stakeholder salience—indicated by stakeholder urgency and power—and the levels of targeting activities at each disaster stage (RQ2), independent sample t-tests and ranked order correlations were performed.

Results

Top Stakeholders Targeted Across Each Stage

RQ1 sought to identify major stakeholders that were frequently replied to versus mentioned by government and EM organizations across each stage of Hurricane Harvey. Among all reply relationships throughout the disaster, the stakeholder groups that were most frequently replied to were average citizens (N = 1,171, 53.32% of all reply relationships), followed by government agencies (including both governmental officials' individual accounts and agencies' organizational accounts, N = 360, 16.39%) and media organizations (N = 304, 13.84%). Meanwhile, the most frequently mentioned stakeholder groups throughout all disaster stages were government agencies (N = 692, 48.43% of all mention relationships), businesses (N = 73, 7.53%) and nonprofit organizations (N = 58, 5.99%; see Figures 1 and 2).
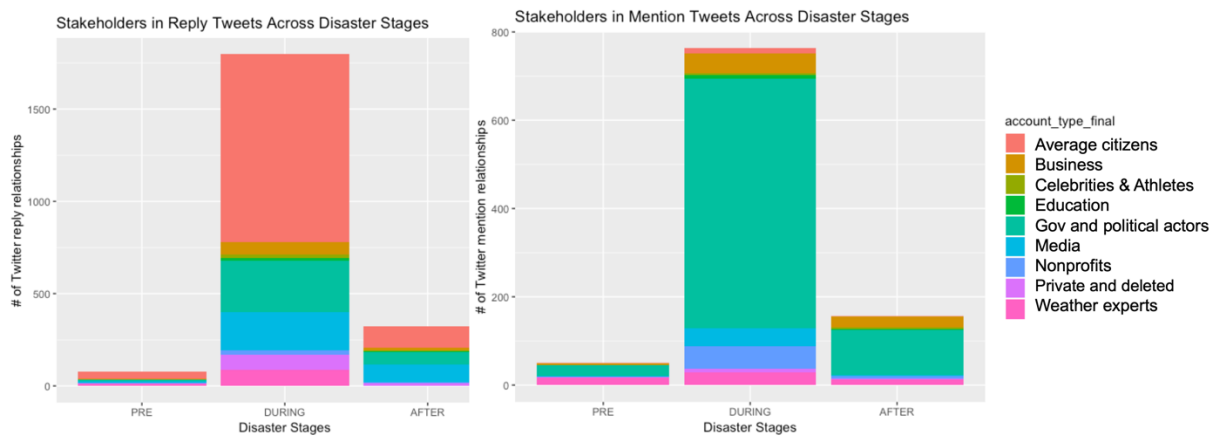

Figure 1. The number of tweets in reply to versus mentioning different stakeholders across the three stages of Hurricane Harvey, with colors indicating the nine stakeholder types.
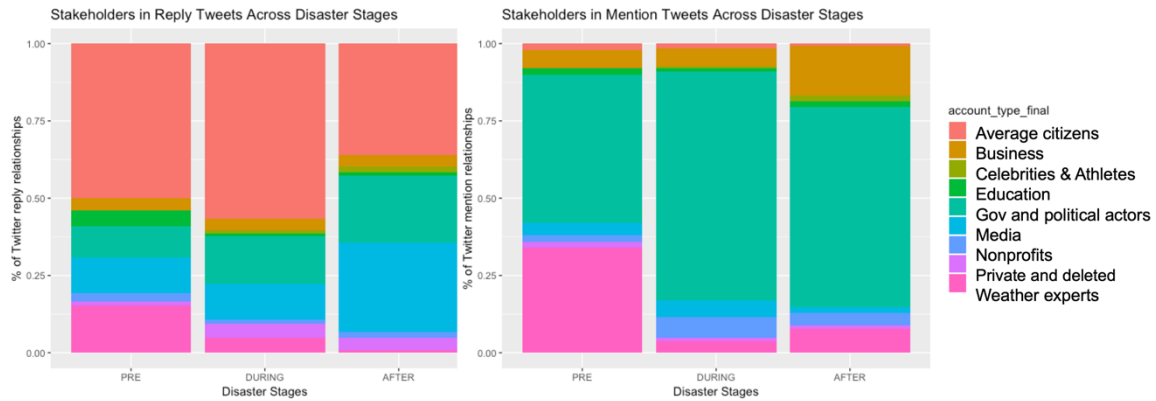
Figure 2. A breakdown of the relative proportion of tweets in reply to versus mentioning the nine types of stakeholders targeted across the three stages of Hurricane Harvey.

Figure 3 visualizes the Twitter reply and mention networks across the three disaster stages, with various stakeholders aggregated into nine groups. In these networks, tie strength indicated the frequency at which a particular group of stakeholders were targeted by the selected government and EM agencies. A comparison of reply and mention networks showed that the precrisis stage was characterized by a relatively small and sparse stakeholder network. During crisis, the targeting networks significantly expanded in size and density, indicating that both reply and mention activities reached peak levels. Shortly after the crisis, the total volume of stakeholder targeting activities decreased substantially. Consistently with the percentage analysis above, Twitter replies were largely sent to average citizens, media, and government agencies across the three stages, whereas government agencies dominated mention relationships.
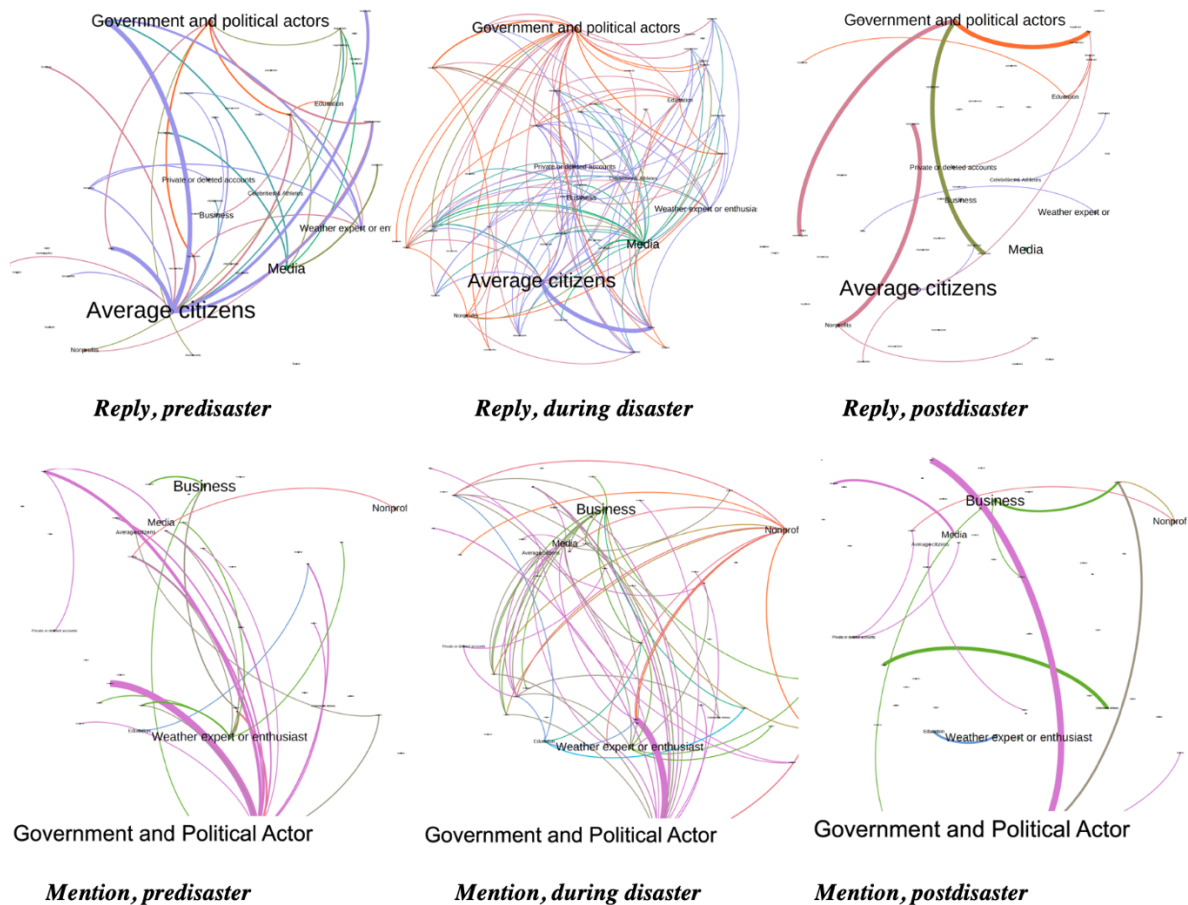
Figure 3. Stakeholder reply versus mention network by stakeholder type across the three stages of the Hurricane Harvey.[3]

To compare whether various stakeholder groups were targeted at different levels before, during, and after the disaster, a series of one-way ANOVA were run. At predisaster stage, the average number of Twitter replies ($F_{(8, 63)}$ = 1.82, p = .10) or mentions ($F_{(8, 25)}$ = .31, p = .95) did not significantly differ across stakeholder groups. During the disaster, significant differences did emerge with regard to the average number of replies each group of stakeholders received ($F_{(8, 1070)}$ = 8.00.82, p = .00), but not with the level of mentions ($F_{(8, 154)}$ = .57, p = .80). Bonferroni post hoc tests revealed that on average, government agencies (M = 2.95, SD = 4.21) and media organizations (M = 2.71, SD = 5.18) were replied to significantly more frequently than citizen groups (M = 1.40, SD = 1.14). Immediately after the disaster, media became the

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[3] All three networks included 42 seed government and EM organizations and the targeted stakeholders. Tie thickness indicated the frequency at which each stakeholder type was replied or mentioned.

stakeholder group that was most frequently replied to (M = 3.83, SD = 6.08), and the average number of replies were significantly higher than that for government agencies (M = 1.49, SD = .83) or citizen groups (M = 1.16, SD = .44, F (8, 196) = 3.87, p = .00). Meanwhile, no significant difference was observed for the average number of mentions across different stakeholder groups (F (8, 78) = .73, p = .66) postdisaster.

　　　　Chi-square analyses further revealed how the targeting priority may shift even within the same group of stakeholders across stages (see Table 2). In terms of the level of Twitter replies, average citizens (χ^2 (2) = 45.90, p < .001), media (χ^2 (2) = 69.21, p < .001), weather experts and enthusiasts (χ^2 (2) = 30.45, p < .001), peer government agencies (χ^2 (2) = 9.65, p < .01), and educational institutions (χ^2 (2) = 16.07, p < .001) were engaged significantly more frequently during the disaster than before or immediately after the disaster. Meanwhile, the level of Twitter mentions showed similar stage-based variations only for government agencies (χ^2 (2) = 19.97, p < .001), weather experts and enthusiasts (χ^2 (2) = 77.01, p < .001), and businesses (χ^2 (2) = 19.25, p < .001). The level of Twitter mentions did not significantly differ for other stakeholder groups across different stages. Finally, Gini coefficient, a coefficient indicating the inequality among values of a frequency distribution (Dorfman, 1979), indicated that government agencies are likelier to prioritize certain stakeholders through Twitter mentions and replies during a disaster than before or after the disaster (see Table 2 for the specific coefficient of each stage).

Table 2. Chi-square Tests for Stakeholder Groups Reply versus Mention Frequencies Across Disaster Stages.

	Reply Relationships (N = 2,196)				Mention Relationships (N = 969)			
	Predisaster	During Disaster	Postdisaster	χ^2	Predisaster	During Disaster	Postdisaster	χ^2
Media	9	203	92	69.21***	2	40	3	3.27
Nonprofits	2	24	6	1.23	1	51	6	3.34
Weather experts or enthusiasts	12	87	3	30.45***	17	29	12	77.01***
Political and governmental actors	8	282	70	9.65**	24	567	101	19.97***
Celebrities & Athletes	0	19	6	2.53	0	4	3	3.92
Average citizens	39	1016	116	45.90***	1	11	1	.80
Educational institutions	4	13	3	16.07***	1	8	3	1.06
Businesses	3	69	12	.01	3	45	25	19.25***
Other	1	84	13	2.17	1	8	2	.41
Gini coefficient	.59	.64	.59		.66	.72	.70	
Total	78	1,797	321		50	763	156	

Stakeholder Salience and Targeting Levels Across Stages

　　　　To test how stakeholder salience was related to the level of targeting activities (RQ2), a set of independent sample t-tests were run to compare whether local stakeholders, a proxy measure of stakeholder urgency, were likelier to receive Twitter replies or mentions (Table 3). Results suggested that during disaster, local stakeholders (M=1.93, SD = 2.85) received significantly more replies than nonlocal stakeholders (M=1.37, SD = 1.10, t (751.46) = 4.34, p = .000). And the same pattern continued for the postdisaster stage in terms of Twitter replies (M=1.84, SD = 2.87 for local stakeholders, and M=1.15, SD = .48 for nonlocal stakeholders, t (133.27) = 2.63, p = .01). However, stakeholder urgency was not significantly related to the level of Twitter mentions in any of the disaster stage.

Table 3. The Relationship between Stakeholder Urgency and the Level of Twitter Replies versus Mentions Across Disaster Stages.

	Replies			Mentions		
	Local	Nonlocal	Independent sample *t*-test	Local	Nonlocal	Independent sample *t*-test
Pre	M=1.07, SD = .25	M=1.16, SD=.37	t (35.9) = -1.14, p = .26, Cohen's d = .29	M=1.70, SD = 1.72	M=1.10, SD = .32	t (31) = 1.08, p = .29 Cohen's d = .49
During	M=1.93, SD = 2.85	M=1.37, SD=1.10	t (751.46) = 4.34, p = .000*** Cohen's d = .26	M=5.07, SD = 15.58	M=2.88, SD = 3.96	t (161) = .79, p = .43 Cohen's d = .19
Post	M=1.84, SD = 2.87	M=1.15, SD=.48	t (133.27) = 2.63, p = .01** Cohen's d = .34	M=1.74, SD = 1.30	M=1.88, SD = 2.74	t (85) = -.34, p = .74 Cohen's d = .07

Note. Stakeholder urgency is operationalized as whether a user is located in the state of Texas (local) or not (nonlocal).

Spearman-ranked order correlation was calculated between stakeholder power—operationalized as a four-quartile measure based on the ratio of Twitter follower-following—and the level of replies and mentions. Results suggested that stakeholder power was positively and significantly related to the level of replies stakeholders received from the selected government and EM organizations both during (r_s = .13, p = .000) and after the disaster (r_s = .22, p = .002), and the magnitude of association was stronger at postdisaster than during disaster phrase. Meanwhile, power was only significantly related to the level of mentions during disaster (r_s = .22, p = .006).

Table 4. Spearman Ranked Order Correlation Between Stakeholder Power and the Level of Twitter Replies versus Mentions Across Disaster Stages.

	Replies	Mentions
	Power	Power
Pre	r_s = .03, p = .795	r_s = .05, p = .783
During	r_s = .13, p = .000***	r_s = .22, p = .006**
Post	r_s = .22, p = .002**	r_s = -.04, p = .73

Discussion

Using a stakeholder theory of crisis management, the present study examines how government and EM organizations selectively targeted and engaged diverse stakeholders via Twitter's mentions and replies. It conceptualizes this social media–based targeting practice as a strategic stakeholder management process, through which the focal organizational community—in our case, the government and EM organizations managing the disaster of Hurricane Harvey—proactively and reactively responded to various stakeholders. Throughout multiple stages of the crisis, the current analysis identifies significant changes in terms of the types of stakeholders targeted, a finding consistent with a dynamic view of stakeholder management (Alpaslan et al., 2009). When an eruptive event like Hurricane Harvey takes place, the process of stakeholder management starts with the very initial stage of crisis planning—evidenced by the active involvement of weather experts

and professional organizations before the hurricane via mentions—to an intensive period of sharing information and coordinating among citizens, media, and other public sector partners during the crisis, to prioritizing media organizations in order to foster strong organization-media relationships postcrisis. Furthermore, the current study delineates two distinct stakeholder-targeting activities on Twitter: replies versus mentions. The results suggest that different targeting activities tend to prioritize different stakeholder groups. For example, citizen groups and media are likelier to be targeted via replies, confirming such relationships are best conceptualized as information flows. Meanwhile, peer government agencies dominated mention relationships, suggesting that Twitter mentions are likelier to play the role of action mobilization and representational communication. Finally, the current study empirically tests the relationship between stakeholder salience and the level of targeting activities, suggesting that organizational stakeholder engagement decisions are rarely random; decisions like whom to engage and how frequently to engage them are subject to the relative salience of different stakeholders (Uysal et al., 2018).

The following findings are particularly worth discussing from the current analysis. First, in terms of engaging multiple groups of stakeholders, our analysis suggests that government and EM organizations prioritize three types of stakeholders the most—citizen groups, media organizations, and peer government agencies. The active engagement of citizens may be explained by the public-facing nature of government and public sector organizations. Different from their corporate counterparts, the accountability and legitimacy of public sector organizations hinge on defending public interests and providing services that benefit community constituents (Rowley, 1997). As Liu and Horsley (2007) discuss the importance of public good in government decision-making processes, they contend that the communication between government and the people is less driven by managerial considerations than the ethical, moral expectations of government being public servants. The occurrence of a natural disaster heightens such public-serving expectations, because natural disasters put public and community safety at a much more precarious position than during the regular time. The elevated salience of citizen groups during crisis thus particularly requires government agencies to prioritize this group of stakeholders and respond to their claims.

Second, the tendency that peer government and first-responder organizations are intensively targeted during crisis is worth discussing. Previous literature has documented the use of social media to coordinate collective action and facilitate resource mobilization, such as during social protests (e.g., Wang, Liu, & Gao, 2016). As a networked platform, social media like Twitter can be used as an effective tool to reach a large scale of public. Meanwhile, they can also supplement traditional means of alliance building by coordinating action and solidifying relationships with existing partners (Pilny & Shumate, 2012). A content analysis of government organizations' crisis-response messages identifies the prevalence of messages that are action-oriented (Liu, Lai, & Xu, 2018). For example, several tweets sent by government agencies would include explicit calls for donation or for volunteering toward the entire public, as well as specific calls for action toward existing organizational partners, such as peer government agencies, first responder organizations, and federal level disaster management organizations like FEMA. As part of future research, it is therefore important to investigate not just the content of general government tweets, but also the subset of tweets that target stakeholders. It is likely that government agencies selectively respond to stakeholder claims or employ distinct crisis response strategies (e.g., apology versus justification) when different stakeholders are involved in the conversation.

Third, media organizations, commonly viewed as pressure groups (Ulmer, 2001), are not only actively replied to during disaster, but they grow more salient at the postdisaster stage. Government and EM organizations have long had intricate relationships with news media during natural disasters (Sood, Stockdale, & Rogers, 1987). Recent scholarship points out the growing use of online platforms, such as websites and social media, to build mutually beneficial relationships with journalists and media organizations (Waters, Tindall, & Morton, 2010). To effectively disseminate information and combat rumors, government agencies are motivated to build close relationships with media professionals for effective disaster management (Veil et al., 2011). Indeed, current findings suggest that government and EM organizations are actively engaged in such relationship-building efforts with media, which is consistent with prior studies suggesting that emergency managers act as an information subsidy to journalists to shape media agenda (Walters & Hornig, 1993). However, we also find that the most active relationship building with media organizations takes place at the postdisaster stage. This may indicate that government and EM organizations, having already fulfilled their commitment to the public and to peer organizations, then move to manage relationships with this stakeholder group.

Compared with common disaster-management practices around the globe, it is worth noting that nonprofit and civil society organizations appear to be one of the least engaged types of stakeholders, despite their active role that is consistently documented across various disaster relief contexts. For example, the on-the-ground collaborative networks among NGOs proved critical to deliver humanitarian relief to the community affected by the Typhoon Haiyan in the Philippines (Lai et al., 2019). Local NGOs also played an important role in leading the rehabilitation programs after the Indian Ocean tsunami (Kilby, 2008). The current finding, however, should not be interpreted as the lack of participation from the nonprofit sector. Instead, nonprofit organizations ranging from the Red Cross and the Salvation Army, to local human and animal shelters have been an integral part of the large-scale hurricane relief network surrounding Hurricane Harvey (Sterling Associate, 2017). The lack of targeting activities as observed in the current study, however, speaks to the potential disconnect between public and third-sector organizations during disaster management. Studies have repeatedly found that organizations tend to rely on preexisting partnerships to cope with crisis situations (Doerfel et al., 2013). During Hurricane Harvey, it is likely that various nonprofits had yet to enter government and EM organizations' existing partnership network, and government agencies might have been preoccupied with relationship building with peer agencies and citizen groups. From a diagnostic standpoint, it would be important for government and EM agencies to cultivate stronger relationships with nonprofits for future disaster management.

Overall, the stakeholder targeting patterns identified in the current study are consistent with several best practices recommended by Veil, Buehner, and Palenchar (2011). Specifically, the finding that citizen groups received the greatest percentage of Twitter replies demonstrates the willingness of government agencies to collaborate with the public and share information in a timely manner. Moreover, the significant amount of media targeting during and immediately following the disaster shows that government agencies prioritize building media relations, which is crucial for effective crisis communication even in the social media era. Meanwhile, not all recommendations from Veil and colleagues (2011) are reflected in the current study. Because the message content is not examined, the current study does not assess whether tweets convey self-efficacy or adapt narratives for different cultural communities.

Implications for Stakeholder Management Theory

The current study provides several implications for stakeholder management theory. First, it expands the conception of stakeholder identification and management from offline to online, by conceptualizing Twitter-based targeting activities as a strategic process of ad hoc stakeholder management. The management of stakeholder relationships may take a variety of forms, ranging from taking direct action (Uysal et al., 2018) and issuing a press release, to discursively engaging stakeholders in the digital space. As social media are increasingly incorporated in organizations' communication toolkits, it is important to recognize the diverse spectrum of stakeholder management practices as well as the interconnected nature of these practices. In a way, the emergence of social media and digital communication technologies makes the stakeholder identification and management process more complex. For one thing, social networks may make the otherwise isolated stakeholders connected, which complicates the ways in which different stakeholder communities form expectations and cast influences on the focal organization. According to the network theory of stakeholder management, Rowley (1997) posits that when the level of interconnectedness among stakeholders increases, indicated by an increase in the density of the overall stakeholder network, stakeholders are more capable of constraining the focal organization's behaviors. Therefore, social networking platforms like Twitter are likely to increase the overall influence of an organizational stakeholder community, making effective management strategies more needed than ever.

Second, this study integrates crisis management and stakeholder management theory by investigating how public sector organizations manage stakeholder relations during a crisis, although most existing literature has been focused on the corporate sector (Freeman, 1984; Mitchell et al., 1997). Evidently, public sector organizations differ from private firms in terms of which groups of stakeholders possess a higher level of urgency, power, or legitimacy. Though salient stakeholders of corporates tend to be shareholders who have direct economic interests, the key stakeholders of government organizations are average citizens, whose power is distributed, yet they collectively hold the government accountable. The current study confirms the significant relationship between stakeholder salience and the level of stakeholder targeting activities online. Specifically, local stakeholders are prioritized by disaster management organizations because of their proximity to the disaster and the urgency of their needs. Meanwhile, we observe that more powerful stakeholders, at least those who are influential online, are engaged more frequently both in the form of replies and mentions during the disaster.

Third, by testing the relationship between an organization's online popularity (i.e., the Twitter follower-following ratio) and targeting levels, the current study provides a novel way to operationalize stakeholder power, an important concept in stakeholder management theory. Existing conceptualization of stakeholder power often emphasizes a stakeholder's ability to mobilize physical resources (Mitchell et al., 1997), which does not adequately note how technology use may empower stakeholders who are "resource poor" offline. The role of technology in enhancing organizations' ability to mobilize resources and build social capital has drawn growing attention in recent scholarship (e.g., Liu & Shin, 2019). It is therefore important for future studies to extend the conceptualization of stakeholder power by examining one's influence both online and offline.

Findings from the current study further suggest that stakeholder management is never a static process, as "who constitutes stakeholders" as well as stakeholder salience may vary greatly across contexts, and in our case, across different stages of a crisis. An important implication for crisis managers is thus to take a more holistic and dynamic view of stakeholder management in order to identify the full spectrum of stakeholder communities and adjust the response strategies according to the varying levels of stakeholder salience.

Conclusion

Several limitations shall be noted. First, while the current study draws the concept of stakeholder salience, it only measures two dimensions of salience, urgency, and power, as proposed by Mitchell and colleagues (1997). Both dimensions are operationalized based on stakeholders' Twitter profiles, which differ from traditional offline measurements such as an actor's offline reputation, prestige, or the ability to mobilize social and political forces. It would be worthwhile for future studies to triangulate multiple online and offline measures of stakeholder salience to more systematically map the scope of stakeholder influence on focal organizations. Along this line, the current study offers only a preliminary analysis of stakeholder salience in the context of crisis management.

Using a single disaster as a case, current findings may not be generalized to other cases of natural disasters, nor the wide spectrum of crisis types. In this direction, future research may conduct multiple case studies to compare how the same government organizations may strategically engage different groups of stakeholders via social media depending on crisis types. Relatedly, the current study only examined a single social media platform, Twitter. Although multiple forms of social media are used by government organizations, it is likely that the unique characteristics of each platform may lead to the divergence of stakeholder targeting practices. Future research may systematically investigate whether and how multiple social media platforms enable or constrain different types of stakeholder targeting practices, as well as the degree to which the same stakeholders are targeted differently across different platforms.

The current study maps disaster-related stakeholder networks on social media. However, the networks in the study include only unidirectional ties from government agencies to various stakeholder groups. Future studies may construct full networks by including Twitter mentions and replies in both ways, and use inferential network statistics, such as ERGM (Shumate & Palazzolo, 2010), to more systematically identify predictors of stakeholder targeting behaviors on social media.

Finally, it is worth noting that an organization's social media activities may not fully represent the management's strategic intentions or decision making. Although more and more government organizations are devising formal crisis communication protocols on social media (Graham et al., 2015), there may still be discrepancies between an organization's overall vision of stakeholder management and the actual implementation by its social media professionals during a crisis. Findings from the current study, therefore, only offer partial understanding of organization-stakeholder relations during a natural disaster; future research may employ key informant interviews or organizational field observation to fully unfold the intricate process of stakeholder management.

By empirically identifying major types of stakeholders targeted via Twitter by government and EM organizations managing Hurricane Harvey, the current study advances the growing research on multisector stakeholder management via social media in the natural disaster context.

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