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Community-based disaster communication: how does it become trustworthy?

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Abstract

Purpose – Trust in disaster communication is significant because a lack of trust will prevent the transformation of information into usable knowledge for an effective disaster response. Therefore, the purpose of this paper is to investigate how the culture and network ties of an affected community can encourage trust and participation in disaster communication.

Design/methodology/approach – A qualitative case study of Jalin Merapi (JM) was conducted by interviewing 33 research participants in the Mt Merapi surroundings.

Findings – The findings indicate that culture-embedded disaster communication plays important roles in increasing the effectiveness of disaster information and encouraging trust in the authenticity of locally based disaster information at the individual level. The findings also identify that strong ties and weak ties play different roles in disaster communication. The strong ties are more effective in facilitating information diffusion and encourage trust and community participation within the affected community. Furthermore, the weak ties are more effective in disseminating information to wider audiences, and have an indirect influence in encouraging trust by extending the offline social network owned by the affected community.

Originality/value – Most literature on disaster communication focusses on the construction of disaster messages to encourage effective disaster response. Less attention has been paid to the information receivers regarding how disaster information is considered to be trustworthy by the affected community and how it can increase collective participation in community-based disaster communication.

Keywords Social capital, Trust, Social networks, Culture-embedded communication, Disaster communication, Jalin Merapi, Weight ties

Paper type Research paper

1. Introduction

Numerous scholars have identified a significant increase in information demand within both affected and unaffected communities during a disaster response (Ferrante, 2010; Reynolds and Seeger, 2005). In order to fulfill the demand for information, community members often go to mass media, local government, or other community members as the dominant information sources in disaster response (Johnson, 2007). Yet, Austin *et al.* (2012) and Johnson (2007) specifically argue that community members cannot automatically become formal communication sources because of a lack of a mechanism to aggregate and validate the information. Consequently, this creates demands for continual organizing, monitoring of credibility, and additional verification in order to establish reliable disaster communication for any engaged individuals (Palen *et al.*, 2010; Palen and Liu, 2007). However, Johnson (2007) suggests that information seeking is more likely to have a successful outcome by engaging local people as information sources, in comparison to mass media. Similarly, Romo-Murphy *et al.* (2011) emphasize that affected communities tend to merge and connect with others as their reliable information sources in times when they have to completely rely on themselves for assistance.

In order to gain an in-depth understanding about community-based information networks, this study specifically investigated the case study of Jalin Merapi (JM) (*Jaringan Informasi Lingkar Merapi* – information network of Merapi circle) during the 2010 Merapi eruption in Indonesia. The case study is regarded as a comprehensive example of a community-based disaster information network when mass media and local government are unable to effectively function as information sources in disaster response (e.g. BBC, 2012; OCHA, 2013):

> Jalin Merapi has helped shelters that are unable to receive government aid […] the government had established communication systems for volunteers and soldiers but it could not cover all of the 700 refugee centres scattered around the foot of Mount Merapi […] when the community announced they needed help to provide meals for 30,000 people, and the meal was ready in four hours (Reuters, 2010).

According to Mei *et al.* (2011), the 2010 Merapi eruption was regarded as an extreme explosion with 353 casualties, 350,000 internally displaced persons (IDPs), and 1,335,885 affected residents. Consequently, the local governments appeared to be overwhelmed because of the extensive affected areas and the large number of IDPs; subsequently, an absence of information about how and where to re-evacuate was inevitable. The mainstream mass media did not seem to be a reliable information source either as inaccurate news from a national television station led to more chaos and casualties (Prenanto, 2010). Hence, both the absence of official information and the inaccurate news led to distrust in mass media and local government. They simultaneously encouraged a critical demand for alternative information sources from the Merapi community, particularly from their inner social networks.

With regard to community-based disaster communication, trust is demanded when crucial disaster information emerges from personal resources and is raised into a collective attention (Widén-Wulff *et al.*, 2008). In response to the demand, the Harvard Humanitarian Initiative (2011) emphasizes that social capital embedded in the personal relationships of an affected community actually has critical roles in encouraging trust. Unfortunately, the affected community has had limited engagement in disaster communication; they are often framed as a passive and vulnerable party without anymore significant roles than providing information about their needs. However, this paper does not investigate either information accuracy or information transmission, but rather investigates the social capital of the affected community that can establish trust and community participation in community-based disaster communication.

2. Literature review
People rely on trustworthiness as a stand-in for disaster (Ferrante, 2010; Uslaner, 1999). They are unlikely to pay attention and act on information provided by someone in whom they have a lack of trust; this will prevent the transformation of the information provided into usable knowledge (Fisher, 2013; Jaeger *et al.*, 2007; Sandman, 1993). Hence, disaster communication strongly requires trust for rapid decision making during critical times (Murayama *et al.*, 2013; Reinhardt, 2015). Additionally, Johnson (2007) and Tang *et al.* (2012) argue that trust increases the overall quality of the communication process and efficiency of information seeking.

However, humanitarian organizations (that mostly consist of outsiders) often face difficulty in establishing trust within the affected community (Borgatti and Halgin, 2011; Harvard Humanitarian Initiative, 2011). This is particularly so because trust establishment is a long-term process that includes a history with a specific audience.

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It is hardly obtained by the outsiders who often arrive into the disaster-affected neighborhood shortly after a disaster has occurred. In responding to the difficulty, Antonovsky (1987) and Widén-Wulff *et al.* (2008) suggest that these outsiders should engage local actors because they can identify useful local knowledge to accelerate the process of trust establishment. Additionally, Putnam (1995) agrees that the features of social networks, which are defined as social capital, have a positive association with trust establishment, voluntary participation, and collaboration between group members for their mutual benefit.

2.1 Cultural engagement in disaster communication
In comparison with other natural hazards, risk perception, and disaster-response behaviors in a volcanic eruption are more closely associated with cultural beliefs (Donovan, 2010; Gaillard, 2008; Lavigne *et al.*, 2008). However, the cultural beliefs are often incompatible with the scientific approach that is frequently used by the authorities (Donovan *et al.*, 2012; Dougall *et al.*, 2008; Harvard Humanitarian Initiative, 2011). Community members are more likely to practice community-generated knowledge based on cultural rationality (Dougall *et al.*, 2008; Harvard Humanitarian Initiative, 2011). More often the focus on outrage tends to ignore the actual hazards. On the other hand, the authorities often tend to apply scientific and institutional approaches by focussing on hazard-related factors and ignoring public outrage (Sandman, 1993).

In contrast to the authorities' tendency, Guion *et al.* (2007), Romo-Murphy *et al.* (2011), and Veszteg *et al.* (2015) suggest that cultural values should be engaged in order to encourage trust and reduce outrage in disaster. Sandman (1993, p. 69) agrees that homophily ("sharing the cultural values of your audience and showing that you share them") is one of the determining factors of public perception of an information source's credibility. Despite these studies that demonstrate a similar confidence in the positive association between culture and trust in disaster, Fronz (2012) finds that socio-culture factors have not been thoroughly discussed in most crisis communication theories, and culture has been treated as an insignificant factor by disaster managers in practice (Donovan, 2010). Specifically, the socio-cultural factors in this paper refer to the "beliefs, attitudes, feelings, experiences, values and narratives, and their associated behaviors, actions, and day-to-day routines" (Bankoff *et al.*, 2015, p. 5), which are shared by the communities living on the slopes of Mt Merapi, with regard to volcanic hazards. The gap informs the first question of this study in regard to how culture can be involved in disaster communication in order to encourage trust and community participation.

2.2 Tie strength of a community's network in disaster communication
Scholars of social networks mostly identify the strength of network ties as strong ties (e.g Widén-Wulff *et al.*, 2008) and weak ties (e.g. Granovetter, 1973). According to Bouchillon (2014), Uslaner (1999), Veszteg *et al.* (2015), and Widén-Wulff *et al.* (2008), strong ties are social relationships that are most likely to occur between close community members with geographic proximity where they communicate and interact with one another (*Gemeinschaft*). Individuals with strong ties are considered to embody a large amount of social capital and a high level of trust, which binds them altogether. Hence, they are more effective in facilitating internal information diffusion for collective purposes (Opsahl *et al.*, 2010; Uslaner, 1999). In a disaster response, strong ties encourage mechanical solidarity as the "coping capital" that is significantly required by the affected community (Putnam, 2000). However, Fisher (2013), Granovetter (1973),

and Widén-Wulff *et al.* (2008) warn that the social capital owned by a strongly tied network may excessively bind its members, which can lead to an egocentric and introverted network. Consequently, this may become a collective blindness to new information due to an internal concentration of information. Additionally, the group members tend to limit information access to and for the outsiders; they tend to control incoming and shared information for the group's strategic purposes. Therefore, information bias or disregard for information is more likely to happen in a community with strong ties (Borgatti and Halgin, 2011; Widén-Wulff *et al.*, 2008).

According to Granovetter (1973) and Fisher (2013), weak ties are social relationships between acquaintances or community members with shared interests (*Gesellschaft*). Similar to strong ties, weak ties are considered to be able to encourage trust. Hence, regarding information diffusion, they are more effective in reaching a large number of people by providing shorter bridges between different group members (Fisher, 2013; Lin, 2001; Valente and Fujimoto, 2010). In a disaster response, weak ties can facilitate collective action and solidarity mobilization. However, Bouchillon (2014) and Widén-Wulff *et al.* (2008) critique that weak ties are built on an unstable network; hence, they only encourage thin trust or nothing at all. As a result, weak ties are less likely to be able to internally diffuse complex knowledge in a particular group, regardless of the ease in gaining new information across different groups (Hansen, 1999). Additionally, the community of weak ties is more likely to be temporary because of its instrumental characteristic; it strongly depends on shared interests and the instrument used to connect with other community members. If the instrument or the interest is no longer available, the "sense of community" is more likely to collapse (Day, 2009; Haythornthwaite, 2005; Miller, 2011).

In summary, diverse studies show the benefits and weaknesses of strong and weak ties regarding information diffusion and trust encouragement and they often debate over which are the most effective ones. Although, Borgatti and Halgin (2011), and Widén-Wulff *et al.* (2008) suggest that strong ties and weak ties may be combined or a particular tie may become more important (without necessarily replacing the other), depending on the context. The debates on the effectiveness of strong and weak ties, in establishing trust and information diffusion, inform the second question in this study regarding how each type of tie strength establishes trust and influences community-based disaster communication.

3. Methodology
In order to gain an in-depth understanding of a community-based information network in disaster communication, 33 in-depth interviews were conducted in districts surrounding Mt Merapi (Sleman district, Magelang district, Klaten district, and Boyolali district). The interviewees were divided into two groups: the representatives of JM and the representatives of JM's audiences. The first group comprised the individuals who were closely involved in JM during the 2010 Merapi eruption: the community radio stations' volunteers (CRVs) of Lintas Merapi FM, K FM, MMC FM, Gema Merapi FM, and Lahara FM, as the community radio stations located in Mt Merapi surroundings which initiated the establishment of JM and have become the main actors of JM; the staff or former staff of the Combine Resource Institution (CRI), as the locally run NGO which has been collaborating with the CRVs in JM; and the volunteers of JM. Meanwhile, the second group consisted of the affected community members and donors who had experiences with JM during the 2010 Merapi eruption. The representatives of JM, specifically, were interviewed about the establishment of JM, the involvement of community radio stations, and the process of JM's disaster

communication. Meanwhile, the representatives of JM audiences were interviewed regarding their participation in JM and experiences in disaster communication during the 2010 Merapi eruption.

Adopting the grounded theory, the number of research participants was not initially defined, because it did not necessarily aim at reaching a particular number that statistically represents the population of the Mt Merapi surroundings. Instead, the decision on the number of in-depth interviews reflects the emerging categories and their properties in data analysis (Charmaz, 2006). Hence, as long as the data obtained still contributed to the emergence of a new category in the simultaneous data analysis, the researcher continued interviewing based on snowball sampling until the researcher reached the point of theoretical saturation. In analyzing the data, the researcher started it by systematically coding the empirical data into key themes and developing them into conceptual categories. Further, the researcher identified the patterns of and the relationships between the developed conceptual categories. Each analytical work of the data analysis involved constant comparative analysis to name the category and compare the emerging category against another, and memo writing to define relationships between the data categories, specify their properties, and identify any possible gaps in order for a theory to emerge (Charmaz, 2006; Glaser, 1978; Miller and Salkind, 2002). The expected result of the data analysis is a construction of a theoretical framework, which describes patterns and relationships between concepts of trustworthy community-based disaster communication.

4. Findings and discussion
According to the CRVs, the engagement of community radio stations was considered to be the key factor for community participation in disaster communication through JM. The participation was not necessarily encouraged by sustainable radio broadcasts, despite some studies arguing that sustainability has been the main strength of radio broadcasts in maintaining information availability during a disaster (Ewart and Dekker, 2013; Moody, 2013; Reynolds and Seeger, 2005). Only two radio stations (Lintas Merapi FM and Lahara FM) were able to broadcast at the IDP camps during the 2010 Merapi eruption. Yet, the CRVs were able to engage their community members' involvement in JM, even without the radio's live broadcast. Therefore, this raises the assumption that the important roles of the community radio stations did not rely heavily on reliable radio technology, but more likely on the cultural characteristics of community radio stations, which were strongly embedded in the community's daily environment, and its volunteers as local actors.

4.1 Culture-embedded disaster communication
Most the residents living on the slopes of Mt Merapi are Javanese; they speak the Javanese language, practise Javanese traditions and have close kinships. Similarly, the community radio stations strongly "practise" the cultural identities and local content in their daily radio broadcast and this practice has been highly recognized as one of the main characteristics of community radio stations (Day, 2009; Fraser and Estrada, 2001). Despite being closely practised in the daily environment, Butt (2014), Donovan (2010), Donovan et al. (2012), and Lavigne et al. (2008) found that the cultural beliefs have produced a lack of fear, a false perception of volcanic risks, and repeated reluctance to the official warnings to evacuate. In contrast to the negative effects on risk perception, the engagement of Javanese culture seems to have a positive association with trust in disaster communication in this case study.

Being constructed by cultural identities and local content, the involved CRVs also encouraged cultural engagement in their disaster information. In practice, they provided their disaster information to JM in the Javanese language during the 2010 Merapi eruption. Consequently, the disaster information provided was considered to be able to facilitate familiarity and could be understood easily by the affected communities, as explained below:

Because of the usage of local language and local content, they can "speak" to community members in such a way that can be easily understood by the community members (Wulandari, a Community Member, personal interview, July 7, 2014).

This finding mirrors the studies of Berque (1992) and Valenzuela (1992) that identify local language as a key factor for mutual understanding because community members tend to identify themselves with it. Furthermore, JM was most likely to be accepted by the Merapi people, because it could "bridge" the information they needed in such convenient ways based upon their daily communication behaviors.

In addition to the usage of the Javanese language, JM (through the engagement of the CRVs) also engaged Javanese beliefs in its disaster communication. The interviewees mostly pointed to the issue of discrepancy between their local wisdom and the official approach, particularly in regard to evacuation instructions. This finding of the incompatibility between Javanese cultural beliefs and a scientific approach replicates the previous studies on Mt Merapi (Donovan, 2010; Donovan et al., 2012; Dove, 2008; Lavigne et al., 2008; Schlehe, 1996). Specifically, most Merapi people refused to comply with the official evacuation instructions because of their local knowledge of volcanic mythologies of traditional precursors. They assume that an eruption must be preceded by earthquakes, lightning, and strange behavior of wild animals. Thus, if any of the traditional precursors did not happen, the at-risk communities were less likely to evacuate because they assumed that Mt Merapi would not erupt soon (Setiyoko, a Community Member, personal interview, July 8, 2014).

Additionally, the Merapi people have developed a "culture of hazard" in adjusting the volcanic hazards for their benefits (Dove, 2008, p. 333). They culturally perceive Mt Merapi's eruption as not destructive, but beneficial in providing them with more fertilizer and volcanic material for a prosperous livelihood. Therefore, as an attempt to adapt to the particular local beliefs, Mujianto (MMC FM, personal interview, April 26, 2014) underlined the need to comprehend the local wisdom by applying a "culturally rational" approach. Specifically, he explained that they composed the evacuation instruction based on the "need" of Mt Merapi for "extra workspace" to improve its nature. This approach was more likely to successfully encourage the affected community to evacuate because it fitted their cultural wisdom to live in harmony with nature. Similarly, Mei et al. and Shannon et al. (2014, p. 646) agree that a "parallel practice" combining traditional values and scientifically rational response can create useful hybrid forms of disaster management.

The culture-embedded communication, in the forms of the usage of the local language and culture-adapted message design, can potentially overcome the incompatibility between some cultural beliefs and a scientific approach that is often applied in formal disaster management. This is particularly required to translate technical disaster-related information in order to adapt to public understanding (Nisbet and Scheufele, 2009; Reynolds and Seeger, 2005). Additionally, the engagement of culture is more likely to encourage trust within the affected community. In practice, the Merapi people tend to feel that the disaster information is trustworthy because it comes

from someone who is "part of us." Correspondingly, a community member agreed that "[…] the engagement of local wisdom was one of the determining factors in maintaining trust" (Julianto, personal interview, July 8, 2014). This finding also has another implication in emphasizing the engagement of the affected community as the local actors, because of their understanding of local perspectives (Day, 2009; Fraser and Estrada, 2001; Moody, 2013).

The culture-embedded disaster communication does not only potentially encourage trust within the affected community, but may further become a means of establishing trust in its authenticity in providing and sharing Merapi-based information within the wider audiences of JM. In his interview, Nasir (a former CRI staff, March 17, 2014) gave an example as below:

> My first tweet was derived from the Facebook status of a community radio volunteer. Sukiman (Lintas Merapi FM) always uses the Javanese language (on his Facebook status). I copied and tweeted it. My second tweet was its translation […] There were some tweets mentioned that it was interesting because it was different and directly came from the locals in the Javanese language […] They even recommended that (JM) published real information from the locals of Merapi.

In summary, a culture-embedded communication that is performed by the affected community potentially becomes an effective means of increasing the effectiveness of disaster information and establishing trust. In contrast to the finding of Fronz (2012) regarding the lack of socio-culture acknowledgment in crisis communication theories, this finding suggests that socio-culture recognition may have positive outcomes in disaster communication. This finding, likewise, supports the previous studies in regard to their arguments about the positive association between cultural values and trust (Guion *et al.*, 2007; Romo-Murphy *et al.*, 2011; Sandman, 1993). Consequently, the established trust can transform the social relationships owned by the affected community members into social capital (Putnam, 1993; Uslaner, 1999). In practice, the affected community members are more willing to voluntarily participate in exchanging their information with other community members (Bouchillon, 2014; Haythornthwaite, 2005; Tang *et al.*, 2012). In the case of JM, the IDPs were more likely to deliberately share their information with the CRVs at the individual level. Furthermore, the individual actions may act as collaborative catalysts and be promoted into a collective action of the affected community in order to effectively respond to a disaster.

4.2 Networks of local actors in community-based disaster communication
Following the previous discussion about how trust can be encouraged in disaster communication between the individual's social relationships, this particular subsection draws up the individual's trust into a higher context at the community level. The focus is particularly centralized in the influences of a community's tie strength on the process of information sharing and trust in disaster communication. As a community-based information network, JM strongly encouraged the affected community's participation in providing "inside" information during the 2010 Merapi eruption (Asnawi, K FM, personal interview, March 21, 2014). However, the participation levels in the providing of information varied among the affected community members, mainly depending on their access to communication technologies and individual trust. Some IDPs hesitated to share their information about their needs with strangers and considered that it was culturally inappropriate (Purnomo, a Community Member, personal interview, July 8, 2014). Thus, they often only shared the information about their needs to

someone they knew from their personal networks or established a temporary post to gather any available aids without necessarily sharing what they really needed (Setyawan, Lahara FM, personal interview, March 20, 2014). The hesitancy to share personal disaster information to strangers tends to widen the gap between them and outsiders; yet the outsiders are those who are more likely to be able to provide aid for the affected community when their supporting systems are extremely damaged.

4.2.1 The roles of strong ties in information sharing and trust encouragement. During the 2010 Merapi eruption, some IDPs might not feel ashamed or hesitate to share their information with JM through the CRVs, because of their personal familiarity based on common community membership and geographical proximity with the CRVs. As a result, the JM volunteers (including the CRVs) acted as "information couriers" by actively gathering information at the individual level in the IDP camps and shared it further in the higher context of the community level through JM. This particular finding demonstrates the strong ties embedded in the close personal relationships between the CRVs (as parts of the affected community) and the IDPs and played a significant role in encouraging the affected community to share their personal disaster information.

Additionally, the IDPs trusted in JM's good will to help them because of the involvement of CRVs as the local actors. Under the "tagline" of JM, CRVs and CRI have been working together to establish community-based disaster communication since the 2006 Merapi eruption (Nasir, former CRI staff, personal interview, March 17, 2014). Thus, JM has been acknowledged as an extensive network that has been significantly established on local relationships and previous disaster experiences, as described by one of the community members below:

> JM is an iceberg phenomenon […] The initiative (of JM) cannot be separated from the community radio stations […] It would be meaningless without the previous disaster experiences and the community-based networks […] In my opinion, the JM was a descendant of the movement of community-based information networks. The main instruments were the community radio stations (Zakaria, personal interview, June 27, 2014).

Similarly, Sukiman (Lintas Merapi FM, personal interview, May 6, 2014) strongly emphasized that:

> JM significantly required the community radio stations for their actors and networks; otherwise, it would not be able to engage the community members during the 2010 Merapi eruption.

Therefore, a combination of close personal relationships and consistent involvement in community-based disaster communication provides a basis of community recognition for their genuine intentions to assist the Merapi people. This also provides an assumption of stronger ties within the Merapi people's social networks (as the affected community), as strong ties are not established only on personal or geographical closeness, but also on regular interactions to maintain the strength of the ties over a long period of time (Fisher, 2013; Granovetter, 1973; Widén-Wulff *et al.*, 2008).

Similar to previous studies (Bouchillon, 2014; Putnam, 1993; Shannon *et al.*, 2014; Uslaner, 1999), the strong ties owned by the CRVs (as the local members of the Merapi community) eventually led to disaster communication's effectiveness, trustworthiness, and participation by the other affected community members. This is supported by six (out of eleven) of JM's audiences who described that JM (as a community-based information network) was considered to be more trustworthy, in comparison to the local government and mass media. Again, they argued that it was mostly because of

the involvement of the local actors who were part of personal relationships/networks. This led to trust based on personal recognition. In his interview, Haji (K FM, personal interview, March 21, 2014) expressed his agreement as below:

> I personally trusted our volunteers […] I do not reckon the media, but I 100% trust all information from them […] If someone informed about a condition of a particular area in Merapi, all we needed to do was to chat with the CRVs who lived in that area, and ask them about the information's accuracy. If they said that it was not true, I would have shared it.

On the other hand, the remaining five JM's audiences mainly argued that a community-based information network is susceptible to rumors because of the absence of official information sources.

Although the strong ties may effectively encourage "inside" information, they seemed to be another barrier to sharing their information with outsiders. Some interviewees seemed to show a tendency for "amoral familism" which demonstrates a high number of strong ties and a low number of weak ties (Widén-Wulff *et al.*, 2008, pp. 351-352). They specifically perceived that the involvement of some outsiders had not been assisting them to gain accurate information about Mt Merapi, but was more likely to create confusion. This also may lead into an egocentric network as raised by Fisher (2013) and Granovetter (1973). Consequently, the community members tend to restrain themselves from networking and communicating with people outside their own community and this may prevent the insiders' information from being shared with the outsiders, and the other way around.

4.2.2 The roles of weak ties in information sharing and trust encouragement. With regards to the possibility of the egocentric network, the relationships among the community radio stations and CRI functioned as the weak ties, which were more likely to extend the social networks of Merapi people and simultaneously bridge them to the outsiders (see Figure 1). In conjunction with offline personal networks, CRI engaged online media, particularly Twitter (@jalinmerapi), to virtually share the information provided by the Merapi people with the wider audiences. Practically, JM created a new network by connecting the "dots" of information nodes consisting of the IDPs, potential donors, and authorities, which did not exist previously (Zakaria, Community Member, personal interview, June 27, 2014). This finding supports the previous studies (Fisher, 2013; Granovetter, 1973; Lin, 2001; Valente and Fujimoto, 2010) by showing that the
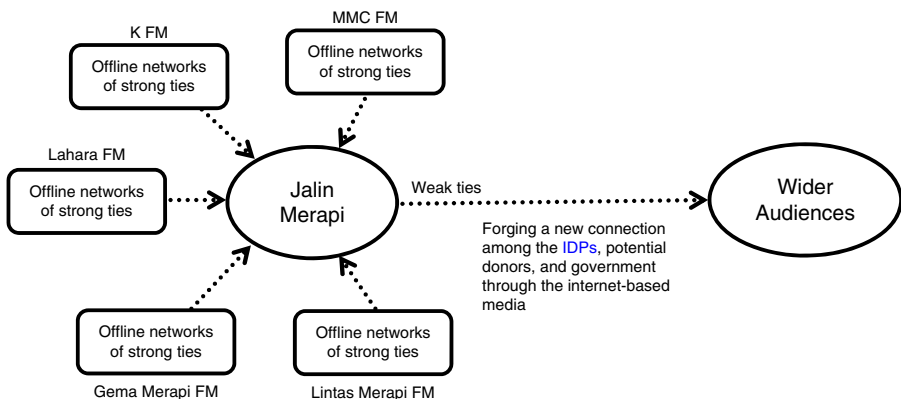

Figure 1.
Tie strength in Jalin Merapi's disaster communication

weak ties can bridge information between the affected community and the wider audience in disaster communication. Moreover, it also demonstrates the capacity of online disaster communication to reach out to wider audiences by extending the offline social networks in a virtual environment and to forge new connections that previously did not exist (Fraser and Estrada, 2001; Haythornthwaite, 2005; Hindman and Coyle, 1999; Jaeger *et al.*, 2007).

Regardless of the finding of the benefits of weak ties in bridging insider information from the affected community to the wider audience, it does not automatically indicate that the information is regarded as trustworthy. Another question that still needs to be asked, however, is whether the disaster information is still perceived as trustworthy by the outsiders when being shared through weak ties, as it is perceived by the affected community when it is shared through their strong ties. According to Fisher (2013), and Valenzuela *et al.* (2009), there is a positive association between trust and weak ties, including those that are mediated by online media. In practice, the trust (within the strong ties) led to personal recommendations on JM's trustworthiness to their extended networks (the weak ties), as explained by Zakaria (Community Member, personal interview, June 27, 2014) who acted as a donor during the 2010 Merapi eruption as below:

> […] whom I knew in the JM's network mattered. I didn't need to verify. So, the network was the most important thing […] I didn't notice who the IDPs (the information sources) were anymore. I was confident that the information from JM was valid […] because it was based on my friend's recommendation […] even my friend's friend […]. Conversely, my friends didn't need to verify who JM was; the most important was my recommendation about JM […] So, it was more a friendship network.

The online disaster communication, which was performed by JM, did not only extend the offline personal relationships but also indirectly extended trust that had been established by the strong ties of the Merapi people. This finding confirms the study of Bouchillon (2014) that weak ties do not have a direct effect on trust establishment, but are more likely to have an indirect or extended effect that was initiated by the strong ties of the affected community.

5. Conclusion
Culture-embedded disaster communication within the affected community is more likely to increase the effectiveness and acceptance of disaster information because it can "bridge" the information in convenient ways based upon their cultural communication behaviors. Another significant finding that emerged from this study is that both strong ties and weak ties play important roles in such a supportive relationship in community-based disaster communication. The strong ties of the affected community are more likely to establish social capital, trust, and community participation; they are more effective in encouraging the affected community to provide their "inside" information. Meanwhile, weak ties are more effective in disseminating the "insiders" information' to a larger number of people across different communities (e.g. the unaffected community). By engaging online media, weak ties potentially have an indirect influence in encouraging trust, as they extend the offline social networks and trust owned by the affected community. Furthermore, the combination of culture-embedded communication, community participation, and online communication significantly influences trust establishment within the outsiders in the authenticity of disaster information as locally based information from the affected community.

The most important limitation lies in the fact that this study has not necessarily provided evidence to support verified community-based disaster communication, regardless of the findings of how a community-based information network can establish trust in disaster communication. The findings of this study are more likely to support the concept of trustworthy community-based disaster information because people tend to "trust without verifying" (Uslaner, 1999, p. 51). Therefore, future research to identify trustworthy and verified community-based disaster communication, especially in an ethnically diverse community, is highly encouraged.

References

Antonovsky, A. (1987), *Unraveling the Mystery of Health: How People Manage Stress and Stay Well*, Jossey-Bass Publishers, San Francisco, CA.

Austin, L., Liu, B. and Jin, Y. (2012), "How audiences seek out crisis information: exploring the social-mediated crisis communication model", *Journal of Applied Communication Research*, Vol. 40 No. 2, pp. 188-207.

Bankoff, G., Cannon, T., Kruger, F. and Schipper, E. (2015), "Exploring the links between cultures and disasters", in Kruger, F., Bankoff, G., Cannon, T., Orlowski, B. and Schipper, E. (Eds), *Cultures and Disasters: Understanding Cultural Framings in Disaster Risk Reduction*, Routledge, Taylor & Francis Group, New York, NY and London.

BBC (2012), "Still left in the dark? How people in emergencies use communication to survive and how humanitarian agencies can help", Policy Briefing, BBC Media Action, London.

Berque, P. (1992), "The hard lesson of autonomy: Kayes rural radio", in Girard, B. (Ed.), *A Passion for Radio: Radio Waves and Community*, Black Rose Books, Montreal.

Borgatti, S. and Halgin, D. (2011), "On network theory", *Organization Science*, Vol. 22 No. 5, pp. 1168-1181.

Bouchillon, B. (2014), "Social ties and generalized trust, online and in person: contact or conflict – the mediating role of bonding social capital in America", *Social Science Computer Review*, Vol. 32 No. 4, pp. 506-523.

Butt, S. (2014), "Disaster management law in Indonesia: from response to preparedness?", in Butt, S., Nasu, H. and Nottage, L. (Eds), *Asia-Pacific Disaster Management: Comparative and Socio-Legal Perspective*, Springer, Heidelberg, pp. 183-196.

Charmaz, K. (2006), *Constructing Grounded Theory: A Practical Guide Through Qualitative Analysis*, Pine Forge Press.

Day, R. (2009), *Community Radio in Ireland: Participation and Multiflows of Communication*, Hampton Press, Cresskill, NJ.

Donovan, K. (2010), "Doing social volcanology: exploring volcanic culture in Indonesia", *Area*, Vol. 42 No. 1, pp. 117-126.

Donovan, K., Suryanto, A. and Utami, P. (2012), "Mapping cultural vulnerability in volcanic regions: the practical application of social volcanology at Mt Merapi, Indonesia", *Environmental Hazards*, Vol. 11 No. 4, pp. 303-323.

Dougall, E., Horsley, J. and McLisky, C. (2008), "Disaster communication: lessons from Indonesia", *International Journal of Strategic Communication*, Vol. 2 No. 2, pp. 75-99.

Dove, M. (2008), "Perception of volcanic eruption as agent of change on Merapi volcano Central Java", *Journal of Volcanology and Geothermal Research*, Vol. 172 Nos 3-4, pp. 329-337.

Ewart, J. and Dekker, S. (2013), "Radio, someone still loves you! Talkback radio and community emergence during disasters", *Continuum*, Vol. 27 No. 3, pp. 365-381.

Ferrante, P. (2010), "Risk & Crisis Communication", *Professional Safety*, Vol. 55 No. 6, pp. 38-45.

Fisher, R. (2013), " 'A gentleman's handshake': the role of social capital and trust in transforming information into usable knowledge", *Journal of Rural Studies*, Vol. 31, July, pp. 13-22.

Fraser, C. and Estrada, S. (2001), *Community Radio Handbook*, UNESCO, Paris.

Fronz, C. (2012), *Strategic Management in Crisis Communication – A Multinational Approach*, Diplomica Verlag, Hamburg.

Gaillard, J. (2008), "Alternative paradigms of volcanic risk perception: the case of Mt Pinatubo in the Philippines", *Journal of Volcanology and Geothermal Research*, Vol. 172 Nos 3-4, pp. 315-328.

Glaser, B. (1978), *Theoretical Sensitivity: Advances in the Methodology of Grounded Theory*, Sociology Press.

Granovetter, M. (1973), "The strength of weak ties", *American Journal of Sociology*, Vol. 78 No. 6, pp. 1360-1380.

Guion, D., Scammon, D. and Borders, A. (2007), "Weathering the storm: a social marketing perspective on disaster preparedness and response with lessons from Hurricane Katrina", *Journal of Public Policy & Marketing*, Vol. 26 No. 1, pp. 20-32.

Hansen, M. (1999), "The search-transfer problem: the role of weak ties in sharing knowledge across organization subunits", *Administrative Science Quarterly*, Vol. 44 No. 1, pp. 82-111.

Harvard Humanitarian Initiative (2011), *Disaster Relief 2.0: The Future of Information Sharing in Humanitarian Emergencies*, United Nations Foundation and The Vodafone Foundation, Washington, DC and Berkshire.

Haythornthwaite, C. (2005), "Social networks and internet connectivity effects", *Information, Communication & Society*, Vol. 8 No. 2, pp. 125-147.

Hindman, D. and Coyle, K. (1999), "Audience orientations to local radio coverage of a natural disaster", *Journal of Radio Studies*, Vol. 6 No. 1, pp. 8-26.

Jaeger, P., Shneiderman, B., Fleischmann, K., Preece, J., Qu, Y. and Fei, W. (2007), "Community response grids: e-government, social networks, and effective emergency management", *Telecommunications Policy*, Vol. 31 Nos 10-11, pp. 592-604.

Johnson, C. (2007), "Social capital and the search for information: examining the role of social capital in information seeking behavior in Mongolia", *Journal of the American Society for Information Science & Technology*, Vol. 58 No. 6, pp. 883-894.

Lavigne, F., De Coster, B., Juvin, N., Flohic, F., Gaillard, J., Texier, P., Morin, J. and Sartohadi, J. (2008), "People's behaviour in the face of volcanic hazards: perspectives from Javanese communities, Indonesia", *Journal of Volcanology and Geothermal Research*, Vol. 172 No. 3, pp. 273-287.

Lin, N. (2001), *Social Capital: A Theory of Social Structure and Action*, Cambridge University Press, Cambridge.

Mei, E., Lavigne, F., Picquout, A. and Grancher, D. (2011), "Crisis management during the 2010 eruption of Merapi volcano", paper presented at the Regional Geographic Conference, International Geographical Union.

Miller, D. and Salkind, N. (2002), *Handbook of Research Design & Social Measurement*, Sage Publications, Thousand Oaks, CA.

Miller, V. (2011), *Understanding Digital Culture*, Sage Publications, London.

Moody, R. (2013), "Hurricane Katrina: local radio and community responsibility", *Media History Monographs*, Vol. 16 No. 4, pp. 1-19.

Murayama, Y., Saito, Y. and Nishioka, D. (2013), "Trust issues in disaster communications", *Proceeding of the 46th Hawaii International Conference on System Science*, IEEE, HI, pp. 335-342.

Nisbet, M. and Scheufele, D. (2009), "What's next for science communication? Promising directions and lingering distractions", *American Journal of Botany*, Vol. 96 No. 10, pp. 1767-1778.

OCHA (2013), "Humanitarianism in the network age: including world humanitarian data and trends", *OCHA Policy and Studies Series*, OCHA.

Opsahl, T., Agneessens, F. and Skvoretz, J. (2010), "Node centrality in weighted networks: generalizing degree and shortest paths", *Social Networks*, Vol. 32 No. 3, pp. 245-251.

Palen, L. and Liu, S. (2007), "Citizen communications in crisis: anticipating a future of ICT-supported public participation", paper presented at the SIGCHI Conference on Human Factors in Computing Systems, San Jose, CA.

Palen, L., Anderson, K., Mark, G., Martin, J., Sicker, D., Palmer, M. and Grunwald, D. (2010), "A vision for technology-mediated support for public participation and assistance in mass emergencies and disasters", paper presented at the 2010 ACM-BCS Visions of Computer Science Conference.

Prenanto, T. (2010), "Boikot TV One!!! Segera Angkat Kaki dari Bumi Jogja!!!", *Kompasiana*, October 30, available at: www.kompasiana.com/sangsurya/boikot-tv-one-segera-angkat-kaki-dari-bumi-jogja_55003cc9a333114f7550ffd3 (accessed September 12, 2015).

Putnam, R. (1993), "The prosperous community: social capital and public life", *The American Prospect*, Vol. 13, Spring, pp. 35-42.

Putnam, R. (1995), "Tuning in, tuning out: the strange disappearance of social capital in America", *Political Science and Politics*, Vol. 28, pp. 664-683.

Putnam, R. (2000), *Bowling Alone: The Collapse and Revival of American Community*, Touchstone, New York, NY.

Reinhardt, G. (2015), "First-hand experience and second-hand information: changing trust across three levels of government", *Review of Policy Research*, Vol. 32 No. 3, pp. 345-364.

Reuters (2010), "Indonesians beat slow disaster relief by tweeting", Reuters, November 22, available at: www.reuters.com/article/2010/11/22/us-indonesia-volcano-twitter-idUSTRE6AL1Q820101122 (accessed May 25, 2013).

Reynolds, B. and Seeger, M. (2005), "Crisis and emergency risk communication as an integrative model", *Journal of Health Communication*, Vol. 10 No. 1, pp. 43-55.

Romo-Murphy, E., James, R. and Adams, M. (2011), "Facilitating disaster preparedness through local radio broadcasting", *Disasters*, Vol. 34 No. 4, pp. 801-815.

Sandman, P. (1993), *Responding to Community Outrage: Strategies for Effective Risk Communication*, American Industrial Hygiene Association, Fairfax, VA.

Schlehe, J. (1996), "Reinterpretations of mystical traditions: explanations of a volcanic eruption in Java", *Anthropos*, Vol. 91 Nos 4-6, pp. 391-409.

Shannon, R., Hope, M., McCloskey, J., Crowley, D. and Crichton, P. (2014), "Social dimensions of science – humanitarian collaboration: lessons from Padang, Sumatra, Indonesia", *Disasters*, Vol. 38 No. 3, pp. 636-653.

Tang, X., Tang, M., Weng, Z., Cao, X. and Lu, Y. (2012), "The impact of social capital on information exchange and well-being in virtual communities", *Journal of Global Information Technology Management*, Vol. 15 No. 3, pp. 5-29.

Uslaner, E. (1999), "Trust but verify: social capital and moral behavior", *Social Science Information/Information sur les Sciences Sociales*, Vol. 38 No. 1, pp. 29-55.

Valente, T. and Fujimoto, K. (2010), "Bridging: locating critical connectors in a network", *Social Networks*, Vol. 32 No. 3, pp. 212-220.

Valenzuela, E. (1992), "New voices", in Girard, B. (Ed.), *A Passion for Radio: Radio Waves and Community*, Black Rose Books, Montreal, pp. 150-155.

Valenzuela, S., Park, N. and Kee, K. (2009), "Is there social capital in a social network site? Facebook use and college students' life satisfaction, trust, and participation", *Journal of Computer-Mediated Communication*, Vol. 14 No. 4, pp. 875-901.

Veszteg, R., Funaki, Y. and Tanaka, A. (2015), "The impact of the Tohoku earthquake and tsunami on social capital in Japan: trust before and after the disaster", *International Political Science Review*, Vol. 32 No. 2, pp. 119-138.

Widén-Wulff, G., Ek, S., Ginman, M., Perttilä, R., Södergård, P. and Tötterman, A. (2008), "Information behaviour meets social capital: a conceptual model", *Journal of Information Science*, Vol. 34 No. 3, pp. 346-355.

Further reading

Egan, T. (2002), "Grounded theory research and theory building", *Advances in Developing Human Resources*, Vol. 4 No. 3, pp. 277-295.

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