2015

STATE OF SOCIAL MEDIA TECHNOLOGIES FOR DISASTER PREPAREDNESS IN ASIA PACIFIC REGION

REPORT TO GLOBAL DISASTER PREPAREDNESS CENTER, AMERICAN RED CROSS

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Global Disaster Preparedness Center

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1. Executive Summary

This project is conducted in response to Global Disaster Preparedness Center's (GDPC) call of developing a comprehensive understanding of the implications of social media analysis tools for disaster preparedness, focusing on the Asia Pacific region.

Two methodological approaches were performed, including an online survey and in-depth interviews with humanitarian organizations in the Asia-Pacific region. All of the 38 Red Cross/Red Crescent (RC/RC) National Societies located in the Asia-Pacific region were invited to participate in the survey, and 18 responded. With one incomplete response, the analysis was conducted based on 17 responses. To construct case scenarios of social media analysis tools, in-depth interviews were conducted with 19 humanitarian organizations (mostly outside the RC/RC network) in the Asia-Pacific region. Through snowball and purposive sampling, those organizations were selected based on their experience with social media and social media analysis tools. To facilitate the process of data collection, six of the interviews were conducted in languages other than English used in the Asia-Pacific region, including Chinese, Japanese, and Vietnamese. The findings from both interview and survey data revealed the state of humanitarian organizations' use of social media and social media analysis and the opportunities and challenges associated with these uses for disaster preparedness.

1.1 Social media usage and varied purposes

Results from both interview and survey consistently showed that humanitarian organizations use social media (especially Twitter, Facebook, and YouTube) mostly for the purposes of public communication, advocacy, fundraising, and community engagement. In the domain of disaster management, social media are used for gathering information from other humanitarian organizations and emergency-related government agencies. Organizations also use social media for sharing information about early warning prior to disaster and posting situational updates during disaster. The target audiences for this disaster communication include the general public, and other humanitarian organizations within and outside the country. Nonetheless, despite the opportunities and advantages, lack of manpower dedicated to social media posts/management stood out as the biggest obstacle encountered by humanitarian organizations in adopting social media for their work on disaster preparedness.

1.2 Social media analysis tools: trends, opportunities, and challenges

A moderate percentage of surveyed RC/RC organizations reported using standalone social media analysis tools, ranging from Google Analytics, Facebook Insights, Crowdbooster, Hoosuite to Twitter's own analysis tools. These social analysis tools are used for purposes ranging from gauging effectiveness of posts, tailoring content to audiences better, and improving communication with the public/audiences. Cost efficiency and usability issue are the major deciding factors that most RC/RC organizations considered when adopting social media analysis tools. In the meantime, they found that cost, coupled with lack of time and lack of manpower, were the main obstacles difficult to overcome in using social media analysis tools to a larger extent. As far as information sharing, the RC/RC organizations shared information they gathered from social media or social media analysis tools to other parties, such as the target community where they serve, other RC/RC organizations, or other humanitarian organizations. Compared to the RC/RC organizations, interviewed organizations mentioned the adoption of more sophisticated tools, such as Radian6, Scanigo,

OpenStreetMap, and MicroMappers. For organizations concerned with financial and manpower constraints, they managed to analyze social media data through manual monitoring and searching or using the free version of proprietary analysis tools. Moreover, depending on the type of disaster, community situations, organizational types, and scope of operations, social media based data monitoring was incorporated in these organizations' work on disaster preparedness in different ways and at different levels. Opportunities and challenges associated with social media analysis tools are discussed in this report, followed by seven recommendations.

Key messages	
Recommendation 1	*Engage in manual searches and monitoring (or using the free version of social media analysis tools) of the popular social media websites used in the respective country, and this includes following social media websites of other humanitarian organizations and emergency-related public agencies within the country*
Recommendation 2	*Depending on the severity of the disaster, manual monitoring or basic version of social media analysis tools can be used for small or slow-moving disaster such as storms or typhoons whereas automated analysis tools should be used for large or fast-moving disasters such as earthquakes.*
Recommendation 3	*Use organization's website and social media pages to build relationships with the public as a way to recruit contacts for long-term effective monitoring*
Recommendation 4	*A model of collaborative or joint efforts of using social media analytics may form at the country level, and guidance can be developed such as standardization of keywords and mechanisms of information sharing*
Recommendation 5	*Tailor the monitoring of public social media postings, either manually or through automated methods, to each country*
Recommendation 6	*In addition to social media-based approach, data monitoring may need to be supplemented with other means, such as mobile-based public reporting and traditional assessment on the ground*
Recommendation 7	*A more systemic thinking needs to be established, requiring a combination of multiple technologies in two-way communication with the community for disaster preparedness*

Table 1 – Recommendations

2. Introduction

With the adoption of new information and communication technologies (ICTs) such as social media and mobile phones, the role of regular citizens in disaster management becomes more visible and influential as they are active not only in being informed about a disaster but also being involved in information sharing that is needed at pre-disaster and aftermath stages. This calls for humanitarian organizations' attention in utilizing these technologies and the growing power of collective intelligence in formulating their disaster programs. Nonetheless, knowledge is still limited as to whether and how increasingly prevalent online information behaviors transfer to different aspects of disaster management (e.g., disaster preparedness, mitigation). These inquiries are especially salient for disaster work in the Asia-Pacific region, where several disaster-prone countries (e.g., the Philippines, Indonesia, Japan, China) are located, and at the same time a relatively high level of new media penetration is seen across the region.

Addressing this important knowledge gap, this research follows a technology-in-practice approach.[1] That is, it examines users' practices enacted in their interaction with technological features and functions (e.g., message broadcasting on Twitter, visual analytical tools on ThinkUp) in different situations. Specifically, this research aims to solicit data from humanitarian organizations' self-reported opinions and usage of social media and related analysis tools, which helps answer the practical question of whether and in what ways organizations' information behaviour (i.e., communicating on social media, monitoring and assessing information via analysis tools) leads to disaster preparedness and resilience building. As a result, findings of this research are useful and relevant to multiple stakeholders involved in disaster preparedness. In particular, humanitarian organizations will benefit from this research in gaining knowledge about whether and how to use new technologies such as social media and related analysis tools in their existing programs of disaster preparedness and community engagement. As well, community members can benefit from the findings of this research by knowing whether and how to utilize social media in building up resources with humanitarian organizations for short-term disaster preparedness and long-term community resilience.

In answering the questions of whether and how social media and related analysis tools are used by humanitarian organizations in the Asia Pacific region, particularly Red Cross/Red Crescent (RC/RC) actors, for disaster preparedness, this research aims to accomplish the following objectives:

1. Investigate current usage of social media and related analysis tools by the RC/RC actors in the Asia-Pacific region;
2. Identify the ways RC/RC actors can incorporate social media and related analysis tools in disaster preparedness work and define the gaps between desired and current uses of these tools, considering the geographical characteristics (i.e., Asia-Pacific region);
3. Provide recommendations for the adoption of social media analysis tools in different scenarios of disaster preparedness (e.g., type of disaster, situational demands) that are encountered by the RC/RC actors, especially those in the Asia-Pacific region;
4. Offer suggestions for the next step of large-scale user study and system assessment dedicated to Global Disaster Preparedness Center (GDPC) and RC/RC actors.

[1] Orlikowski, W. J. (2000). Using technology and constituting structures: A practice lens for studying technology in organizations. *Organization Science*, *11*(4), 404-428.

3. Methods

Mobile-cellular subscriptions per 100 inhabitants, 2015*

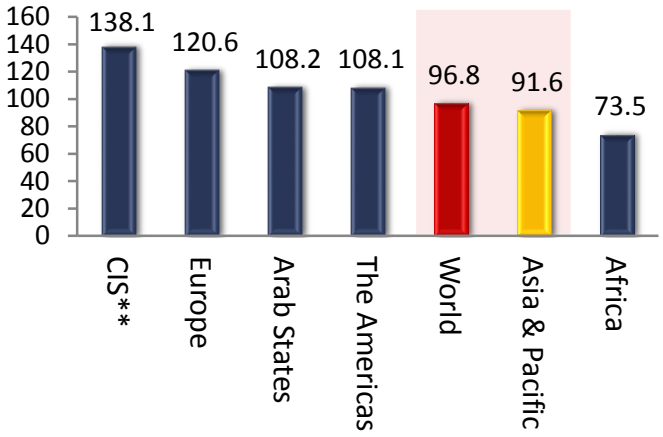

Figure 3.1 – Mobile-cellular subscriptions per 100 inhabitants, 2015* [2]

Individuals using the Internet per 100 inhabitants, 2015*

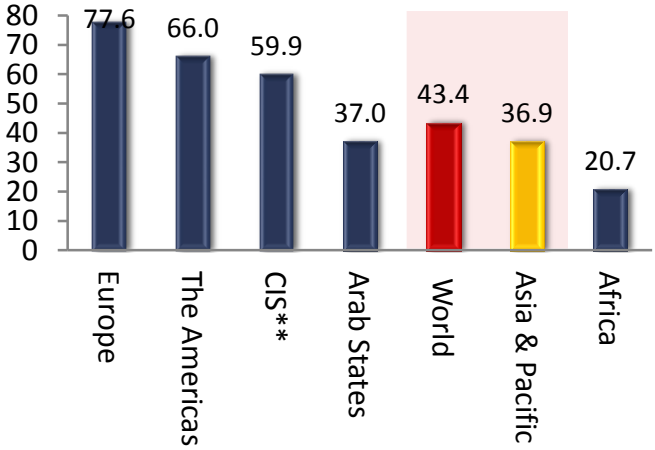

Figure 3.2 – Individuals using the Internet per 100 inhabitants, 2015*

Asia Internet use

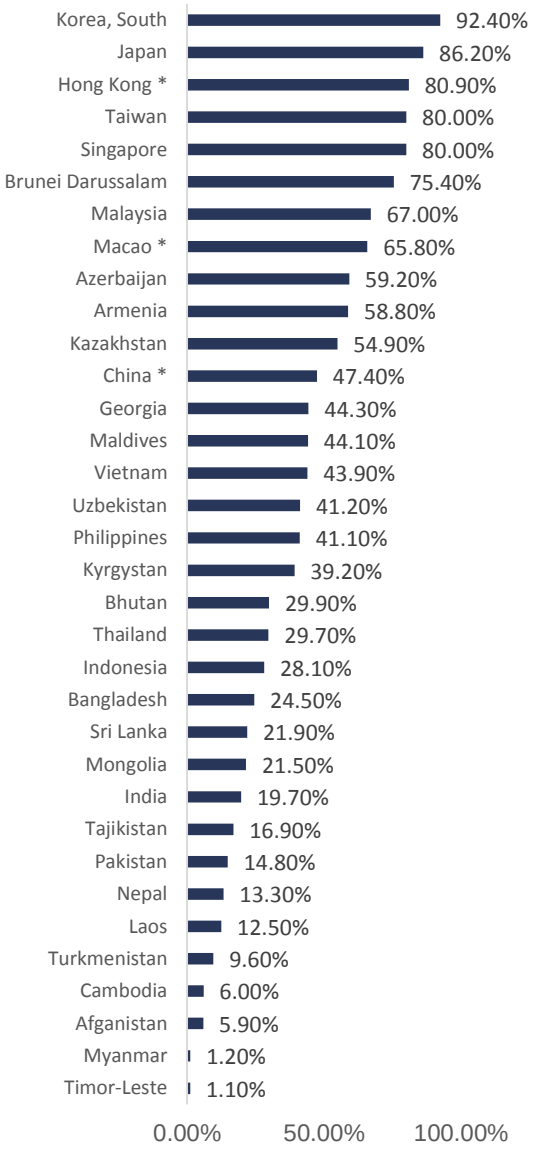

Figure 3.3 – Internet use in Asia by country [3]

[2] Regions are based on the ITU BDT Regions, see: http://www.itu.int/ITU-D/ict/definitions/regions/index.html
Note: * Estimate ** Commonwealth of Independent States
Source: ITU World Telecommunication /ICT Indicators database

[3] Source: http://www.internetworldstats.com/stats3.htm#asia

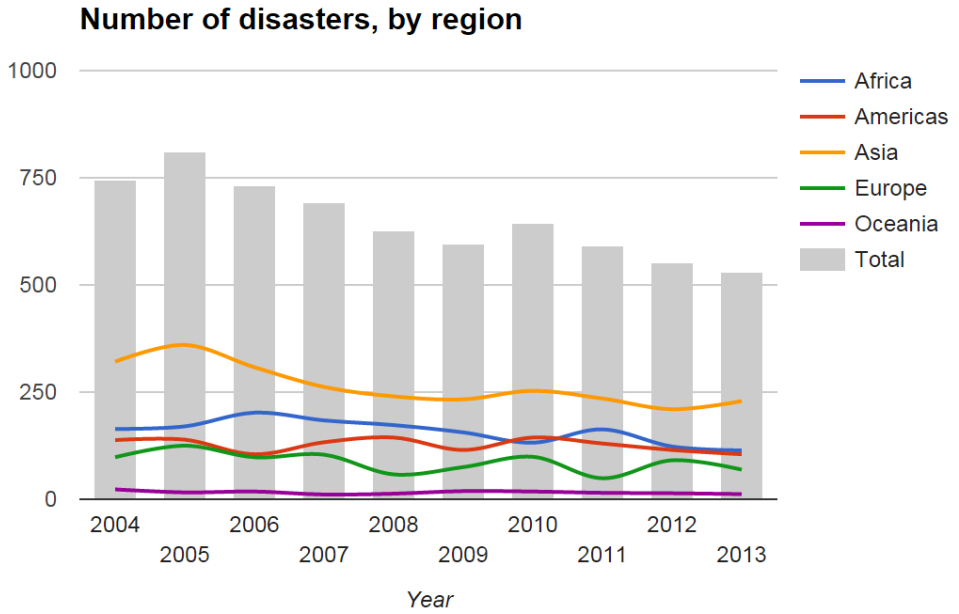

Figure 3.4 –Disaster situations in Asia[4]

Data were collected through an online survey and in-depth interviews. The online survey was conducted to understand the state of uses of social media websites (e.g., Facebook, Twitter) and social media analysis tools (e.g., Radian6, ThinkUp) within the RC/RC network. All of the 38 RC/RC National Societies in the Asia Pacific region were invited to participate in the online survey between April 22 and May 31, 2015 and 18 responded (response rate: 47.4%). One response was incomplete, which resulted in 17 valid responses used for analysis (completion rate: 44.7%). Representatives of each National Societies in charge of social media and social media analysis tools were invited to fill out the questionnaire asking their usage, needs, expectations, and challenges of using social media and related analysis tools for general organizational operations and for disaster-related work. Among the 38 RC/RC organizations, 32 have social media pages on Facebook and/or Twitter.

To gain a more in-depth understanding about the opportunities and constraints of using social media and social media analysis tools for disaster preparedness, interviews were conducted with humanitarian organizations in the Asia Pacific region. These interviews also helped construct different cases scenarios in adopting social media analysis tools for disaster preparedness. Due to geographical dispersion, these interviews were mostly conducted through technologically mediated forms (e.g., phone, Skype). Twenty-five interviews were conducted from May 6 to June 29, 2015. These participants represented 19 organizations selected through snowball and purposive sampling based on the levels of using social media and engagement in disaster preparedness. For some organizations, interviews were conducted with multiple representatives in order to gather sufficient user opinions capturing both the aspects of disaster preparedness and social media use. These participating organizations covered areas ranging from global (n= 2), regional (n= 4), Philippines (n= 5), Japan (n= 2), Taiwan (n= 2), Vietnam (n= 2), India (n= 1), and Indonesia (n= 1). By combining the results from both the survey and the interviews, insights were revealed regarding the differential usage of social media among RC/RC actors and development of case scenarios for the adoption of social media analysis tools in disaster preparedness.

[4] Source: https://www.ifrc.org/world-disasters-report-2014/data

4. Findings

In this section, we present the findings from the interviews and the online survey data. Specifically, these findings answer the objectives for this research by: a) identifying the current state and purposes of using social media and related analysis tools by the RC/RC actors and other humanitarian organizations in the Asia-Pacific region; b) identifying the factors influencing adoption of social media and social media analysis tools by the RC/RC actors and other humanitarian organizations in the Asia-Pacific region; c) presenting different scenarios of using social media and social media analysis tools for general humanitarian operations and disaster preparedness.

4.1 Findings from the Interviews

Analysis of the interview data identified seven themes which we elaborate in the following. On the one hand, the unique nature of humanitarian organizations makes the selection and adaptation of social media and social media analysis challenging. On the other hand, the needs for public communication and fundraising make the uses of these tools no different than those by private organizations. Note that due to the confidential protocol, organizations are presented using pseudonyms.

4.1.1 Target communities and social media use

Facebook and Twitter were reported as the common social media websites by the interviewed organizations. The main purpose of using these websites is public communication, especially to inform the general public about organizations' activities. Some organizations also use these websites for advocacy and fundraising. It is important to note that the public is not necessary the target community where the organization serves for disaster preparedness. Target community is defined differently. In most of the cases, social media have been used as a way to expand the reach outside the community where organizations serve locally. For example, for Organization F6, Organization J10, and Organization D4, target communities are local communities and partnering organizations and they communicate mostly through face-to-face and traditional media channels (radio, TV stations), couple with social media. Organization G7 uses social media such as YouTube to educate people about disaster preparedness training. Organization K11's target community are the volunteers around the globe, hence, they use multiple ways of communication, including Skype, email, and Line, to conduct training as part of the preparedness work between deployments. Organization S19 uses multiple means of communication, including email, Skype, Intranet, and a Facebook group page to communicate with its local county offices distributed globally.

Social media are also used as a good way to quickly gather and disseminate information when a disaster is developing. For example, Organization M13 and Organization R18 follow local governments' Twitter accounts to gather situational reports about the disaster and use their Twitter accounts to share operational information to other humanitarian organizational partners. Organization Q17 mentioned the information they post on Twitter about the disaster would be quickly picked up by humanitarian organizations in other countries, which is then useful for those organizations' fundraising efforts in their respective countries. Organization Q17 also uses its Facebook and Twitter accounts as a way to engage community members in developing situational awareness about disaster. When a disaster strikes, they recruit volunteers from the community, and those volunteers take pictures of the situation on the ground and send these pictures to Organization Q17 via SMS texting, or Facebook posting.

Taken together, even though social media are mostly used by the interviewed organizations as a means for public communication, social media uses can benefit other domains of humanitarian operations. For instance, Organization R18 and Organization P16's use of social media helps earn trust with the general public, which in turn helps receiving donations for disaster response.

Due to the access issue in particular rural or poor populations, however, organizations do not consider social media as an effective way to reach local target communities. This is a salient issue to be reckoned with when it comes to the institutional implementation and policies incorporating social media in disaster preparedness. As Organization O15 pointed out:

> *What our organization keeps in mind is that we do not miss those who suffered being left behind as much as possible. Of these people, for example, the handicapped have limited access to information that is necessary. If people like them are more accessible to information by using social media, we will make use of it more often. Or, for example, if people who have difficulty speaking a language look at social media and can get access to information on what is happening, we would like to make use of social media more often. Our organization will utilize social media in the future if it is guaranteed that not only young generation, who are good at using social media, but also a wider range of people including elderly people or handicapped people are able to have a command of and get access to it.*

Undoubtedly, disaster preparedness involves not only monitoring and gathering information but also informing the vulnerable community about how to take preparedness measures. This also touches on the mechanisms of translating the aggregated information into actions, which we will explain in the next few sections.

4.1.2 Automated and manual approaches of searching and monitoring

Social media usually provide embedded analysis tools. A few of such analysis tools stood out as the common ones used by the interviewed organizations, including Facebook Insights and Tweetdeck. Google Analytics is another popular tool used by organizations to track and analyze their website performance. For cross-platform options, Hootsuite is the most common one, but its uses vary by organizations. For Organization R18 and Organization A1, the idea of using Hootsuite is to be able to know the audiences better in order to craft preparedness messages to different types of audiences more effectively. Organization Q17 uses Hootsuite to more easily follow the social media postings by the government agencies, emergency-related organizations, and other humanitarian organizations. The reason of monitoring other humanitarian organizations' social media pages is mainly because there are certain local areas where only those humanitarian organizations are able to reach.

In general, except for a few, most of the social media analysis tools mentioned above are used to understand website traffic and visitor preferences, with the aim of better tailoring the messages to the intended audiences. Yet, regardless of the purposes, organizations rely much on manual searching and monitoring of public posts and other humanitarian organizations' social media accounts. Organization C3 and Organization D4 have been doing this digital "loitering" regularly with the aim of detecting potential community interests or online public discussion about the organizations themselves. Admittedly, instead of investing in proprietary software, resorting to manual ways of minoring public messages is partly because of the lack

of needs. Not surprisingly, the tools mentioned earlier (Hootsuite, Google Analytics, Facebook Insights) were chosen by the interviewed organizations mainly because of their low costs.

Some organizations adopt more advanced tools mainly for disaster response, and these include Radian6, Artificial Intelligence for Digital Response (AIDR), Scanigo, OpenStreetMaps, and MicroMappers. These tools allow for the aggregation of a big amount of data from social media websites, mostly Twitter, and aided with human coding, translating raw data into actionable information for relief actions on the ground. Even with the use of these automated tools, organizations always need to rely on human processing and coding. For organizations who are involved in crowd sourcing efforts for disaster response (Organization K11 & Organization L12), manual searches are needed across various social media websites (e.g., Facebook, Reddit, Instagram) and emergency-related organizations' websites (e.g., ReliefWeb, local governments). Hence, as part of these organizations' preparedness work, members engaging in manual searching and monitoring often undergo training between disasters in terms of knowing how to do online and social media searches and geolocating. The uses of automated and manual monitoring also depend on the type of disaster. In the case of Organization L12, automated tools are activated for disasters of large scope while manual searching and monitoring are adopted for small-scale disasters.

Not only is a combination of machine-based and human monitoring necessary, from a user's point of view, different technological tools also complement and supplement one another in accomplishing the work. For example, Organizations I9 uses Raidan6, coupled with the online crowd sourcing community, for disaster response, and uses Hootsuite to detect public perceptions and other organizations' work. Similarly, Organization O15 and Organization G7 use Google Analytics, in conjunction with manual searches, to understand visitor patterns and whether their organizations have been mentioned by other organizations or the public on social media and what other humanitarian organizations have been doing on social media.

4.1.3 Local contexts vs. global reach

Several organizations mentioned the importance of considering the local context in adopting and implementing social media technologies in general, and for disaster preparedness in particular. Different countries have different media preferences and different infrastructure of disaster preparedness in place. For example, in the Philippines and Indonesia, local government's preparedness measures are relatively solid and social media have been used as a common tool for government agencies to disseminate preparedness information. Organization D4 does not need to rely much on social media analysis tools for early warning because of their active role in the country-level emergency management system.

> *For example, if I'm in [city], I might receive a text from Water Resources Agency, telling me that there might be a chance of flooding in [city]. And our staff in charge can send the alert message to our respective branch, letting them prepare for what to do. So right now this type of alert is not from social media. Instead, it's because we have the connection with the government and the whole process is built into its system.*

It is known that media usage often exhibit country differences. Organization C3 has an understanding of which social media to search for different countries. For example, they search Weibo in China and Facebook in Taiwan. Organization K11 mentioned the differences in revealing location information by Twitter uses in different countries. This difference may in turn affect the data captured by social media analysis tools.

> *certain countries have no problems putting their location data. Australia leads the way, I'm not 100% sure about that, but I believe Australia will put their… they apparently have no problem keeping their location data on, where other countries, we don't want people following us, so we turn off our location, and so you know, if you can find out which countries do that, their Tweets are probably going to have location information with it, especially like Instagram will have location for their photographs, where other countries will not.*

4.1.4 Roles of offline and physical humanitarian networks

Information monitoring can take different forms, including using keywords or searching particular types of organizations. It could also happen through organizations' networks. When engage in digital monitoring, organization C3 relies on their informants or volunteers to direct them to certain interesting or important news they have overlooked. Organizations D4, Organization G7, and Organization N14 are embedded in the humanitarian networks in their respective countries, which helps locate accurate and immediate information for their work on disaster preparedness.

In disaster response, humanitarian organizations also collaborate with other volunteer networks to help with information processing. For example, Organization L12 works with another volunteer-based organization to clarify search terms before the step of automated searching and processing is initiated. In fact, more and more humanitarian organizations activate the connections with online volunteer networks without engaging in information aggregation and processing themselves. As a matter of fact, the possibility of working with volunteer and technical communities (V&TCs) or technology partners is the reason why Organization M13, Organization N14, and Organization H8 did not adopt or use social media analysis tools regularly.

4.1.5 Opportunities and challenges of social media analytics

The powerful function of social media analysis tools to quickly aggregate information from multiple online sources is beyond doubt. To reflect this trend, guidelines about social media analytics for emergency management have been developed. [5] Standardized hashtags have been implemented by organizations in the Philippines, which makes the automated data curating process more effective. Yet social media are changing, which can be seen as an opportunity and a challenge for data analytical purposes. For example, Facebook's safety check service on Facebook was used by some people after Nepal earthquakes in late April 2015. The questions of how to incorporate this service in organization's preparedness training

[5] http://reliefweb.int/report/world/hashtag-standards-emergencies
http://humanityroad.org/smemanalyticsguide/

with the community and how this information can be captured in the existing analysis tools merit further discussion.

On the other hand, the quality of the data captured by these tools needs to be taken with a grain of salt due to the linguistic natures (e.g., abbreviations, incomplete sentences) and the noises (e.g., irrelevant posts). As Organization L12, Organization K11, and Organization H8 said, it takes quite a lot of manpower to verify and clean the data in order for the data to be useful. If the Twitter user does not put detailed information such as location in the message, the usefulness of the information can be limited. Organization P16 also expressed concerns about the quality or even less reliable information from the public postings on social media. Hence, they usually made the response action based on the assessment team or branch offices on the ground. As Organization P16 pointed out, if the general public does not verify the information before forwarding or retweeting it, the data from these public postings may cause confusion or even delay response actions.

Several organizations do not see a particular need to use a dedicated social media analysis tool, given that manual searches and monitoring sufficient to meet their goal of disaster preparedness and general operations. Costs and lack of manpower are the common barriers mentioned by the participating organizations in developing a full-blown strategy for social media analytics. Additionally, due to the unique nature of disaster preparedness, one of the challenges encountered is to find a tool that can fit the exact needs of the tasks involved in disaster preparedness, specifically knowing the different types of audiences involved in disaster preparedness; some are the community members, some are general public, while others are the humanitarian organizations.

Certainly, the value of social media analysis tools entirely rests on the data that are produced on social media. If social media use is only limited to certain selective groups of people in a country, the technology itself or the analysis of this technology can provide little value to humanitarian work. A common concern about digital disparities has been raised by several organizations (e.g., Organization S19, Organization E5). As Organization M13 pointed out:

> *the big limitation here is we don't know if we have accurate pictures of who has -- what the rates of access to social media are in different areas so it can be hard to differentiate between a heavily damaged area with not a lot of social media for severely damaged area with lots of social media and that creates a false signal.*

When it comes to disaster preparedness and response, actual preparedness behaviors and physical relief actions on the ground are the most important outcomes to deliver. As a result, questions arise regarding the mechanisms of transferring online information/big data into realization of actual action and program and integration of data output, and whether other channels are needed to communicate the information back to the target communities, affected communities, or the responders on the ground. Organization L12 commented on this potential gap between big data analysis and actionable response on the ground, which involves "a life cycle of the information flow in case management." Organization M13 alluded to the challenge when integrating the information gathered from traditional assessment on the ground and that from social media postings into one common operational picture. In fact, such comparisons between different sources of data are needed, yet have not been conducted.

4.2 Findings from the Survey Data

Among the 17 responding RC/RC organizations, 16 indicated using social media. Facebook, Twitter and YouTube are the three most popular social media websites used by the RC/RC organizations in the Asia Pacific region.

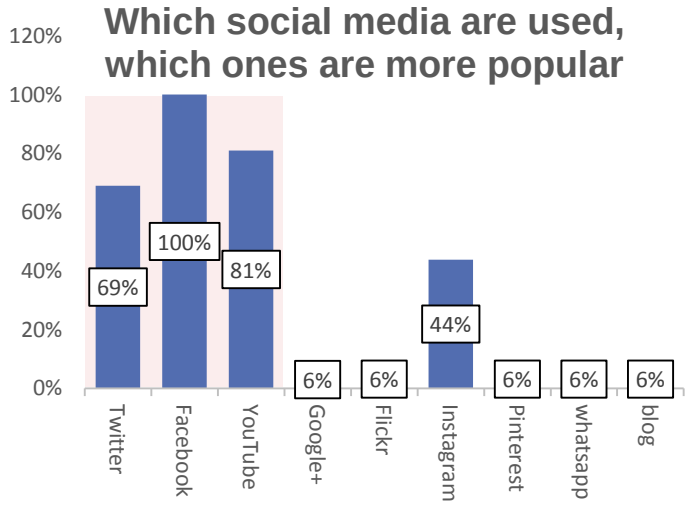

Figure 4.2.2 – Choices of social media and popular social media

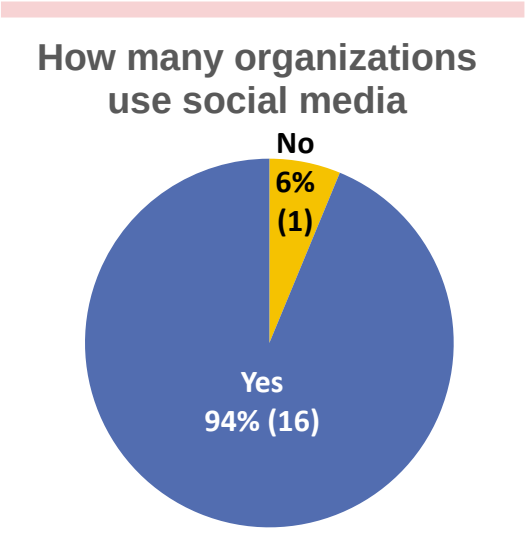

Figure 4.2.1 – State of social media usage

In terms of frequency, Facebook dominates the list, followed by YouTube. Twitter is used less often across the board.

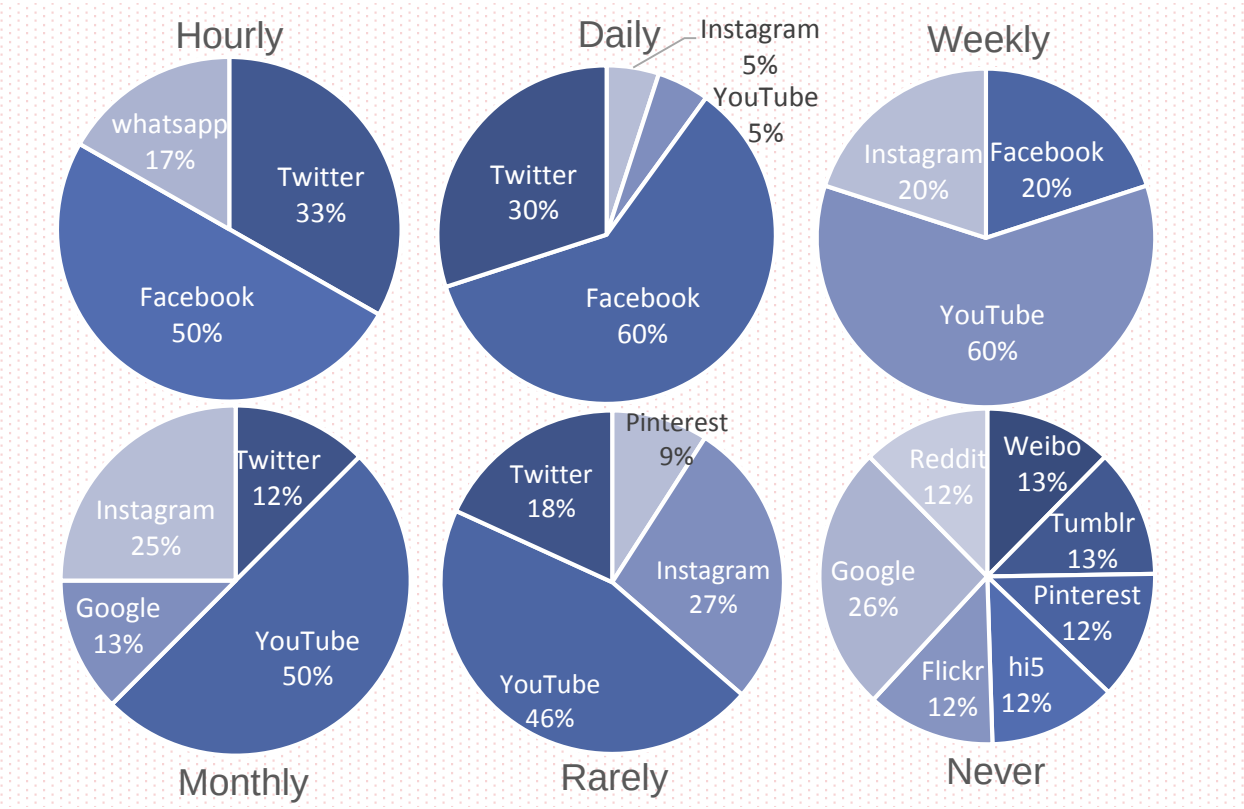

Figure 4.2.3 – Frequency of social media use across 16 organizations

Social media (especially Twitter, Facebook, and YouTube) are mostly used for communicating with the public and for community engagement, followed by communication during and after disaster, and fundraising.

Figure 4.2.4 – Common purposes of using social media

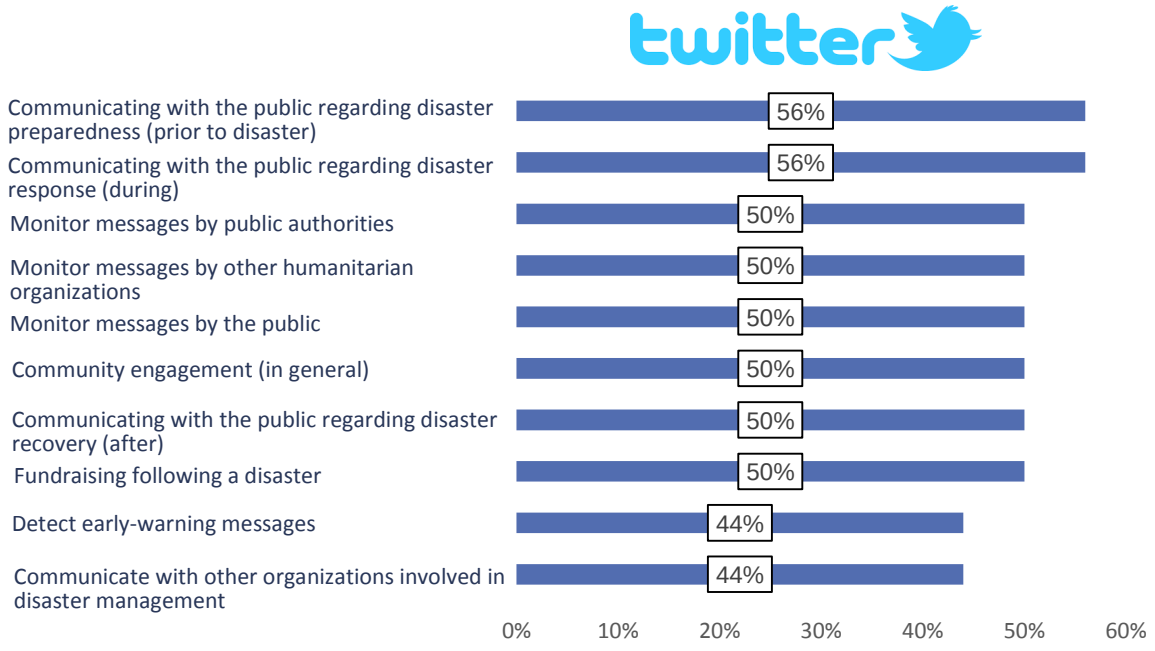

Figure 4.2.5 – Common purposes of using social media (Twitter)

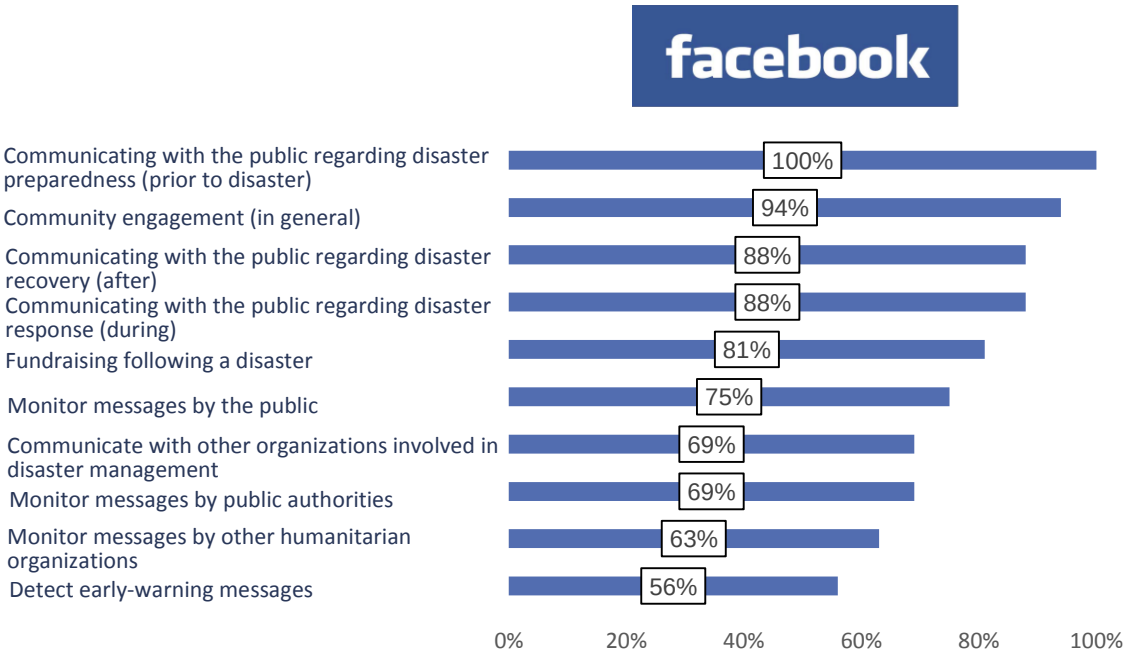

Figure 4.2.6 – Common purposes of using social media (Facebook)

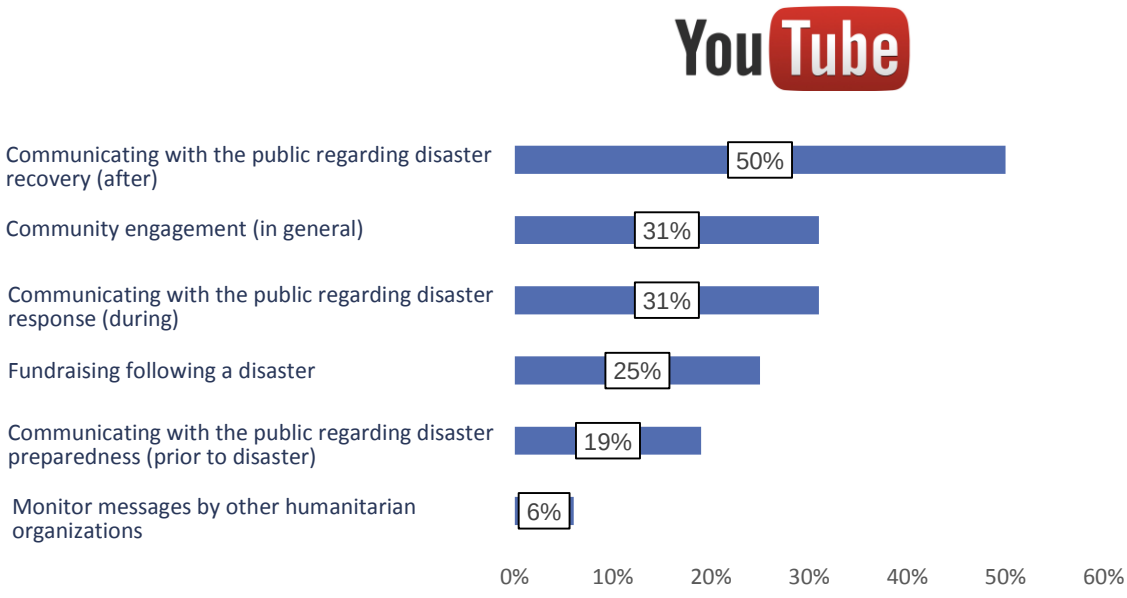

Figure 4.2.7 – Common purposes of using social media (YouTube)

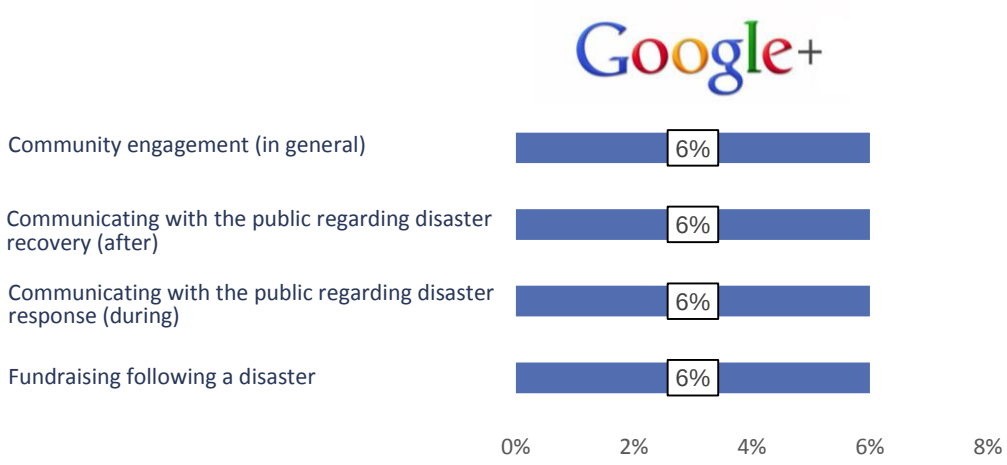

Figure 4.2.8 – Common purposes of using social media (Google+)

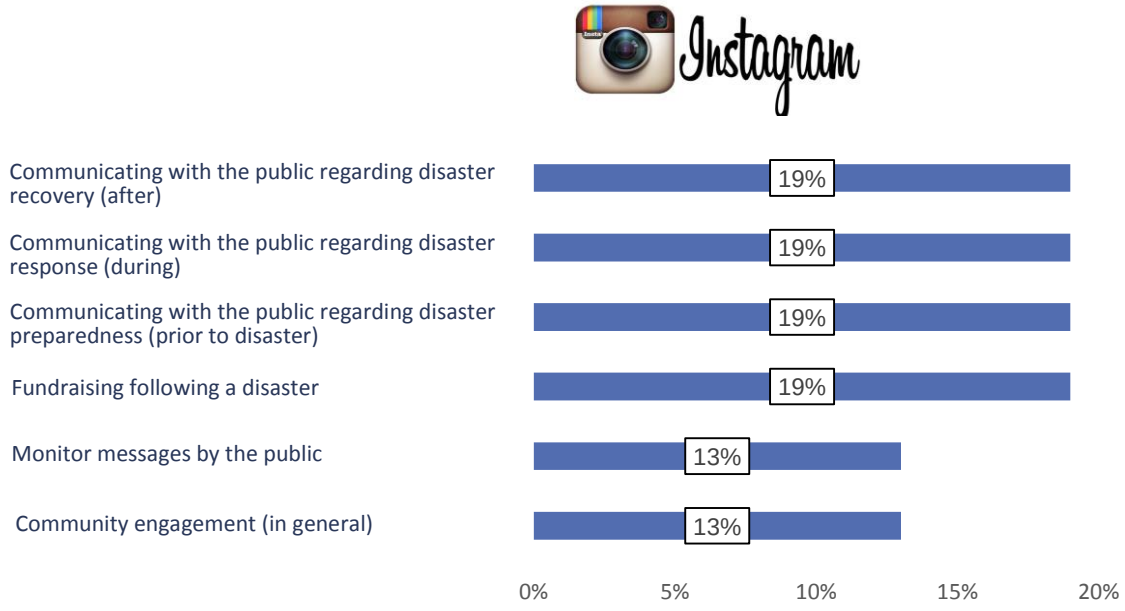

Figure 4.2.9 – Common purposes of using social media (Instagram)

Other purposes include: volunteer mobilization, awareness and promotion, education, advocacy. Problems encountered include the reach to a wider public, and lack of manpower dedicated to social media posts/management.

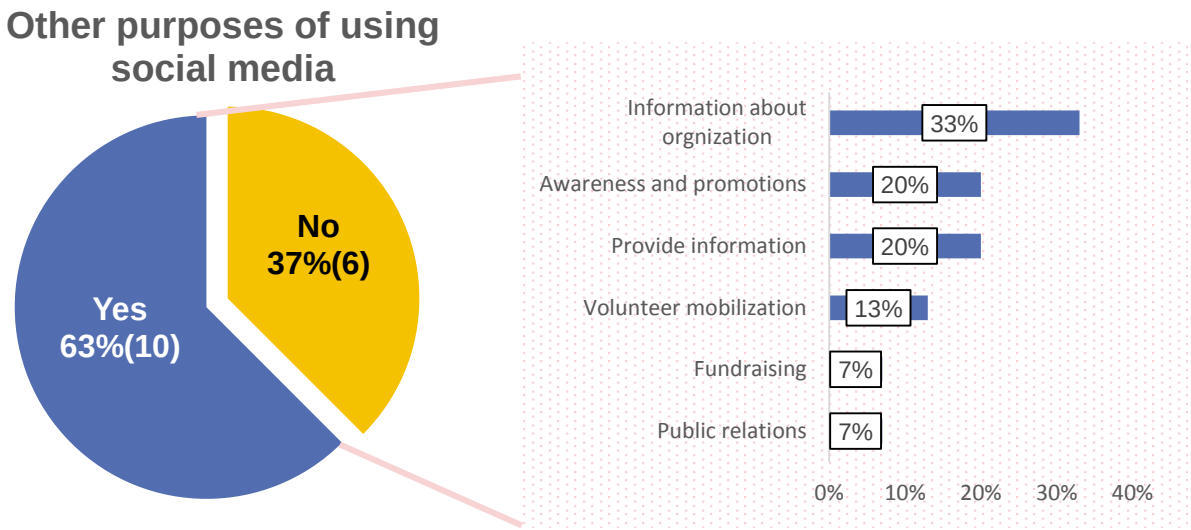

Figure 4.2.10 – Other purposes of using social media

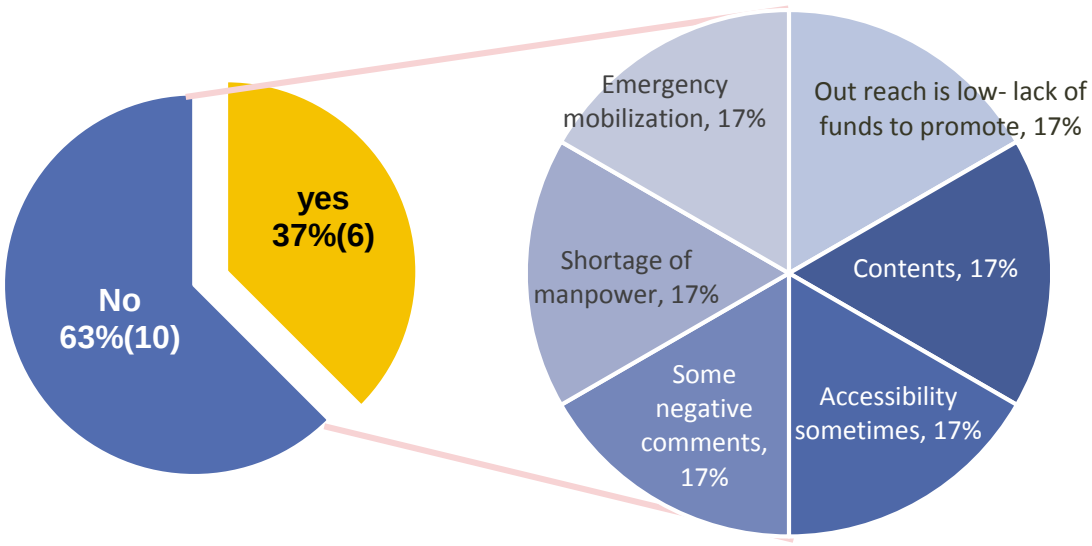

Figure 4.2.11 – Problems of using social media

Figure 4.2.13 reported using standalone social media analysis tools, ranging from Facebook Insights, Google Analytics, Crowdbooster, Hoosuite to Twitter's own analysis tools.

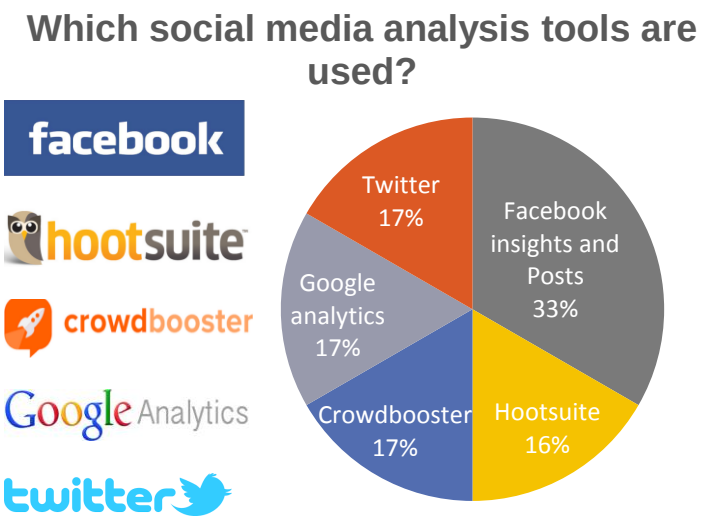

Figure 4.2.13 – Adoption of social media analysis tools

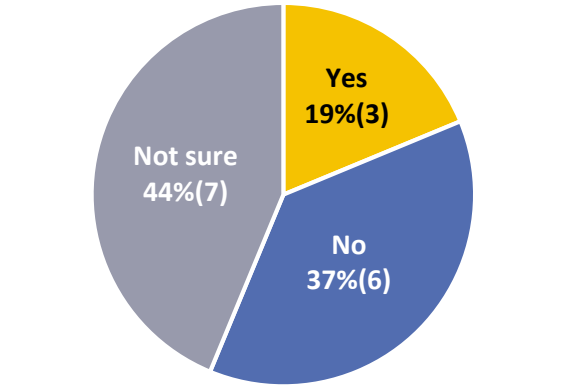

Figure 4.2.12 – State of social media analysis tools

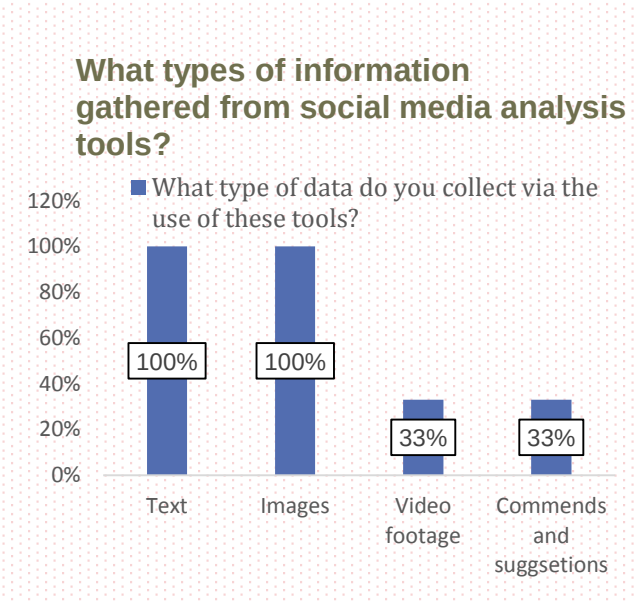

Figure 4.2.14 – Types of information gathered from social media analysis tools

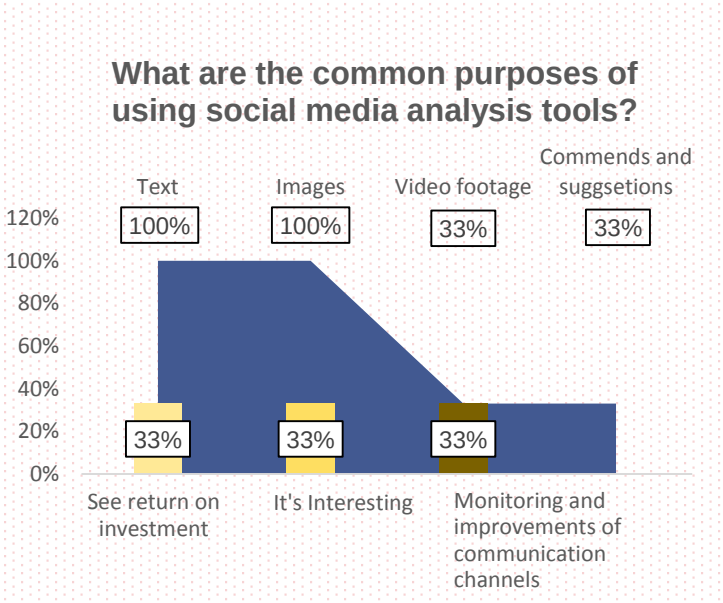

Figure 4.2.15 – Common purposes of using social media analysis tools

For the few organizations (n=3) who have adopted social analysis tools, they reported the reasons of using social media analysis tools, including: gauging effectiveness of posts, tailoring content to audiences better, and improving communication with the public/audiences. Data visualization was considered the most useful feature among surveyed organizations. Interestingly, geocoding was rated with mixed feedback, which is consistent with the interview findings.

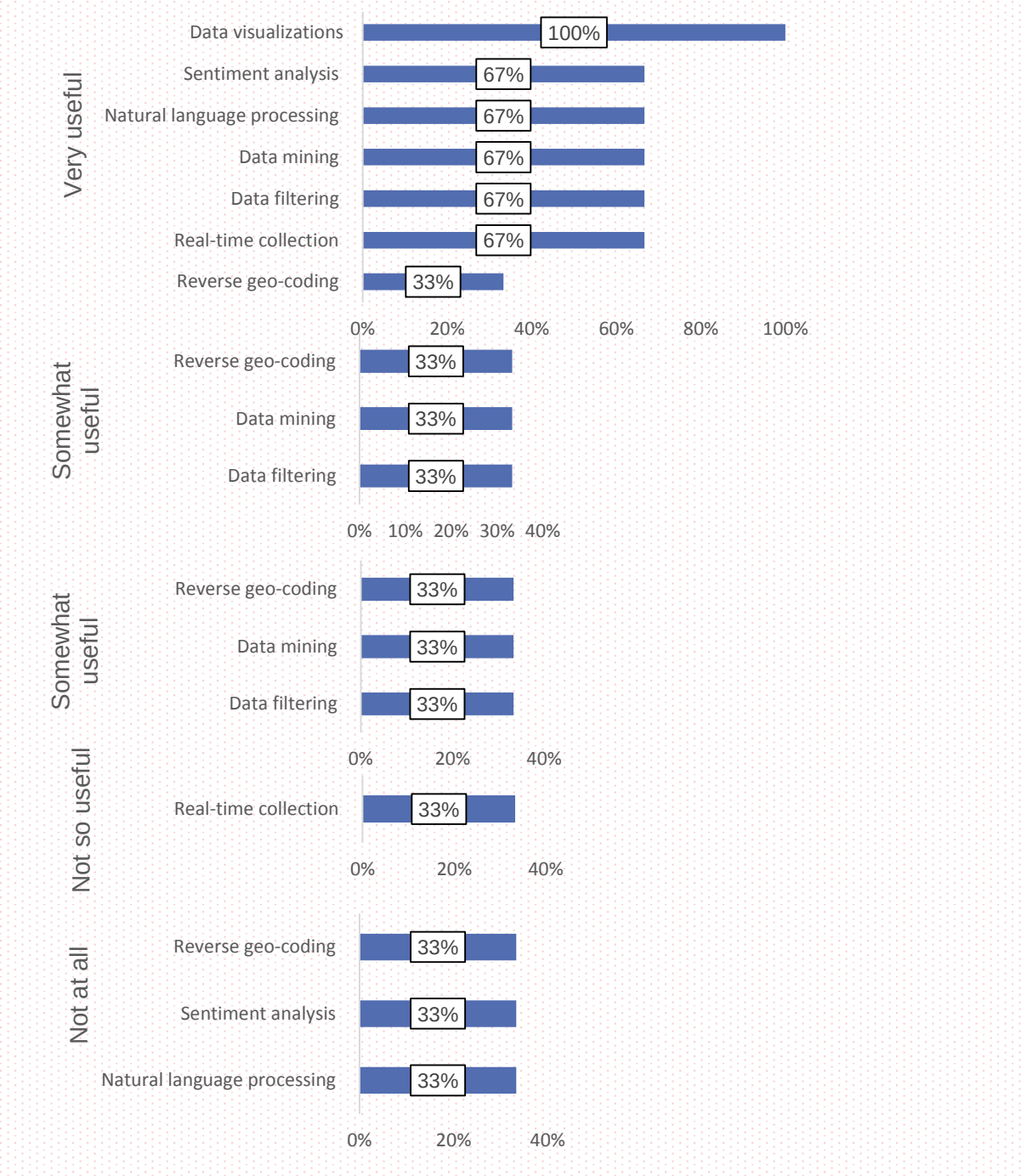

Figure 4.2.16 – Usefulness of features enabled by social media analysis tools

Cost efficiency and usability issue are the major deciding factors in adopting social media analysis tools. The secondary set of factors is concerned with whether the tool allows for analyzing text in multiple languages and whether the support is available in terms of how to use the tool. Financial consideration and difficulty to find the right tools to serve the organization's purposes were reported as barriers to using social media analysis tools. Once again, cost was the obstacle that organizations found difficult to overcome in adopting social media analysis tools, coupled with lack of time or manpower to manage the use of these tools.

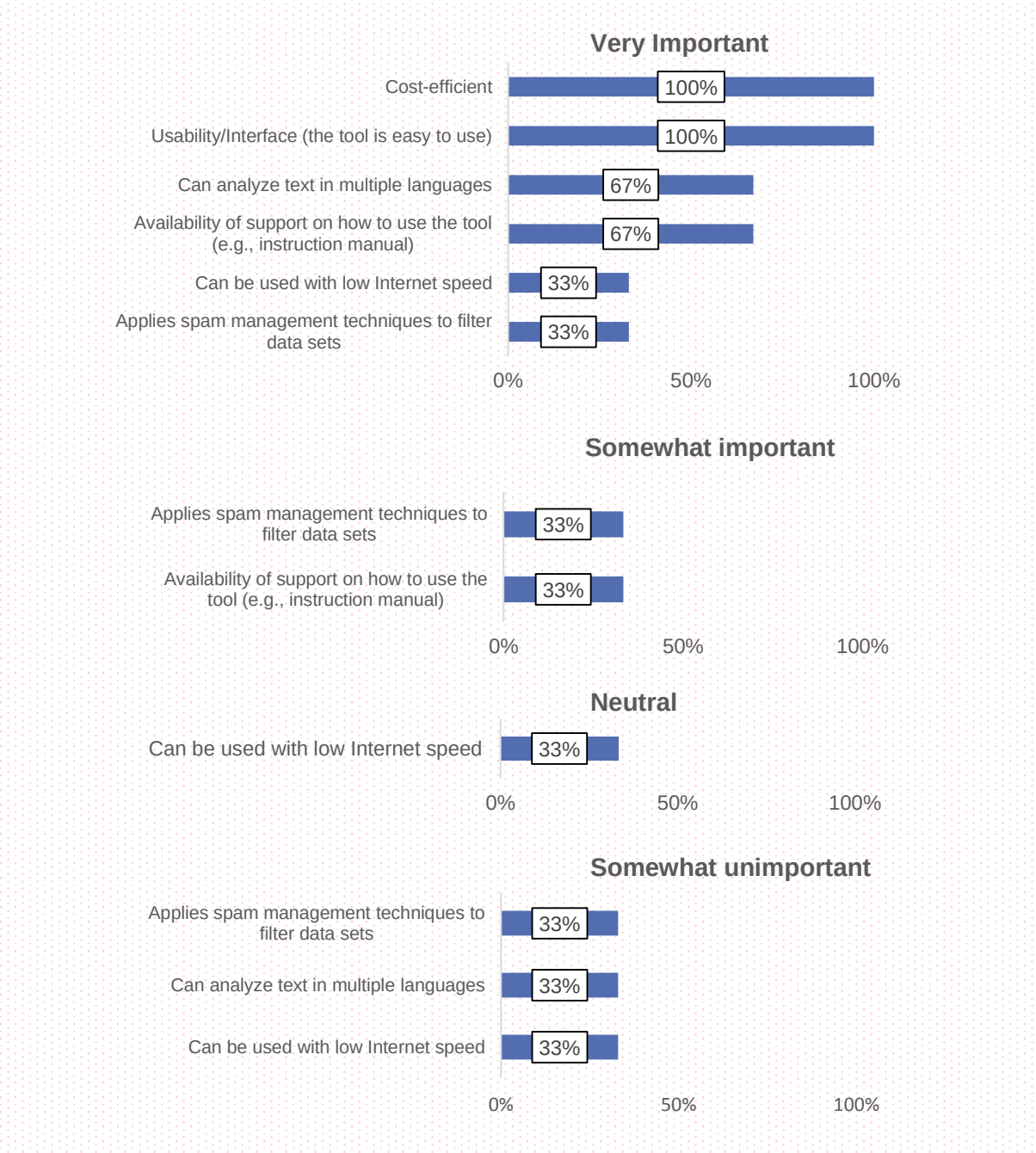

Figure 4.2.17 – Selection criteria of using social media analysis tools

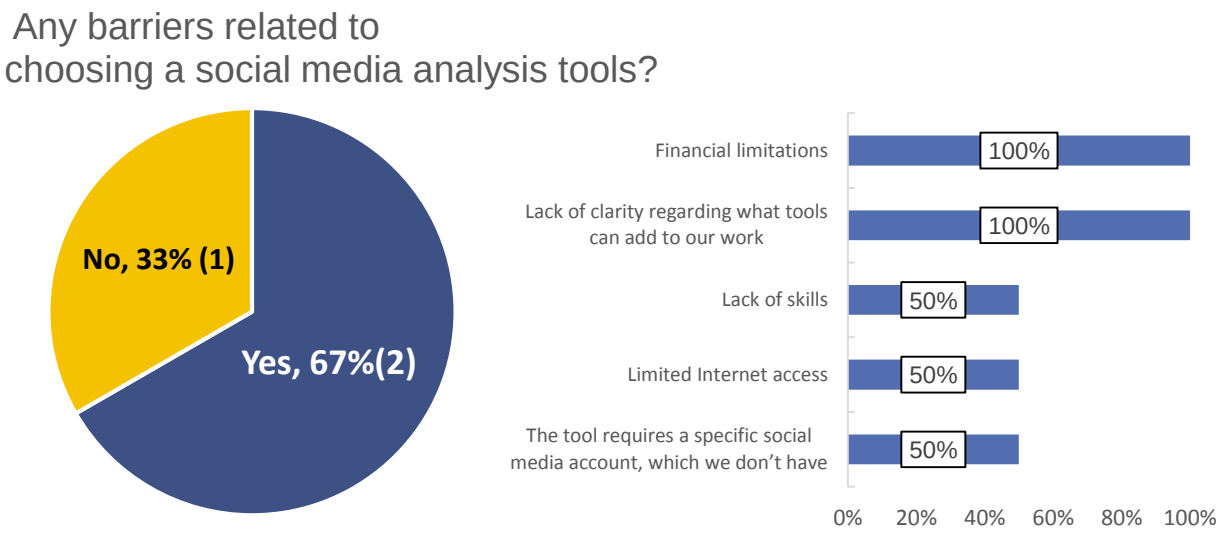

Figure 4.2.18 – Barriers of choosing social media analysis tools

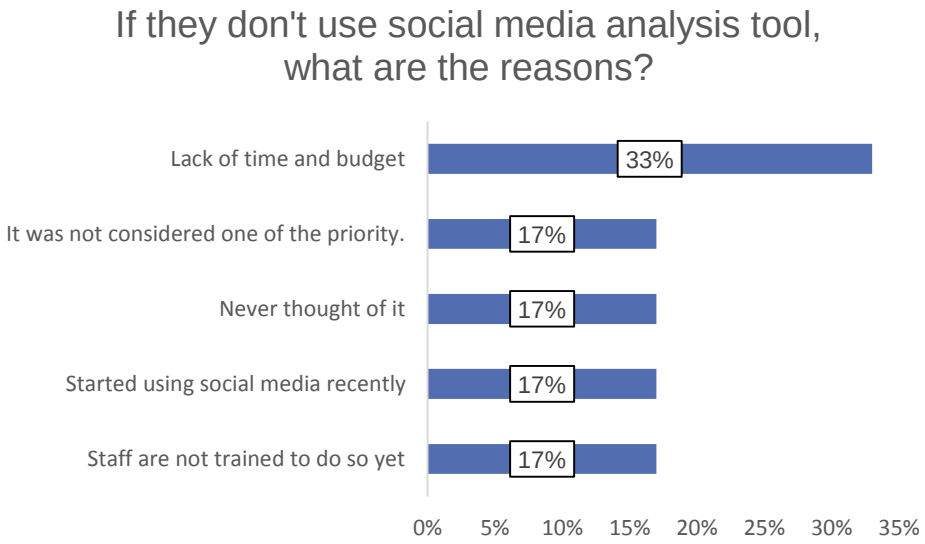

Figure 4.2.19 – Reasons of non-adoption of social media analysis tools

The uses of social media and social media analysis tools for disaster preparedness entail information sharing. The survey results showed that 9 of the responding RC/RC organizations share information they gathered from social media or social media analysis tools to other parties.

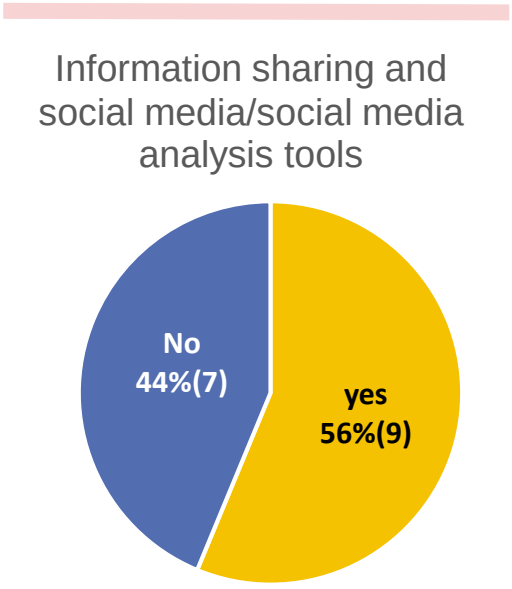

Figure 4.2.20 – Information sharing and social media/social media analysis tools

These include the target community where they serve (mostly through face-to-face, followed by phone calls),community-based groups (mostly through face-to-face), other RC/RC offices within the country (mostly through online messaging/social media or emails, followed by phone calls), other RC/RC organizations in other countries (mostly through online messaging/social media or email), other humanitarian organizations within the country (mostly through email, followed by online messaging/websites or face-to-face), and other humanitarian organizations in other countries (mostly through online messaging/ social media or email).

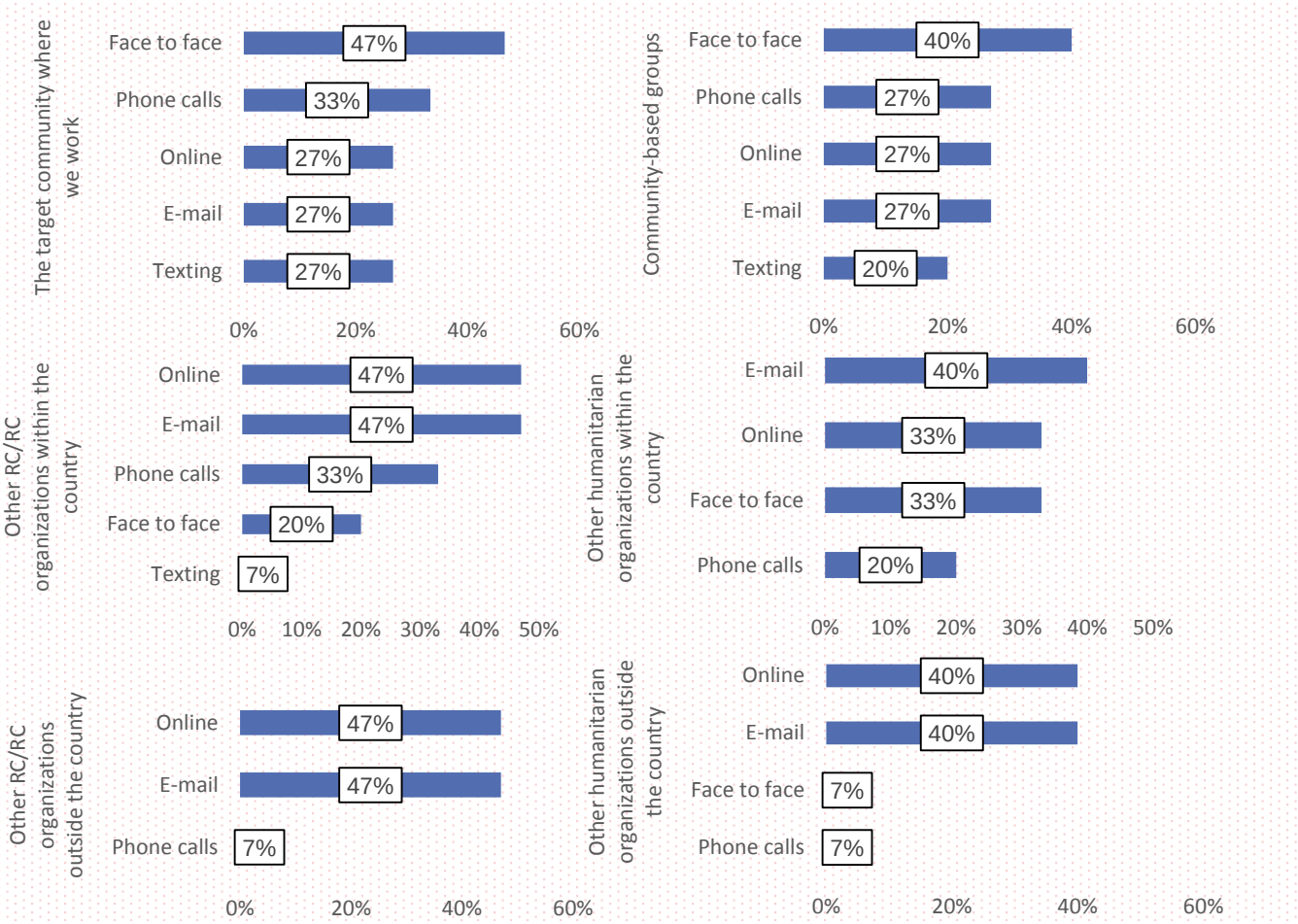

Figure 4.2.21 – Information sharing with target community by channels

5. Recommendations

Depending on the data needed and the scope of community engagement, different types of social media analysis tools should be implemented (manual, standalone open-source, free version or subscription plans for proprietary software). The following recommendations are developed in the form of case scenarios, with the aim of providing suggested options for organizations with different needs and different levels of resources in adopting analysis tools for disaster preparedness.

The interview data showed that the major barriers associated with using social media and social media analysis tools are lack of funding and lack of manpower. But most organizations operating at the country level engage in manual searches of public online postings or other humanitarian organizations' social media postings, with the purpose of detecting public perceptions and community interests about different topics. Even though these uses are not directly linked to disaster preparedness and risk reduction, it indicates the potential of building on the existing manual approaches to invest in disaster preparedness. Depending on the type of disaster, contingent efforts can be spent on the choice of the approach to aggregate and analyze the social media data. For example, as the approach followed by Organization L12, for small-scale or slow-moving disasters, relatively low-cost manual ways of searching and monitoring may meet the needs of disaster preparedness and response.

Recommendation # 1

1. As a low-cost option, building on existing practices of manual monitoring (or free versions of social media analysis tools), organizations can focus on the popular social media websites used in the respective country to regularly use keywords searching discussion about the organization. Parallel to this is the manual searching of social media websites of other humanitarian organizations and emergency-related public agencies. In this way, organizations can expand their use of social media for public relations purposes to the domain of disaster preparedness without extra financial burdens. Note that the basic version of most social media analysis tools can effectively aggregate the postings from the sources that the organization mostly relies upon such as emergency management organizations, which saves time costs.

Recommendation # 2

2. Depending on the severity of the disaster, manual or basic version of social media analysis tools (e.g., Hootsuite) can be used for small or slow-moving disaster such as storms or typhoons whereas automated analysis tools (e.g., Radian6, Scanigo, AIDR) should be used for large or fast-moving disasters such as earthquakes. If constrained by resources, the automated method can be initiated through cooperation with online volunteer and technical communities. Organizations may choose to invest in manual or automated approaches suitable for their needs and goals.

Engaging community in disaster preparedness can take multiple forms and on short-term and long-term bases. For example, the relationships Organization C3 has built over time with the public on their social media websites helps their manual searches and monitoring of online public reporting for preparedness purposes. Through a crowdseeding approach where trained volunteers gather information regularly from the local community, Organization C3 and Organization Q17 not only help the community to build resilience but also build the capacity to mobilize their volunteer network quickly when a disaster happens.

Recommendation # 3

3. As a low-cost option without adding extra financial cost to purchase social media analysis tools, organizations can use their website and social media pages to build relationships with the public. Rather than effortless random searches, these relationships can help organizations effectively activate monitoring of potential community interests in disaster preparedness in particular online spheres.

Depending on the type of organization, to reduce management of manpower and overhead, collaboration with digital humanitarian networks or technology companies may be a complement or even a substitute to investing in social media analytics in house. Organization B2 described their idea of reducing redundant effort of sending out duplicate information on social media. Instead, humanitarian organizations might see the information posted on social media as a "collaborative goods." Extending this remark to social media analysis tools, it is obvious that if the humanitarian sector within a country can collaborate on incorporating social media in disaster preparedness, a compatible and smooth interface can be established between information aggregation and prevention work. For example, if two similar Facebook postings about non-emergency situations in a small region are picked up by two organizations, the information should be interpreted universally based on certain standardized usage instead of treating the postings as distinct. In this way, the disaster preparedness program can be implemented more efficiently, instead of compromising resources in a suboptimal way.

Recommendation # 4

4. A model of collaborative or joint efforts of using social media analysis tools may form at the country level, and guidance can be developed such as standardization of keywords and mechanisms of information sharing. This guidance or agreement can help facilitate accurate information gathered by either manual monitoring or through analysis tools, and streamline the process from data gathering to preparedness measures and response action on the ground.

A common theme that emerges from the data is the consideration of the local context. Indeed, country differences are reflected in the type of data that can be sourced and aggregated. For example, the value of data might be limited because the geo-locating feature is not activated in certain countries. Moreover, in some countries (e.g., Taiwan), Twitter is not a popular social media website. Diffusion of selective social media coupled with the well-established emergency management system indicates the importance of following social media websites of these public agencies regularly in certain countries. Moreover, except for Google Analytics that has a wider geographical reach, popular social media analysis tools such as Hootsuite are not available in many languages used in the Asia Pacific region (e.g., Vietnam). Together, these findings show the importance of making adjustments when monitoring and searching country data, either through manual or automated ways.

Recommendation # 5

5. For organizations operating across multiple countries, if without the assistance of sophisticated analysis tools, manual monitoring should be tailored to each country. In other words, pay attention to the social media websites to monitor, the hashtags/keywords, and the sources of postings. If using social media analysis tools, instead of the generic keywords, it is also necessary to configure the search range and parameters of data for different countries. This approach can help ffacilitate precise information aggregation and facilitate effective response action.

Disaster preparedness is not only about getting information out but also sending and communicating the information to engage with the community so they know how to prepare themselves. Hence, it is important to understand the needs of the community before imposing the tools on the community. The majority of the interviewed organizations mentioned the use of a mixed channels of face-to-face, traditional media (radio, television), and social media in communicating with communities regarding disaster preparedness. As several organizations Organization E5, Organization M13 and Organization J10 pointed out, while social media are intuitively powerful in reaching out audiences, vulnerable populations such as those living in the rural area lack digital access to these advanced technologies and they are the ones who are in need of building their resilience capacity against disasters. Alternatively, aggregating and curating mobile phone data is a possibility of building situational awareness as mobile phones have a relatively wider reach and higher penetration among vulnerable populations in Asia (Organization N14 and Organization H8). This type of mobile-based environmental surveillance has been developed in countries such as a Red Cross-sponsored MRA app and a flood alert app in Indonesia and Mo-Buzz in Sri Lanka.[6]

Recommendation # 6

6. In communities without sufficient access to the Internet or only with low bandwidth access, data monitoring may need to be implemented through mobile devices such as mobile apps or mobile SMS messaging, as a supplement to social media-based data monitoring and curating. In particular, community members are able to receive alert or preparedness messages, and at the same time, they can engage in first-hand environmental surveillance and report non-emergency situations directly to the local Red Cross or public agencies. Accordingly, more precise situational reporting messages from the target community can be expected and preparedness message can reach the target community effectively.

Certainly, this community engagement approach will be enhanced with a foundation of data preparedness already established. As Organization M13 and Organization H8 mentioned, data preparedness involves information gathering about the community (e.g., size of the population, socio-economic situations of the households, technology access) during the preparedness stage, and it usually relies on the publicly available data (e.g., government census) or community surveys performed by the assessment staff on the ground. The approach adopted by Organization Q17 offers another useful reference. They solicit help from the local community members in providing information about the area through mobile devices prior to disaster. The information or photos are taken by community members' mobile phones, and sent to Organization Q17 contact persons' mobile phone, Organization Q17's Facebook or Twitter page. Similarly when the organization culls risk-related information from social media analysis tools, they communicate the message back to the community through SMS, Facebook or Twitter. The lesson taken here is the use of a combination of multiple ICTs in engaging community members in disaster preparedness. Undoubtedly, when engaging the community in this interaction, the process of validating and integrating different sources of information (e.g., public postings on social media, mobile alerts, reporting by trained volunteers on the ground) into operational information needs to be carefully executed.

[6] https://play.google.com/store/apps/details?id=com.ecc.dma&hl=en;
http://petajakarta.org/banjir/en/;
http://www.mo-buzz.org/srilanka/how-it-works/

Recommendation # 7

7. A more systemic thinking needs to be established, keeping in mind the situation where communities do not have prevalent access to the Internet or only with low bandwidth access to the Internet. To facilitate a seamless process from data gathering, interpreting (filtering cleaning process, verification process), and reaching out to the community, a set of communication channels should be prepared to engage the community in disaster preparedness, including traditional media (radio, television), mobile app alerts, and social media. As a result, community members are likely to be motivated to engage in disaster preparedness and risk reduction and enhance their capacity in ways suitable for them.

	Strategy	Expected benefits
Recommendation 1 ***Low-cost option***	*Engage in manual searches and monitoring (or using the free version of social media analysis tools) of the popular social media applications used in the respective country and this includes following social media websites of other humanitarian organizations and emergency-related public agencies within the country*	*Building on existing practices of manual or basic monitoring for public relations to expand to disaster preparedness without exerting extra burden on costs and manpower*
Recommendation 2 ***Disaster-contingent strategy***	*Depending on the severity of the disaster, manual monitoring or basic version of social media analysis tools can be used for small or slow-moving disaster such as storms or typhoons whereas automated analysis tools should be used for large or fast-moving disasters such as earthquakes.*	*Organizations may choose to invest in manual or automated approaches suitable for their needs and goals*
Recommendation 3 ***Long-term strategy***	*Use organization's website and social media pages to build relationships with the public as a way to recruit contacts for long-term effective monitoring*	*More effectively activate monitoring of potential community interests in disaster preparedness in particular online spheres*
Recommendation 4 ***Country-wide strategy***	*A model of collaborative or joint efforts of using social media analytics may form at the country level, and guidance can be developed such as standardization of keywords and mechanisms of information sharing*	*Help streamline the process from data gathering to preparedness measures and response actions on the ground*
Recommendation 5 ***For multi-country organizations***	*Tailor the monitoring of public social media postings, either manually or through automated methods, to each country*	*Help facilitate precise information aggregation and facilitate effective response action*
Recommendation 6 ***For communities with varied digital access***	*In addition to social media-based approach, data monitoring may need to be supplemented with other means, such as mobile-based reporting (mobile apps or mobile SMS messaging and traditional assessment on the ground*	*Ensure more precise situational reporting messages from the target community and preparedness message can reach the target community*
Recommendation 7 ***For communities with varied digital access***	*A more systemic thinking needs to be established, requiring a combination of multiple technologies in two-way communication with the community for disaster preparedness*	*Motivate community members to engage in disaster preparedness and risk reduction and enhance their capacity in ways suitable for them*

Table 5.1– Overview of recommendations

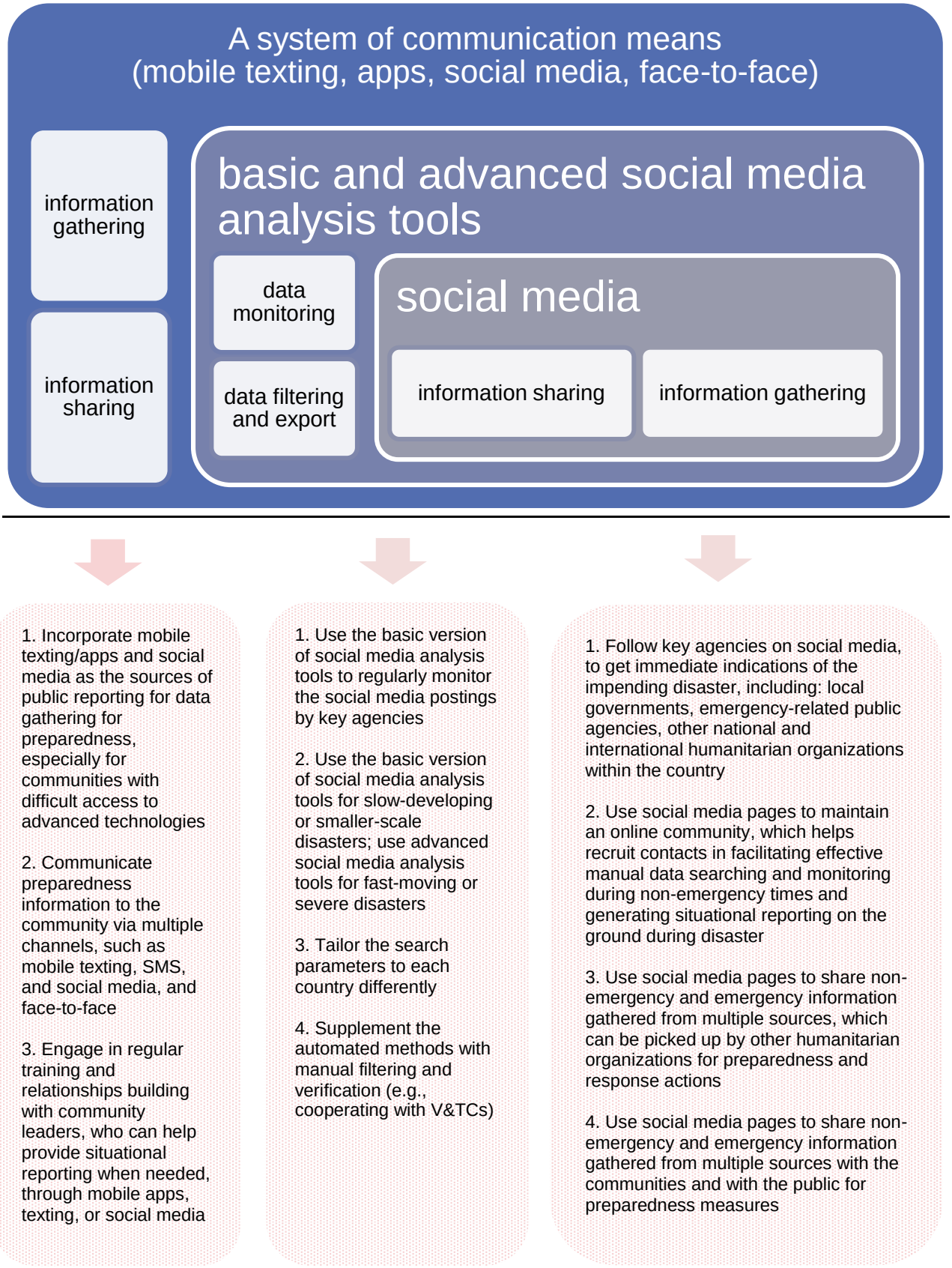

Figure 5.1 – Key messages about social media and analysis tools for disaster preparedness

6. Suggestions for future research

Expanding on our findings and GDPC's initiative, we conclude our report with three areas of future research.

Future research 1:

Findings of this study showed the prevalent use of social media by humanitarian organizations in several countries in the Asia Pacific region. Nonetheless, a common theme that emerges from the interview data pointed to the digital disparities that need to be reckoned with in incorporating social media and analysis tools in the work on disaster preparedness. With the relatively high penetration rate of mobile phones in Asia, we consider a two-pronged study assessing how mobile media and social media, individually and in combination, can be used to build and enhance situational awareness about disasters at the community level. Research on mobile phone based environmental surveillance is still in its infancy even though some apps have been developed such as MRA app in Indonesia and Mo-Buzz in Sri Lanka. Specifically, this future research will be conducted at the user side, examining how members of communities of different levels of Internet and mobile penetration engage in environmental surveillance through mobile phones and/or social media and the resulting effects on their risk awareness and preparedness behavior. The first phase of the study focuses on mobile-based situational reporting and the second phase expands to examine the engagement of both mobile phone and social media-based reporting.

Future research 2:

Findings of this study showed that organizations share information they gathered from social media or social media analysis tools with the target communities or other humanitarian organizations, through face-to-face, email, online messaging, or social media. The mechanism of information sharing in this aspect is key to mobilize a humanitarian network for disaster preparedness and response. In fact, the interviewed organizations raised the concern about how to measure community reactions to the information shared on their social media pages. Measuring community engagement and disaster preparedness is another well-established area. Yet related to social media, little research has been done on measuring community members' receipt and perceptions of preparedness messages on humanitarian organizations' social media pages. This research can be conducted in a form of survey with selected communities and investigate whether and how they receive the preparedness messages posted on humanitarian organizations' social media pages. These results can inform the ways social media messages are disseminated (or not) to targeted communities and whether social media analysis tools are able to capture accurate community interests. This research can thus offer better insights about how to incorporate social media and analysis tools into disaster preparedness.

Future research 3:

Development of social media and analysis tools changes rapidly and the demands for disaster preparedness and response are changing quickly too. It is thus necessary to investigate whether the use of social media incorporates more elements of disaster preparedness in one or two years. Content analysis can be conducted on selected humanitarian organizations' (including RC/RC organizations) social media pages and compare the change, if any, in adopting social media for disaster preparedness, especially comparing the practices with the recommendations proposed in this report. This research can also shed light on the possible country and cultural differences in adopting social media for disaster preparedness.

7. About the principal investigator and the institution

Principal investigator (PI) (Lai) and the affiliated organizations, Singapore Internet Research Centre (SiRC) at Nanyang Technological University, have unique advantages of carrying out this proposed project. Lai has been involved in several projects on organized disaster management, including Hurricane Katrina, Hurricane Sandy, and Hurricane Haiyan, and is well versed in knowledge about the relief network and international humanitarian relief community. This project meshes well with Lai's other research work in progress on the use of new media technologies for humanitarian aid on a global scale. Specifically, in that particular project, using both survey and social media data, Lai investigates how humanitarian organizations use social media and other online media technologies to build network relationships within and across organizations, and to interact with the communities where they serve. These network relationships and community engagement are deemed critical in building organizational and community resilience, which could ultimately help the management and delivery of humanitarian aid on the ground.

Launched in January 2004, SiRC is hosted at the Wee Kim Wee School of Communication and Information, Nanyang Technological University (NTU). SiRC is recognised as a premier Asian research institute on new media. SiRC initiates and conducts research related to new media/internet across Asia, bringing Asian experiences and perspectives to the global discussion about the development, impact, and potential of modern information and communication technologies. The SiRC associates engage in a wide variety of collaborative research efforts with other researchers around the globe. For more information see www.sirc.ntu.edu.sg.

In research, SiRC has produced a remarkable list of publications and conference presentations. SiRC has in the past few years spearheaded numerous research projects, conducted workshops and conferences, and hosted visiting fellows. One of the latest and second biggest grant award to-date to SiRC by the International Development Research Centre, Canada is the Strengthening Information Society Research Capacity Alliance (SIRCA), which is designed to support research projects that will strengthen the body of methodologically sound and theoretically-based social science research in information societies and to improve the inter-disciplinary research skills of emerging scholars in information and communication technologies for development (ICTD) and information societies in the global south. SIRCA I had a total of 13 projects from Asia and SIRCA II is currently funding emerging ICTD scholars in 15 countries from the three regions – Asia, Latin America and Africa. More information about the programme can be found at www.sirca.org.sg. In teaching, SiRC research associates have brought state-of-art knowledge to the classroom. In training, workshops have been held for the Internet community, for example, workshops on the legal issues facing bloggers, journal publication and personal data protections. In public consulting and policy advocacy, SiRC associates were present in the high-level Advisory Council on the Impact of New Media on Society (AIMS) and contributed to the final report of the Council.

8. Acknowledgments

We wish to acknowledge the critical support and contributions by the RC/RC organizations participating in the survey and the organizations joining the interviews, including the following (those who agreed to be publicly acknowledged):

Asia Disaster Preparedness Center
CARE
Humanity Road
ICRC Philippines
IFRC Southeast Asia
OCHA Indonesia
OCHA Philippines (Information Management Unit)
OCHA ROAP
Oxfam Philippines
Plan International Philippines
Plan International Asia
SRD
Standby Taskforce

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