Small Businesses and Social Media Usage in the 2013 Colorado Floods

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ABSTRACT

The recovery of small businesses from a disaster is critical to community recovery. Such businesses can be extremely vulnerable to disasters, particularly because they often occupy a single location and have a localized customer base. Although social media is an effective platform for information dissemination, and has been extensively used in a disaster context, the way in which small businesses use social media in this context, and the effectiveness of those efforts, are still not well understood. With this in mind, this paper uses the 2013 floods along the Front Range in Colorado as a case study to help improve our understanding of how small businesses use social media in disaster situations. Characterizing the organizations' behavior involves using both qualitative and quantitative approaches, and the paper focuses on an initial qualitative analysis.

Keywords

Social media, Small business, Recovery, Disaster

INTRODUCTION

The recovery of small businesses from a major disaster is critical to the overall recovery of a community (Muske et al., 2007; Runyan, 2006). Small businesses constitute a major force in the U.S. economy (Astrachan & Shanker, 2003; Edmiston, 2007), and play a significant role in job creation, local economic development, and maintaining the health of a community's economy (Muske et al., 2007).

Small businesses can be extremely vulnerable, however, and it can be hard for them to recover from a disruption. This vulnerability is related to the nature of small businesses, in that their assets and customers are normally based in a single physical location. As a result, small businesses tend to be heavily impacted by a regional disaster. The difficulty in recovering, especially compared to large companies, is related to their lack of access to capital and to resources for mitigating disruption risk (American Sustainable Business Council, 2013; Runyan, 2006). For example, according to the U.S. Chamber of Commerce Foundation's Business Civic Leadership Center, there are 60,000 to 100,000 small businesses that were negatively affected by Hurricane Sandy, and up to 30% of them had to close because of the storm (Crespin, 2013).

The growing emergence of social media provides a venue for small businesses to actively implement disaster recovery activities. Social media platforms, like Twitter and Facebook, can be an effective information propagator in disaster situations (Gao, Barbier, & Goolsby, 2011; Peary, Rajib, & Yukiko, 2012), especially when they are one of the few functioning communication methods immediately after disaster (Adam & Muraki, 2011; Winn, 2011). Social media has been used in disaster-related contexts such as safety identification, displaced-persons locating, damage information provision, support for disabled individuals, volunteer organization, fund-raising, and moral support systems (Peary et al., 2012). In spite of these examples, however, there is no existing empirical study that specifically addresses how small businesses use social media in this context and if such usage is effective. We seek to help fill this gap in the literature.

We use the 2013 Colorado floods as a case example. These floods started on Sept. 9th and intensified through

Sept. 11th and 12th. Boulder County was significantly affected during the flooding, with total rainfall amounts over 5 days exceeding the county annual average (Laurie, 2013). The flooding caused three deaths, 349 homes were destroyed, another 428 homes had major damage, and over 1600 people were evacuated (Blair, 2013; Brain, 2013). The transportation infrastructure was also impacted, in that 40 percent of U.S. Highway 36 between Boulder and Estes Park was extensively damaged, with some sections being completely washed away (Brain, 2013).

METHODOLOGY

This following introduces an empirical study that incorporates both qualitative and quantitative methods.

- Qualitative analysis – to reveal small business usage of social media in a disaster situation.
- Quantitative analysis – to examine the effectiveness of these behaviors.

Data Collection

The data source used in the study is comprised of Facebook postings by small businesses in the greater Boulder, Colorado area. To identify small business accounts in Boulder County, we used the key words "Boulder, Colorado" to search in Facebook, and received the account list of "Places in Boulder, Colorado". We selected 100 organization accounts to perform the analysis.

Because the flooding began on September 9th, we collected posts from August 15th to October 31st, 2013. In total, we retrieved 3962 relevant posts, and we manually split them into two categories: flood related and non-flood related posts, where flood related posts included items such as road closure information, the open or closed status of stores, special events, and donations. One student was used to code the entire set of posts as either flood related or non-flood related, and then a second student was used to randomly code a subset of 640 of the posts, for validation purposes. The agreement rate of the twice-coded posts was 96.4% and the corresponding Kappa score was 0.78, which supports the assertion that the two independent coding processes had substantial agreement (Landis & Koch, 1977). The larger set of coded posts was then used for the following analysis.

Figure 1 illustrates the number of posts by date, and it clearly shows that flood related posts emerge at Sept. 12, 2013, when the floods intensified. There is almost no flood related posts before this date, and the number of flood related posts after the 13th decreases slowly until October.

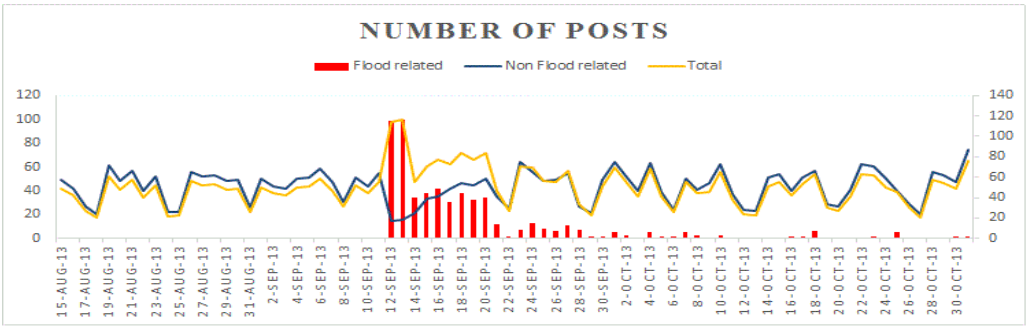

Figure 1. Number of posts from Aug.15 to Oct. 31, 2013

In total there were 577 flood related posts. The following analyses are based on these posts.

Qualitative Methodology

To reveal the social media behavior of the small businesses during this flooding event, we performed content analysis for the 577 flooded related posts. This time we only have one person tag each post because of limited resources, and we will have another person verify the results for the future studies. We developed a coding scheme using the standard content analysis procedure: we manually tagged each post using key words, then grouped the key words to derive the scheme with enough detail to differentiate each post based on its content. Thereafter we mapped this coding scheme to the classical disaster management framework, in order to have an

overall understanding of the context of the observed behaviors. This framework includes five possibly overlapping stages: prevention, mitigation, preparedness, response, and recovery (Altay & Green, 2006).

Quantitative Methodology

We are also interested to know if such use of social media can actually provide benefit to the businesses. To examine the effectiveness of social media usage, therefore, we will also perform a quantitative analysis. The quantitative methodology that we adopt is based on the following conceptual framework.

We assume that there are two primary motivations for small businesses to post disaster related information on social media. The first of these is to gain a good reputation and to achieve visibility in the local community by actively participating in community disaster response and recovery activities. This can benefit a small business in the long run. The second motivation is to agilely adapt to the disaster situation in order to decrease profit losses or even increase profits. This can provide short term benefits for the businesses. Activities related to this second point include offering special promotions to increase revenues, and delivering useful information to increase customer satisfaction.

Our quantitative model will be based on this conceptual framework. We will test several different models to measure the relative effectiveness of different activities.

PRELIMINARY RESULTS

Preliminary Qualitative Results

Table 1 provides the coding scheme used to categorize the content of posts with respect to the different stages of disaster management. By mapping the posts with this scheme, we can have a rough idea of how small businesses used social media in the 2013 Colorado floods.

Disaster Mgt Stage	Coding Scheme	Definition
Prevention	Flood Alert Information	Provide flood alert information to let audience be prepared for the flood
Mitigation	Strengthening protection	Provide information about sandbags and other techniques for mitigating potential damage
Preparedness	Volunteer recruiting to support community	Recruiting personnel for emergency services and for community volunteer groups
	Assistance Information	Provide assistance information
Response	Advocate for Saving Water*	Advocate for saving water to respond to the influence and to support recovery from the floods
	Evacuation Information	Provide evacuation information
	Advocate for reporting damage	Advocate audience to report damage to support recovery work
	Information of Business Operation*	Provide information about business operations to support flood response & recovery.
Recovery	Advocate for Fund Raising	Advocate for financial assistance to support individuals or organizations suffered in the flood
	Road Information	Provide road information
	Flood Clean Up Activity	Flood clean up information to support flood recovery
	Flood Relief	Activities to support flood relief
	Other Information	Include mental support service information, public facility information, flood response workshop information and debris disposal information, etc.
Other Business Related Information	Business Open/Close Information	Provide information of whether business is open or not at a certain time point
	Promotion Activity	Special promotion activities that small business adapt to current flood situation

*means this category also belong to recovery stage

Table 1. Coding Scheme

Figure 2 shows the results of mapping the posts into this scheme. Three patterns are obvious in this figure. First, all kinds of posts suddenly appear on September 12th, immediately after the flooding intensified. Secondly, small businesses tend to post mostly *other business related information*, following by *recovery*, *response*, and *prevention* information. Thirdly, messages about *other business related information*, *response*, and *prevention* die out quickly, while the messages about *recovery* last much longer.

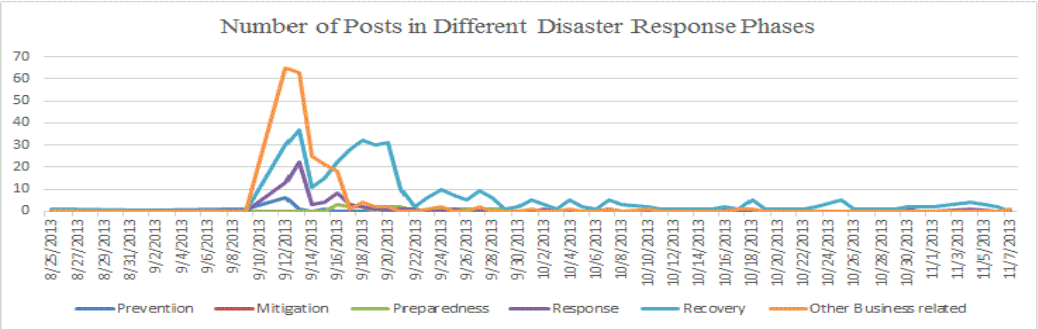

Figure 2. Number of Posts in Different Disaster Management Phases

Planned Quantitative Approach

First we will use the business categories from Better Business Bureau to classify the Facebook accounts with respect to different industries (http://search.bbb.org/BrowseCategories.aspx). In our sample, the majority of these small business accounts are Food & Dining (64), followed by Personal Care & Services (10), Shopping (7), and Sports and Recreation (5). This approach is to differentiate the industry influence in the model.

The following is an example of a three-level model:

$$\text{feedback}_{ijk} = \beta_0 + \beta_1 \text{prevention}_{ijk} + \beta_2 preparedness_{ijk} + \beta_3 response_{ijk} + \beta_4 recovery_{ijk} + \beta_5 otherbusiness_{ijk} + \varepsilon_{ijk}$$

where *i* represents the industry, *j* represents the account, and *k* represents the specific Facebook post. The chosen performance measure is the feedback, which is calculated as the ratio of the number of likes of each post to the number of likes of the account. Use of this measure is based on the following reason. The number of likes of each account is an indicator of the number of people interested in this small business, and the number of likes of each post is the number of people who like this particular communication or product. Thus, the number of likes of each account can significantly influence the number of likes of the posts in this account. Hence, to normalize this influence, we use this ratio as the performance measure.

In this equation, β_0 is the intercept of the equation, which does not change with variables, and ε_{ijk} is the error term. $\beta_1,\beta_2,\beta_3,\beta_4,\beta_5$ are the variable parameters, which represent how these variables influence the performance measure.

The decision variables are the activity types. For example, $\text{prevention}_{ijk} = 1$ means that this post belongs to disaster prevention activities. All of these variables are binary.

This model will be the foundation for the quantitative analysis of the data, which is an ongoing effort. We will enrich the conceptual background, and test different models to examine which activities are most effective in terms of the different phases of the disaster management cycle.

CONCLUSIONS

This is the first research to investigate small businesses' behaviors on social media during a disaster. The preliminary analysis shows that a substantial percentage of small businesses (62 accounts out of 100 selected accounts) used social media as a platform to mitigate the disaster risk. The main activities in social media are providing *other business related information*, *recovery*, *response*, and *preparedness*.

Although this is still work in progress, we believe not only that this study and ongoing related studies will

contribute to the literature gap in this area, but also that they can actually help small businesses to better protect themselves from and adapt to and recover from disasters.

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