Original Research Article

Examining the Factors that Influence the Use of social media for Disaster Management by Coastal Community People of Bangladesh

ABSTRACT

Aims: To examine how and why did the coastal community people (agriculture, aquaculture and livestock farmers) adopted social media for their disaster management efforts employing Technology Acceptance Model.

Place and Duration of Study: Batiaghata upazila under Khulna district and Bagerhat Sadar, Chitalmari and Fakirhat upazila of Bagerhat district. Data was collected in February 2023.

Methodology: Considering 95% confidence level and 10% Margin of Error 96 sample was estimated for the study. However, for addressing non response we collected data from 25 more respondents, thus all together we collected data from 121 samples. The people who use social media, available during interview and voluntarily agreed to provide data were selected purposively as sample. The study was a quantitative research project that used independent t-tests and descriptive statistics to analyze the information gathered. Data was Analyzed using SPSS 20.0.

Results: The study found 94% community people either strongly agreed or agreed that they use social media for gathering disaster information while 96% respondents strongly agreed or agreed to share disaster information with their friends and families. The outcome of the study established the fact that a significant difference exists between coastal community people whose social media site usage was influenced by their perceived usefulness and those whose social media site usage was influenced by their perceived ease of use ($p<0.05$).

Conclusion: In coastal Bangladesh social media users gather disaster management information from the media and also share this in their friends and families. There is a high perception of perceive usefulness and ease of use of social media among coastal community people in Bangladesh, particularly Bagerhat and Khulna districts. Therefore, government and non-government organizations need to emphasize on social media as part of enhancing community knowledge and improving practice of disaster management.

Keywords: Social Media, Disaster Management, Technology Acceptance Model, Coastal Bangladesh, Climate Change, Climate Induced Disaster, Facebook, YouTube, Disaster Management Information

1. INTRODUCTION

The role of ordinary citizens in disaster management is becoming more visible and influential with the adoption of new information and communication technologies (ICTs), such as social media and mobile phones, as they are actively involved in information sharing that is necessary at the pre-disaster and aftermath stages. This necessitates the use of these technologies by humanitarian groups and the rising influence of collective intelligence in the creation of their disaster management plans. The usage of social media can improve communications before, during, and after a disaster [1]. Peer-to-peer backchannel communications via social media can be utilized to boost the social capacity of information production and distribution.

Social media becomes one of the most important channels for the public to get information when a crisis hits. The majority of people have limited access to alternative information sources like television or radio depending on the kind and scope of a crisis. However, as social media applications are accessible on the majority of mobile devices and may function with a basic phone plan, they frequently serve as the only information source during and immediately following a disaster. Social media has become increasingly popular in the field of disaster management due to several advantages such as ease of use, efficient communication, and enabling open exchange of information online. These benefits have been noted in various studies [2,3,4,5]. Social media has been utilized for various purposes in disaster management, such as collecting data to assess disaster situations, coordinating rescue efforts, and sharing important information with as many people as possible [6]. However, it is still unknown if and to what extent the increasingly common online information practices apply to many areas of disaster management (e.g., disaster preparedness, mitigation).

1996 saw the introduction of Internet access to the general population of Bangladesh. Since then, Bangladeshis are gradually becoming acquainted with the various uses of the internet. According to Digital (2022) [7] there were 52.58 million internet users in Bangladesh in January 2022 which is 32% of total population. Among the internet user 50 million people use different social media which is around 30% of total population and the number increased by 4.6 million (10%) between 2021 and 2022. Facebook is the most popular and significant social networking site in the country. Facebook facilitates the rapid dissemination of news and information, which sometimes has a profound effect on the people of Bangladesh. Likely other countries of the globe, in Bangladesh, different organizations and individuals also adopted social media for disaster management. During cyclone Amphan number of Facebook users used safety mark of Facebook for informing their relatives, friends and well-wishers about their safety status. Different volunteers developed Facebook groups for raising fund for cyclone affected people. Number of YouTube channel disseminated Early Warning Message and live news about the cyclone. Different national and international organizations including UNFPA, World Vision, Christian Aid, UNDP used their Facebook and Linked in page for updating their post disaster response work to people. The usage of social media also observed later Cyclones e.g., Sitrang.

Although there have been numerous studies [8,9,10,11,12] on the effectiveness of social media for disaster management, there still exists a gap in the literature regarding the reasons behind the ineffectiveness of social media for disaster management in underprivileged communities. Particularly in coastal Bangladesh which face both slow onset and rapid onset disasters including water and soil salinity, cyclone, flood, waterlogging and riverbank erosion the reasons which influence the usage of social media for disaster management by the community are not examined notably. Examining the underlying factors that impact the utilization of social media for disaster management can serve as an initial approach in bridging this digital divide and encouraging the use of social media for disaster management among marginalized communities.

This study was commissioned to identify how the coastal community people adopted social media particularly Facebook and YouTube in their disaster management effort. The study had following specific objectives:

1. To assess how do coastal community people use social media satisfy the need of information for disaster management

2. To identify which factors influenced coastal community people's social media adoption for disaster management in Technology Acceptance Model framework

3. Identify difference between the users whose usage of social media sites were influenced by their perceived usefulness and those whose usage were influenced by their ease of use

The following section of the paper explains how the research model was developed based on previous studies. It also describes the methodology used for data collection and research questions. The paper then presents the analysis of data and the results, discusses what the study means for both theory and practice.

2. MATERIAL AND METHODS / EXPERIMENTAL DETAILS / METHODOLOGY

2.1 Research Model

Many researchers were interested to predict system use during 1970s when increasing failures of system adoption in organizations were observed. In 1985 Fred Davis proposed Technology Acceptance Model (TAM) where he proposed that system use is a response which can be explained of predicted by the motivation of users and which in turn directly influenced by an external stimulus of actual system's features and capacities. In this proposal Davis suggested users' motivation are explained by three factors e.g., perceived ease of use, perceived usefulness and attitude towards using the system [13]. The degree to which people think employing technology would help them perform better and need less physical and mental effort is explained by perceived ease of use and perceived usefulness. The perceived ease of use and perceived usefulness of a given technology have an impact on user attitudes and user intention to utilize that technology or device [14,15]. Therefore, TAM has been very helpful in researching how social media technologies are being received.

Salloum *et al* (2018) employed TAM for determining the factors of using social media for e-learning in the United Arab Emirates higher educational institutions and found Perceived Ease of Use and Perceived Usefulness are important factors [16]. Similarly, Amadu et al (2018) also utilized TAM for investigating the impact of social media usage on Ghana's university students' academic performance through collaborative learning and it also found perceived ease of use and perceived usefulness had a significant positive relationship with collaborative learning [17]. Iacurci, L. (2021) applied TAM to discover the factors or elements which influence the adoption of social media in small and medium enterprises (SME). She found compatibility, perceived ease of use and cost had a significant effect on SME's owner or marketers' attitudes toward adopting social media [18]. Alduaij, M. (2019) asserted TAM can be successfully applied to examine social media. He found majority of participants believe that social media is "useful" while the second largest majority believe that "social media is faster" [19]. In terms of perceived ease of use, the majority of participants believe that social media is a simple method to communicate, while most of participants believe that social media doesn't involve much effort.

The TAM predict how individuals and organizations utilize social media to satisfy their own needs. This theoretical framework may be used by academics to comprehend why people and organizations utilize social media during disasters. For example, Meechang *et al* (2020) particularly used TAM for explaining the affecting factors on the intention to use IT for mitigating disaster's impacts. They found PU, PEOU, Information Accessibility, Social Influence, and Disaster Knowledge are the five main possible elements [20]. When employing IT for disaster management, PU is the most crucial component, whereas PEOU and information accessibility are more crucial for online platforms.

The TAM helps predict how likely users are to adopt new technology. It is based on the idea that users' attitudes towards technology are influenced by their perceived usefulness and ease of use. These factors also affect their intentions to use the technology and their actual usage. Users' desire to use the technology is influenced by their attitude and perceived usefulness, which in turn is affected by factors such as the ease of use.

In the present study we intend to examine how and why did the individuals adopted social media for their disaster management efforts, therefore TAM was theoretical underpinning of the study. Keeping in mind the TAM, we assumed that due to Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) individual would adopt social media for their disaster management effort. The technology acceptance model constructs are shown in figure 1.

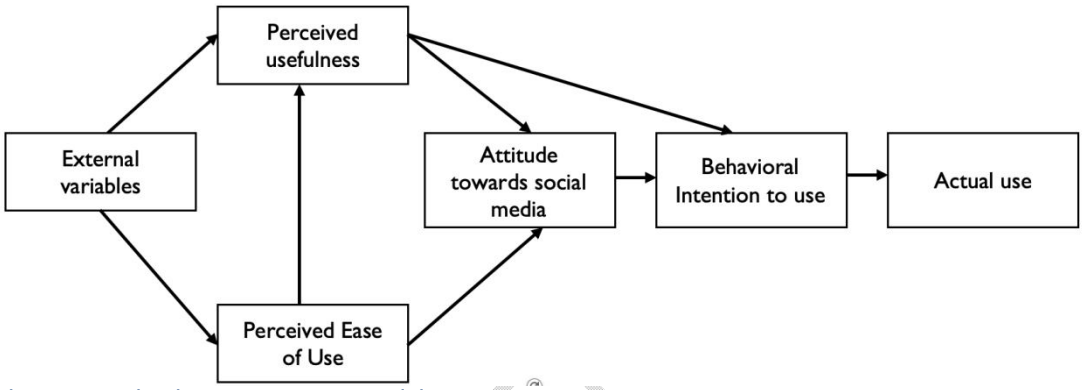

Figure 1: Technology Acceptance Model

Perceived usefulness refers to how much a user believes the technology will help them to find important information in relation to disaster management, helpfulness to share disaster information to their friends and family, how users believe the information of social media is more contextual than their traditional counterpart, how information is useful through better understanding. On the other hand, perceived ease of use is defined as the degree to which a person believes that using a program will require less effort e.g., they can perform tasks in simple manner and easy operation. The intend of use of social media refers the user intend, plan and expect to use social media for disaster management.

The hypothesis that guided the study were as follows:

- H0: There is no significant difference between coastal community people whose usage of social media sites were influenced by their perceived usefulness and those whose usage were influenced by their ease of use.

- H1: There is a significant difference between coastal community people whose usage of social media sites were influenced by their perceived usefulness and those whose usage were influenced by their ease of use.

2.2 Methodology

The study was a quantitative research project that used independent t-tests and descriptive statistics to analyze the information gathered. Data was Analyzed using SPSS. Descriptive statistics were used to respond to study objectives 1 and 2. An independent sample t-test was computed to test the hypothesis. The instrument selected for the study was questionnaire. It was used to gather data on the extent to which coastal community people

use social media mainly Facebook and YouTube within the context of the Technology Acceptance Model. Respondents answered questions about their use of social media. They also responded to questions about the perception regarding the usefulness and the ease of use of social media. Questionnaire was developed in English language and then translated into Bengali language for easy understanding of data enumerator team. Then the questionnaire was digitized to collect data using Open Data Kit (ODK) based data collection system (KoboCollect). Researcher provided two days long training with Data Enumerators (DE) embracing class room based and field practice approach. The data was collected within a period of one (01) week during February 2023.

The population for the study comprised the agriculture, aquaculture and livestock farmers of Batiaghata upazila under Khulna district and Bagerhat Sadar, Chitalmari and Fakirhat upazila of Bagerhat district. Considering 95% confidence level and 10% Margin of Error 96 sample was estimated for the study. However, for addressing non response we collected data from 25 more respondents, thus all together we collected data from 121 samples. The people who use social media, available during interview and voluntarily agreed to provide data were selected purposively as sample.

3. RESULTS AND DISCUSSION

3.1 Result

3.1.1 Usage of social media for disaster information

We asked the respondents whether they utilize social media for gathering information in relation to impact of disaster on their agriculture, aquaculture and livestock as form of early warning message, preparedness of disaster and/or post disaster management. We found most of the respondents (79%+16%=94%) either strongly agreed or agreed that they use social media for gathering disaster information for disaster preparedness, post disaster management information and early warning message for agriculture, aquaculture and livestock (Table 1).

Table 1: % of respondents reported to use social media for disaster information in relation to agriculture, aquaculture and livestock

Agreement	Number of Respondents	% Of respondents
Strongly agree	19	16%
Agree	95	79%
Disagree	6	5%
Neither agree or disagree	1	1%
Grand Total	**121**	**100%**

In response to the question whether they inform their friends and/or families about the impact of disaster on agriculture, aquaculture and livestock e.g., disaster preparedness related information, early warning message and post disaster information using social media most of the respondents (16%+80%=96%) either strongly agreed or agreed that they inform their friend and families (Table 2).

Table 2: % of respondents reported to inform their network regarding impact of disaster on agriculture/aquaculture/livestock (e.g., early warning, preparation, management) using social media

Agreement	Number of Respondents	% Of respondents
Strongly agree	19	16%
Agree	97	80%

Agreement	Number of Respondents	% Of respondents
Disagree	3	2%
Neither agree or disagree	2	2%
Grand Total	**121**	**100%**

3.1.2 Perceived Ease of Use (PEOU) of social media

From Table 3, most community people (M = 4.12, STD = 0.50) strongly agreed that most of the tasks they need to perform regarding disaster management information searching in social media is quite simple. Disaster management information include searching or sharing information on how to manage soil salinity, water salinity, climate smart agriculture and aquaculture technology e.g., saline and flood tolerant variety including sunflower, rice, tilapia cultivation; preparation for livestock/agriculture/fisheries during and after disaster, how to raise dike for vegetable gardening, raising plinth of houses etc. Majority of the community people (M = 3.17, STD = 1.17) agreed that social media work in such a way that mistakes are not easy to made. Similarly, most of the community people (M = 4.13, STD = 0.67) agreed that information gathering in relation to disaster management is easy using social media. Likewise, most of the community people (M = 4.20, STD = 0.46) agreed social media are easy to use for disaster management (Table 3). The results indicate a total average mean of 3.90. The decision rule for mean values, 1.0-1.5 very low; 1.6-2.4 low; 2.5-3.4 average; 3.5-4.4 high and 4.5 to 5.0 very high.

Table 3: Descriptive Score of PEOU

Item	Mean (M)	Standard Deviation (SD)	Decision
Most of the tasks I perform with regard to disaster management using social media are quite simple	4.12	0.50	High
Social media for disaster management work in such a way that mistakes are not easily made;	3.17	1.17	Average
Information gathering in relation to disaster management is easy to make using social media	4.13	0.67	High
Social media are easy to use for disaster management	4.20	0.46	High
Mean of Means	3.90	0.57	High

3.1.3 Perceived usefulness of social media

To further find out community people's perception of usefulness of social media in disaster management, the mean scores are used to analyze the data and the result is shown in Table 4. Most of the community people (M = 4.03, STD = 0.60) agreed that they can find their required important information in social media in relation to disaster management. Majority of the community people (M = 4.07, STD = 0.53) agreed that they can share critical information in relation to disaster management with their friends and family which is very helpful for them. Similarly, most of the community people (M = 4.04, STD = 0.65) agreed the information which is shared in social media (that they follow) is contextual information for managing disaster thus further helpful than traditional media. Likewise, many of the community people (M = 3.23, STD = 1.14) agreed that direct interaction with content creator makes the information useful through better understanding. The results indicate a total average mean of 3.84 (Table 4). The decision rule for mean values, 1.0-1.5 very low; 1.6-2.4 low; 2.5-3.4 average; 3.5-4.4 high and 4.5 to 5.0 very high

Table 4: Descriptive Score of PU

Item	Mean (M)	Standard Deviation (SD)	Decision
I can find important information in social media in relation to disaster management which is required for me	4.03	0.60	High
I can share critical information in relation to disaster management with my friends and family which is very helpful for them	4.07	0.53	High
The information which shared in social media (I follow) is contextual information for managing disaster thus further helpful than traditional media	4.04	0.65	High
Direct interaction with content creator makes the information useful through better understanding	3.23	1.14	Average
Mean of Means	3.84	0.60	High

3.1.4 Hypothesis test

Table 5 shows the test for equality of means between coastal community people whose social media site usage was influenced by their perceived usefulness and those whose social media site usage was influenced by their perceived ease of use. Since the equality of variance assumption is validated, the researchers used the first 2-tailed significant value of a test for equality of means at a p-value of 0.000 which is less than a significant level of 0.050. The researchers, therefore, have enough evidence to reject the null hypothesis. In other words, we reject H0 at the 5% significance level and conclude that there is a significant difference between coastal community people whose social media site usage was influenced by their perceived usefulness and those whose social media site usage was influenced by their perceived ease of use.

Table 5: One sample t-test for Equality of Variance and Means

Coastal community people's social media usage for disaster management	N	M	SD	T-value	P-value
Coastal community people whose social media site usage was influenced by their perceived ease of use	121	3.90	0.57	70.478	0.000
Coastal community people whose social media site usage was influenced by their perceived usefulness	121	3.84	0.60		

3.2 Discussion

The data was collected from highly disaster vulnerable coastal area of the country where people's access to traditional media is limited. They mostly utilize social media for gathering disaster related information. Most of the social media user community people use social media for gathering information in relation to impact of disaster on their agriculture, aquaculture and livestock. They mainly search preparedness information before disaster e.g., climate smart agriculture technology e.g., vertical vegetable gardening, saline tolerant variety of rice, seed and cultivation technology of saline tolerant crops e.g., Mungbean, Sunflower etc. From different social media groups which deal with agriculture, aquaculture

they collect early warning message e.g., early harvesting of rice, vegetables, fish and shrimp, taking livestock to cyclone shelter. They also collect contextualized information regarding rescue, relief and rehabilitation related information from social media. This finding support previous study [21] which found coastal community people are increasingly collecting disaster management information in relation to agriculture, aquaculture and livestock from social media.

Through social media most of the users prepare contextualized content for their friends and family in relation to disaster management. They share content on climate smart agriculture technology, precaution for agriculture, aquaculture and livestock. They also critical information of disaster management with their friends and family.

The results of the objective that sought to find out the coastal community people's perception of the usefulness of social media suggests a total average mean of 3.84. This interpretation shows that the Perceived Usefulness (PU) of social media is high among coastal community people in Bangladesh particularly Khulna and Bagerhat districts. This finding agrees prior studies results which stated people perceive social media useful for their disaster management effort e.g., searching information, connect and share the experience of the disaster [22,23,24].

The result of coastal community people's perception of ease of use of social media suggests a total average mean of 3.90. This indicates that the Perceived Ease of Use (PEOU) of social media is high among coastal community people in Bangladesh particularly Khulna and Bagerhat districts. Several other studies have shown that people can easily use social media [25]

The t-test score of the Equality of Variance and Means between coastal community people whose social media site usage was influenced by their perceived usefulness and those whose social media site usage was influenced by their perceived ease of use, shows that there is a significant difference between coastal community people whose social media site usage was influenced by their perceived usefulness and those whose social media site usage was influenced by their perceived ease of use.

Coastal community people find social media useful, as they perceive benefits such as they can find important information on disaster management to which they can directly relate themselves, can share critical information on disaster with their friends and families. Additionally, they can find contextual data due to social media's hyper local nature where people from locality develop and disseminate contents. In traditional media hyperlocal information is scarce, therefore comparing with traditional media they prefer social media for disaster management information. On the other hand, they can also directly interact with content creator for example when extension officers of agriculture department in their locality create contents one social media (e.g., Facebook) coastal community people directly comment in the content for further clarification. The study further reveals that coastal community people find social media convenient to use due to varied reasons such as less complexity.

4. CONCLUSION

In coastal Bangladesh social media users gather information related to disaster management from the media while they also share this in their friends and families. There is a high perception of perceive usefulness and ease of use of social media among coastal community people in Bangladesh, particularly Bagerhat and Khulna districts. Therefore, government and non-government organizations need to emphasize on social media as part of enhancing community knowledge and improving practice of disaster management.

CONSENT (WHERE EVER APPLICABLE)

N/A

ETHICAL APPROVAL (WHERE EVER APPLICABLE)

N/A

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