Pertanika J. Soc. Sci. & Hum. 28 (4): 2765 - 2785 (2020)

PERTANIKA JOURNALS

SOCIAL SCIENCES & HUMANITIES

Journal homepage: http://www.pertanika.upm.edu.my/

Evaluating the Influence of Resident Agencies' Participation in Flood Management via Social Media, in Nigeria

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ABSTRACT

Disaster management is conducted in multilevel and different stages. However, these different stages are tied together by the key infrastructural components of Information and Communication Technology (ICT) such as social media which is central to the effectual management of disaster through residents' participation. Nevertheless, there has been limited access to information technologies that enhance quick recovery services, timely response, and effective dissemination of disaster-related information. Therefore, this study examined the influence of resident agencies' participation in disaster management via the use of social media information planning and training possibilities (SMDPT) in Nigeria. The study used a survey questionnaire and stratified random sampling technique to collect 370 primary data from flood disaster management agencies in Ibadan, Nigeria. The collected data were analyzed using Partial Least Square - Structural Equation Modeling (PLS-SEM). The study found that social media information planning and training (SMDPT) had a positive influence on flood disaster preparedness (DPRE), disaster response (DRES), and disaster recovery (DREC). Therefore, the study concludes that social media has become an important tool for planning during an emergency situation. Hence, an important implication of this study to the environmental regulatory

ARTICLE INFO

Article history:
Received: 23 October 2019
Accepted: 01 August 2020
Published: 25 December 2020

DOI: https://doi.org/10.47836/pjssh.28.4.15

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ISSN: 0128-7702
e-ISSN 2231-8534

policymakers and emergency response agencies is to create more awareness on the usability and applicability of social media in providing credible information regarding disaster management.

Keywords: Flood disaster preparedness, flood disaster recovery, flood disaster response, participation, resident agencies, social media

INTRODUCTION

In recent times, there have been frequent occurrences of disaster in all parts of the world and these have generated numerous attention to the role played by information and communication technology (ICT) which enhances timely information experience and participation among victims of disaster and the general residents. As such, researchers have started raising interest in determining the need for social media in the management of disaster (Bruns & Stieglitz, 2012; Houston et al., 2015; Owolabi & Ekechi (2014); Zhang et al., 2019).

Residents' participation is an emerging arena for computer-mediated communications that has implications on both informal and formal disaster management (Yeh, 2010). The birth of an avalanche of social media including social network services, community contents, and micro-blogs has considerably reformed the perspective of managing disasters in recent times making social actions more possible. With the availability of software appliances such as online discussion podiums, institutions are presently able to dispense, obtain as well as peruse information more systematically. Thus, social media has the capability of averting disaster from winding wild (Owolabi & Ekechi, 2014). According to experts, disaster management can be categorized into three namely; disaster preparedness, disaster response, and disaster recovery. Across these three stages, social media tools can be used for different purposes which include information dissemination, disaster planning and training, collaborative problem solving, and information gathering (Zhang et al., 2019).

Improving resident's participation in disaster management is expected to influence the effectiveness of disaster management and reduce the information gap. This is because the more engaged people are, the better they learn about how to prepare, respond, and recover from a disaster. Hence, the reason why emergency and disaster management organizations involved the general residents in disaster management is to ensure that the residents get accurate and complete information (Grove, 2014). However, academic efforts on investigating the role of social media in the disaster have been limited especially from the perspectives of the residents' agencies and the general residents (Yates & Partridge, 2015). In view of the above, this study sought to investigate the influence of residents' social media participation on flood disaster management in Nigeria.

Research Objectives

This study was exploratory with a major purpose of collecting primary data on residents' information experience and

participation on social media during flood disasters in Nigeria. Therefore, the specific objective of this study was to investigate the influence of resident agencies' participation via social media on flood management in Nigeria.

LITERATURE REVIEW

Review of Flood Management System in Nigeria

Flooding is the most persistent disaster in Nigeria and it has had more than 1.5 billion individuals murdered while more than 81 million others became homeless over the last two decades (Owolabi & Ekechi, 2014). In Nigeria, flood disaster has been perilous to people, communities, and institutions. Recently, Usman Danfodio University, Sokoto, and other parts of the country have been affected by flooding. In Nigeria, millions of people have been forced to leave their homes and several properties worth millions have been destroyed (Abdulfatai et al., 2014; Owolabi & Ekechi, 2014). Flooding is among the natural disasters that claim more lives and wreck properties than any other natural disaster in the world. Even though it is not the most devastating in Nigeria, it displaces people and causes more havoc to properties. About 20% of the Nigerian population is prone to the risk of flooding (Abdulfatai et al., 2014; Agbonkhese et al., 2014). Evidently, flooding has repeatedly occurred in Nigeria and is generally brought on by either climatic or non-climatic variables, in this way prompting river floods, flash floods, urban floods, sewage floods, glacial lake outburst floods, and coastal floods (Abdulfatai et al., 2014; Agbonkhese et al., 2014). In the historical backdrop of flooding in Nigeria, the most exceedingly bad experience was recorded in the middle of July and October 2012 when 363 individuals lost their lives, 2.1 million individuals across ten states were dislodged with several severe diseases and 18, 282 were harmed (Agbonkhese et al.,2014). In general, flooding in Nigeria has been caused by both natural and human activities. The natural causes of floods are usually a result of climatic change (Agbonkhese et al., 2014), which can be as a result of heavy or torrential rain/storm and ocean or tidal storm along the coast (Nwigwe & Emberga, 2014). Naturally, a flood could be due to a high water table in an area, topography (low-land close hills), and low infiltration such as clayed soil (Odufuwa, 2012). The human causes of flooding in Nigeria may be due to farming activities which result in deforestation that exposes the soil to erosion and increases runoff, burst water main pipes, dam burst, and dam spills (Nwigwe & Emberga, 2014).

Overview of Disaster Management Resident Agencies and their Participation in Flood Management in Nigeria

Residents' participation in flood management is defined as the active involvement of residents in the preparedness, response, and recovery from a disaster (Evers, 2012). A responsible resident helps in every way to construct drains and ditches or embankments, protect buildings, constructions, and utilities, not throwing refuse or solid materials in

drains, and discourages others from doing so. In other words, disaster management in terms of preparedness, response, and recovery are shared responsibilities between the government and the residents (Terpstra & Gutteling, 2008).

The continued propensity of flood incidents in Nigeria necessitated the establishment of institutions from the late 1990s to assists in flood disaster management in Nigeria (Obeta, 2014). Subsequently, the National and State Emergency Management Agency (NEMA), the Federal Environment Protection Agency (FEPA), and the Nigerian Meteorological Agency (NIMET) were unveiled. The N.E.M.A South West Zone covers Six (6) States which are: Lagos, Oyo, Ogun, Ondo, Ekiti, and Osun. With an Operational Office in Ekiti which covers Ondo, Osun, and Ekiti. (Abdulfatai et al., 2014). NEMA is saddled with the responsibility of reducing the impact, loss, and damage incurred from the disaster that may occur (Abdulfatai et al., 2014). This involves the plans of putting in place the necessary methods of responding to the emergency occurrence. This method can be in form of an Emergency Response Plan (ERP), Simulation Exercises (SIMEX), training as well as an early warning system. Inter-agency collaboration for emergency responses at national, state, and local levels including civil society organizations and communication plans with easily understandable terminology and methods are all parts of NEMA's operational purview (Olanrewaju et al., 2019). Conscious of the prevailing vulnerability of local communities to weather and climate-related hazards, the zone adopts various strategies in confronting these disasters namely; collaboration with State Emergency Management Agencies (SEMAs) and other critical stakeholders to intensify efforts in disaster management through comprehensive early warning messages, awareness creation, multi-stakeholder workshops and training and simulation drills (Abdulfatai et al., 2014).

However, NEMA is constantly faced with numerous types of challenges in course of implementing the aforementioned measures. As stated by Abdulfatai et al. (2014) and Obeta (2014), the challenges faced by N.E.M.A in Nigeria are but not limited to: Information management, inadequate number of sustainable flood control strategies, Nonadherence to safety standards, Absence of up-to-date flood control acts, Inadequate Funding & Logistics, Nonconformity to Rules & Regulations, Crowd Control, Absence of prior planning that addresses issues which boost flood. In practical terms, residents can participate in flood management in many ways. For instance, residents can participate in the preparedness towards flood by helping to desist or clean gutters or drains and encourage others to do the same and also identifying safety locations in case of flood disaster (Abdulfatai et al., 2014; Obeta, 2014). Residents can also help in the recovery phase of flood disasters by offering sympathy and relief that can make up for the pain, grief, and losses of victims. Finally, residents have the responsibility of participating in the response to flood

disasters by educating each other about floods, understanding signals, and behave in accordance with the signals (Zhang et al., 2019). At the occurrence of a disaster, residents are even regarded as more active online; they tend to increasingly turn to social network sites looking for the most recent up-to-date information (Houston et al., 2015).

In simplified terms, it can be said that there are three different levels at which residents can participate in flood management namely; disaster preparedness, disaster response, and disaster recovery these terms are coded as DPRE, DRES, DREC respectively for the purpose of this study. These three levels are discussed in detail in the following sections.

Flood Disaster Preparedness (DPRE)

The first phase of flood management is flood disaster preparedness. Theoretically, preparedness is related to the focuses that are directed to preventive measures and activities in order to reduce known risks that could lead to a disaster. The major measures in this phase of disaster management are training and planning on evacuation training and emergency tactics training. Researchers have demonstrated that preparedness is an important part of flood disaster management which cannot be undermined (Takao et al., 2004). However, certain factors determine the flood disaster preparedness of residents in flood disaster management. Takao et al. (2004) had specifically revealed that homeownership and the severity of catastrophe from previous floods inclusive fear of flood were the determinants of residents' flood disaster preparedness.

Flood Disaster Response (DRES)

Flood disaster response is the second phase of residents' participation to flood management. During this phase, the focus is mainly on the speed of response. The effectiveness of response activities is determined by the quickness and swiftness in dispersing quick situational awareness to help authorities respond effectively to an occurrence of flood disaster. In the study conducted by Whitmarsh (2008) focusing on residents' behavioral responses to climate change and flooding, it was revealed that there were number of behavioral responses that could be taken in preventing the severity of flood disaster. Actions such as providing awareness and information about the victims of flood disaster actions can either be the direct solutions to disaster or the actions that make solutions by disaster management agency to be effective. Terpstra and Gutteling (2008) attested that residents did have the responsibility to respond to the risk of flood disaster. Peoples' participation and responsibility to respond to flood disasters has been widely researched and it has been revealed to be important and one of the most significant phases of flood management (Lindell & Whitney, 2000; Paton, 2003). This implies that when the residents participate in responding to flood disaster it does not only lessen the severity of flood disaster it will also make the role of government agencies to be effective and worthwhile.

Flood Disaster Recovery (DREC)

The damage of flood disaster management such as other natural disasters on victims does not evacuate immediately after the disaster. The flood disaster recovery focuses on helping casualties and victims of flood disaster to recover and gain their normal life after going through the damage of flood disaster. The recovery phase is about gaining normalcy and rebuilding houses, repairing roads, and locating all that have been displaced.

Residents' Agencies Participation in Flood Management Enabled Through Social Network Sites

Various attempts have been made by researchers and most nonprofit organizations on how social media can be used for maximizing the essence of residents' participation during flood disasters (Jamali et al., 2019). Liu and Palen (2010) cited the example of how gamification on social media had been used to improve people's knowledge and changing attitudes during natural disasters. Ortiz and Ostertag (2014), for instance, reported on the formation of a community of "Katrina bloggers" and their engagement in a range of offline collective civic activities during the 2005 Hurricane Katrina in the United States (USA). The study demonstrated that digital communication technologies including social media platforms facilitated the advent of new social ties and how the Web served as a mobilizing structure enabling individuals to link their civic engagement with collective civic actions. As indicated in Liu and Palen, (2010) and the approach of advanced camera and cellular telephones with camera offers the likelihood of making photos more open by distributing them online or sharing them utilizing using social networks media sites and applications such as Flickr and social networks sites like Facebook which permits its members to store, sort, hunt and offer photographs and pictures by means of the Internet.

Modern social media applications, which have achieved considerable penetration into the everyday life of many users, provide an invaluable source of data regarding user thoughts, beliefs, and opinions. Social media consists of users with diverse backgrounds and has the ability to encourage aggregation of the users, can provide a unique substrate for researchers to understand behavioral patterns of communities (Jamali et al., 2019). Research shows that heavy social media users seek out contacts, content boosts, favorable information, requirement inquiries, stress discharge, "emotional support", and a sense of belonging (Kim & Hastak, 2018). Communication is seen as the nexus that anchor the connections among the four components of disaster management which are: mitigation, preparedness, response, and recovery (Kim & Hastak, 2018) and in times of emergency in Nigeria, social network sites can stand as a powerful and effective broadcasting component from the disaster management agencies to the public and in addition serve as an impetus for residents' reactions in form of response.

The Technology, Organization, and Environment (TOE) Framework

The T.O.E is a framework that relates technology, organization, and environment by identifying the three aspects of an enterprise's context that influence the process by which it adopts and implements a technological innovation within the technological, organization, and environmental context (Oliveira & Martins, 2010). According to the TOE framework, technological, organizational and environmental context are the three main identified factors that influence technological innovation in enterprises.

Relating the TOE framework to flood disaster management, the technological context includes the current internal and external equipment (including social media) used by the flood management agency in disseminating flood management information. The organizational and environmental context remains the agency, public, and the entire environment affected by the flood. Therefore, the TOE framework has identified the potentials of managing flood disasters through social media through the adoption of the three influencing factors of technology: technology, organization, and environment. The major themes in using social media in flood disaster management include situational information (Oh et al., 2011), sense-making, collaborative resilience (Kim & Hastak, 2018), rumor management (Oh et al., 2011), and a vision of the future of disaster management that better supports inclusion of activities and information from members of the public. Most of these studies highlight the fact that during a disaster, social media can effectively supplement traditional information dissemination and sourcing methods by emergency services organizations and disaster managers (Ngamassi et al., 2016). Figure 1 presents the technology, organization, and environment framework.

HYPOTHESES DEVELOPMENT

Although applications of social media in the preparedness, response, and recovery phases of natural disasters have been widely studied (Kim & Hastak, 2018; Yates &

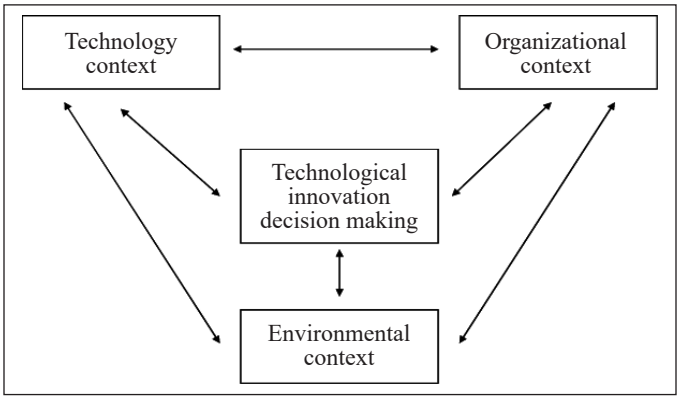

Figure 1. Technology, organization, and environment framework
Source: Ngamaassi et al. (2016)

Paquette, 2011; Yates & Partridge, 2015), there have been only a few studies on the influence of residents' usage of social media as the resident's predictor for planning and training in times of disasters. Therefore, this study hypothesized that planning and training via social media significantly influenced residents' participation in flood management. Hence, sub-hypotheses are as follows:

H_a: Social media disaster planning and training (SMDPT) significantly influence residents' participation in flood disaster preparedness (DPRE).

H_b: Social media disaster planning and training (SMDPT) significantly influence residents' participation in flood disaster response (DRES).

H_c: Social media disaster planning and training (SMDPT) significantly influence residents' participation in flood disaster recovery (DREC).

MATERIALS AND METHODS

This study employed the quantitative research approach to investigate the influence of resident's social media disaster planning and training on flood management in Nigeria. The study was conducted in Ibadan, Oyo State, Nigeria. The choice of Ibadan is informed due to the varying degree of flood incidents that had claimed over 35,000 lives and properties worth millions of Naira over the past 30 years in Ibadan (Eguaroje et al., 2015). The target population of the study was 4,372 members of the agencies responsible for flood/ disaster management in Ibadan, Nigeria. These resident agencies included the Oyo State Emergency Management Agencies (OYSEMA), Nigerian Meteorological Agency (NIMET), and the Red Cross Association, Oyo branch which had been responsible for flood disaster management in Ibadan, Oyo State, Nigeria. Table 1 presents the population distribution of the study and the percentage contributed by each agency.

Sample Size

The size of a sample used for a qualitative project is influenced by both theoretical and practical considerations (Robinson, 2014). The practical reality of research is that most studies require a provisional decision on sample size at the initial design stage. Without a provisional number at the design stage, the duration and required resource-allocation of the project cannot be ascertained, which makes planning all but impossible. However, a prior sample

Table 1
Population distribution and proportion

	Population	Percentage (%)
OYSEMA	150	3.43
NiMET	500	13.43
Red Cross	3722	85.13
Total	4372	100

specification needs not to imply inflexibility – instead of a fixed number, an approximate sample size range can be given, with a minimum and a maximum (Robinson, 2014). Also, the simplified sample size table provided by Krejcie and Morgan (1970) provided that for a population size of 4000, a sample size of 364 is required for analysis at +/- 5% error level while a population of 5000 requires a sample size of 370 respondents (Krejcie & Morgan, 1970).

Therefore, the sample size of this study was determined based on the total population of the study following the formula provided by Dillman (2000) and the ideas provided in Robinson (2014).

$$n = \frac{N(p)(1-p)}{(N-1)\left(\frac{B}{C}\right)2+(p)(1-p)}$$

N = population size, P = 0.5, B = 0.05, C = 1.96

Note: n = *calculated sample size required for the desired level of precision*

N = *size of the population,*

P = *the proportion of the population expected to be chosen,*

B = *the acceptable amount of precision or sampling error*

C = *is the K value associated with the confidence level.*

Therefore, a sample size of 370 is regarded as appropriate for a population of 4372 in this study, and hence, it is further used for the data analysis. Table 2 presents the population distribution, percentage, and proportion of the questionnaire used for the study.

Sampling Technique

This study employed the use of a stratified sampling technique to select the required respondents from the entire population of the study. In a stratified sample, the researcher first selects the particular categories or groups of cases that he/she considers should be purposely included in the final sample. The sample is then divided up or 'stratified' according to these categories and a target number of participants is allocated to each one (Robinson, 2014). As a result, the sample for this study was drawn from various agencies (OYSEMA, NiMET, and Red Cross) responsible for managing flood disasters in Ibadan justifying the use of stratified random sampling.

Questionnaire Design and Data Collection

Primary data was collected using a survey questionnaire to ascertain that all the constructs of this study were fully measured.

Table 2
Population distribution, percentage, and proportion

Agencies	Population	Percentage (%)	Proportion (Questionnaire utilized)
OYSEMA	150	3.43	12
NiMET	500	13.43	49
Red Cross	3722	85.13	314

The choice of the questionnaire for the collection of data was informed based on its ability to efficiently utilize the researcher's time, energy, and costs (Robinson, 2014; Sekaran & Bougie, 2009). Therefore, this research adopted the use of a structured questionnaire consisting of closed-ended questions that were self-administered to the respondents. The choice of this data collection mechanism over the other rests is its ability to allow the researcher to familiarize and clarify the respondents of any doubt during the data collection process.

The questionnaire was designed in different sections to elicit information on the study variables. Section A of the questionnaire elicits information on the demographic characteristics of the respondents. Section B collects information regarding Social Media Information Planning and Training. While section C embodies questions on Flood Management (Disaster Preparedness, Disaster Response, and Disaster Recovery). A type of Likert scale questionnaire (5-point scale) that ranges between "1" = Strongly Disagree (SD); "2" = Disagree (D); "3" = Undecided (U); "4" = Agree (A) and "5" = Strongly Agree (SA) was used in this study.

Validity and Reliability Test

The study questionnaire was further subjected to validity and reliability test to ensure a proper adaption of the instrument. The validation of content was in the process of measuring/testing of respondents' comprehension and understanding of the research instrument items (Robinson, 2014). Content validity was conducted on the wordings and sequence of the items of the questionnaire to determine which best suits the respondents among the alternative formats; to ascertain whether the items of this study would adequately measure the hypothetical concepts of the study. Further validation was conducted by assessing the reliability of the items of the questionnaire through the assessment of the Cronbach's alpha level. Hence, items with Cronbach's alpha level greater than .7 were regarded as having good reliability and thus, retained for further data collection. Table 3 presents the Cronbach's Alpha result for construct validation

Descriptive Analysis of Constructs and Items. The statistical description of the constructs of this study was done by determining the statistical values of mean, standard deviation, minimum and maximum values for all the constructs. The

Table 3
Cronbach's Alpha result for construct validation

S/N	Constructs	Cronbach's Alpha	N. of Items
1	Disaster Preparedness	.743	7
2	Disaster Recovery	.799	11
3	Disaster Response	.703	8
4	Social Media Disaster Planning and Training (SMDPT)	.721	5

measurement of all the constructs was done using a five-point Likert scale ranging from 1 – strongly disagree to 5 – strongly agree.

Description of Disaster Preparedness. The descriptive analysis of construct disaster preparedness as shown in Table 4 reveals a minimum number of 1 and a maximum value of 5 for all the items used in measuring the constructs. The result of the analysis revealed a mean value of 4.23 with a standard deviation of 0.837 for 'Have plan for unpredicted disasters', indicating an agreement among the respondents to having a plan for unpredicted disaster management. The mean value of 4.11 and a standard deviation of 0.863 indicates agreement of the respondents to familiarity with disaster management. Also, the mean value of 4.00, 4.05, 3.98, 3.88, 3.85, 3.77 and standard deviation value of 0.855; 0.613, 0.925, 0.971, and 0.928 indicates that there was an agreement among the respondents to training using disaster simulation, preparedness during disasters, educating others during disaster management, taking part in disaster maneuvers, and possible threats to disaster management.

Description of Disaster Recovery. The descriptive analysis of construct disaster recovery as shown in Table 5 revealed a minimum number of 1 and maximum value of 5 for item 1, 2, 3, 4, 5, and 11, a minimum and maximum value of 2 and 5 respectively for item 6, 7, and 10, while item 8 and 9 had a minimum value of 3 and maximum value of 5 in the construct. The mean values of the construct (greater than 3.5) indicate agreement to the items among the respondents except for item 3 with a mean value of 2.85 and a standard deviation value of 1.22 indicating that the respondents were undecided about managing the recovery operation in an organized and effective manner.

Description of Disaster Response. The result of the descriptive analysis conducted on disaster response construct shows a minimum value for items 1, 4, 6, 7, and 8; a maximum value of 2 for items 2, 3, and 5 with a maximum value of 5 for all the items. The mean values for all items are above 3.5 indicating agreement among the

Table 4
Description of Disaster Preparedness (DPRE)

S/N	Items	Min	Max	Mean	Std. Deviation
1	Familiarity with disaster management	1	5	4.11	0.863
2	Training using disaster simulation	1	5	4.00	0.855
3	Educating others regarding disaster management	1	5	3.98	0.915
4	Have plan for unpredicted disasters	1	5	4.23	0.837
5	Taking part in disaster maneuvers	1	5	3.88	0.925
6	Possible threats to disaster management	1	5	3.85	0.971
7	Possible threats to disaster management	1	5	3.77	0.928
8	Preparedness during disasters	1	5	4.05	0.613

Table 5
Description of Disaster Recovery (DREC)

S/N	Items	Min	Max	Mean	Std. Deviation
1	Minimize the duration of a critical application service interruption	1	5	3.79	0.899
2	Assess the damage to the affected	1	5	4.07	0.572
3	Manage the recovery operation in an organized and efficacy manner	1	5	2.85	1.220
4	Prepare personnel to respond effectively in disaster recovery situations	1	5	3.52	1.049
5	Establish an alternative location where employees can work on key functions	1	5	3.86	0.690
6	Provides basic supplies (e.g. food, water, and first aid) for recovery operations	2	5	4.21	0.636
7	Provide contact information for employees involved in recovery operations	2	5	4.22	0.582
8	Provide employees with the details of the emergency plans	3	5	4.23	0.572
9	Make availability for evacuation in case the need arises	3	5	4.21	0.564
10	Provide financial plans to handle immediate needs	2	5	4.18	0.560
11	Provide supports outside the normal operations	1	5	3.96	0.694

respondents to all items that measured the construct. Table 6 presents a description of the disaster response.

Description of Social Media Disaster Planning and Training. The description of social media disaster planning and training in this study as presented in Table 7 revealed a minimum value of 1 for 'Engage the general public on the topic of interest on social media network', a minimum value of 3 for 'confirm the success of the community exercises on social media' and a minimum value of 2 for item 1, 3, and 4 with all the items having a maximum value of 5 each. The mean value of 3.09 indicates that the respondents were undecided on the item 'confirm the success of the community exercises on social media'. All of the items possessed a mean value greater than 3.5 indicating that there was an agreement to disaster management planning and training via social media.

RESULTS

The primary data collected in the study was analyzed using the partial least square – structural equation modeling (PLS-SEM). However, a number of preliminary activities of data screening (Response Rate, Missing Data, Test of Non-Response Bias, Independent sample t-test for equality of means, detection of outliers, common method bias, normality and linearity test. The Confirmatory Factor Analysis (CFA) was conducted using the principal component analysis (PCA) of PLS-SEM because items used in the conduct of this

Table 6
Description of disaster response (DRES)

S/N		Min	Max	Mean	Std. Deviation
1	Follows the official weather forecasts and warning regularly	1	5	3.72	0.854
2	Provides medication kits for the affected	2	5	4.06	0.601
3	Stocks of food and drinking water for the affected	2	5	4.02	0.697
4	Stocks of fuel for the victims	1	5	3.78	0.887
5	Provides survival tools (e.g., electrical torch, blanket, and warm boots)	2	5	4.16	0.640
6	Pay special attention to the victim and vulnerable public members	1	5	3.81	0.895
7	Provides temporary means of accommodation	1	5	3.23	1.083
8	Adequate provision for evacuation	1	5	3.81	0.726

Table 7
Description of social media disaster planning and training (SMDPT)

S/N	Items	Min	Max	Mean	Std. Deviation
1	I use hash-tags on social media to help filter information relating to disaster on social media	2	5	4.03	0.666
2	Engage the general public on the topic of interest on the social media network	1	5	3.76	0.824
3	Stream video/activity on social media network to announce the occurrence of an event	2	5	3.93	0.789
4	Engage the communities in training exercise through social media	2	5	3.97	0.679
5	Confirm the success of the community exercises on social media	3	5	3.09	0.318

study were adapted from a previous related study; hence, the need for exploratory data analysis is not required (Hair et al., 2010). The essence of this was to ascertain the suitability of the collected data for the main data analysis.

Measurement Model

This study employed the use of partial least squares - structural equation modeling (PLS-SEM) by using the smartPLS M3 software application to estimate the measurement model of this study (Hair et al. (2013). The study assessed the measurement model through the evaluation of the convergent validity, which is indicated by the item loadings, the average variance extracted (AVE), and the composite reliability (CR). The findings of the statistical analysis showed item loadings greater than the threshold (0.5) as recommended by Hair et al. (2013). The result of AVE presented a value of 0.599 for disaster preparedness (DPRE),

0.816 for disaster recovery (DREC), 0.607 for disaster response (DRES), and 0.644 for Social Media Disaster Planning and Training (SMDPT) indicating a good variance shared between a construct and its measures. In addition, the findings indicate a good internal consistency among the items of the constructs as revealed by the values of the composite reliability of 0.899 for DPRE, 0.947 for DREC, O.822 for DRES, and 0883 for SMDPT. Furthermore, R2 value of 0.122 for DPRE, 0.083 for DREC, and 0.207 for DRES indicates that social media disaster planning and training explained 12.2%, 8.3%, and 20.7% variance level in disaster preparedness, recovery, and response respectively. Table 8 presents the convergence and reliability result of the analysis

Furthermore, the discriminant validity result of the study which was assessed through the Fornel and Lacker criterion revealed that the square root of the constructs' AVE were greater than the corresponding correlations of the measures indicating the achievement of discriminant validity in

Table 8
The convergence and reliability analysis

Constructs	Items	Loadings	AVE	CR	R2
Disaster Preparedness	DPRE1	0.737	0.599	0.899	0.122
	DPRE2	0.797			
	DPRE3	0.809			
	DPRE5	0.835			
	DPRE6	0.755			
	DPRE7	0.703			
Disaster Recovery	DREC6	0.864	0.816	0.947	0.083
	DREC7	0.924			
	DREC1	0.908			
	DREC9	0.917			
	DREC10	0.614			
Disaster Response	DRES1	0.750	0.607	0.822	0.207
	DRES2	0.822			
	DRES3	0.763			
	DRES6	0.699			
	DRES8	0.667			
Social Media Disaster Planning and Training	SMDPT1	0.806	0.644	0.878	
	SMDPT2	0.711			
	SMDPT3	0.842			
	SMDPT4	0.844			

Note: Composite reliability (CR) = Square of the summation of the factor loadings) {(square of the summation of the factor loadings) + (square of the error variances)}. Average variances extracted (AVE) = (summation of the square of the factor loadings)/ {(summation of the square of the factor loadings) + (summation of the error variances)

the study indicating the uniqueness of the constructs, not represented by the other constructs in the model (Hair et al., 2013). Table 9 presents the Discriminant validity analysis of the study.

Structural Model

This study assessed the structural model of the study as shown in Figure 2 by evaluating the path coefficient of PLS-SEM to test the stated hypotheses of the study. In achieving this, the PLS path modeling multiple regression approach was used to test the influences of the exogenous variables on the endogenous variables using the bootstrapping technique in PLS to analyze the path modeling using 384 cases and 5000 bootstrapped samples to ensure that all the model parameters have empirical sampling distribution and standard errors were obtained. The path coefficients were estimated using t-statistics. According to

Table 9
Discriminant validity

	DPRE	DREC	DRES	SMDPT
DPRE	**0.774**			
DREC	0.239	**0.903**		
DRES	0.237	0.226	**0.779**	
SMDPT	0.346	0.264	0.426	0.802

Note: Values in the diagonals represent the squared root of average variance extracted while the other entries (off diagonals) represent the variable correlations.

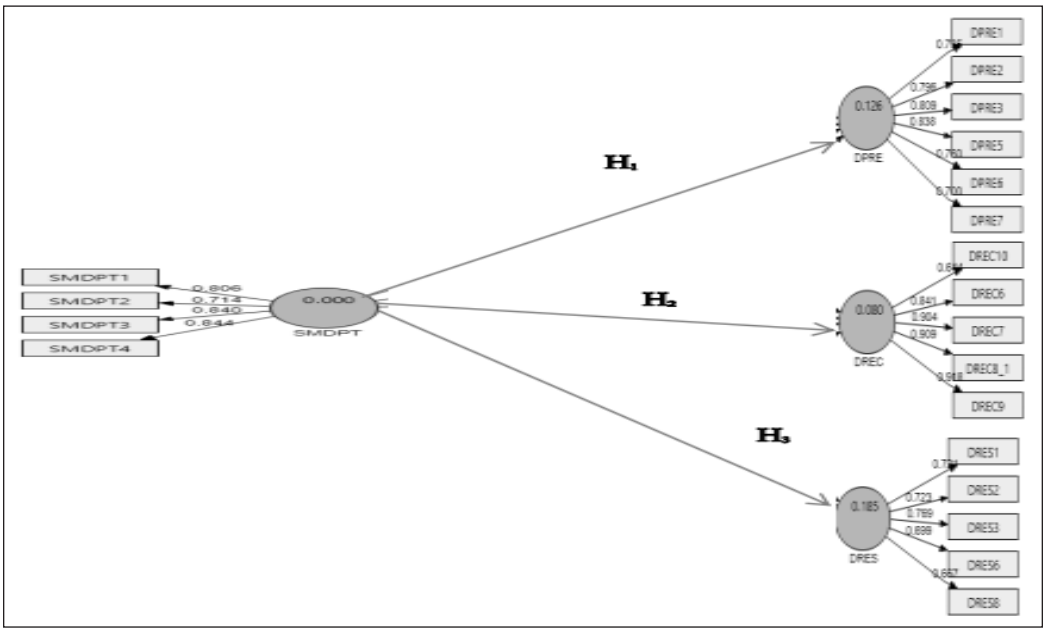

Figure 2. The research model

Churchill Jr. (1979) and Sharma (2000), in a situation where a one-tailed statistical test is conducted, the significance level of t-value of 1% is greater than or equal to 2.326, at 5% is greater or equal to 1.645 while at 10% is greater or equal to 1.282, any t-value lesser than the stated are regarded as not significant.

The result of the standard path coefficient (β), t-value and the decision taken on the hypotheses are presented in Table 10. The findings of the study revealed a significant influence of social media disaster planning and training (SMDPT) on residents' participation in disaster preparedness (SMDPT -> DPRE: β = **.245,** t = **2.941**), recovery (SMDPT -> DREC: β = .241, t = **2.539**) and response (SMDPT -> DRES: β = .384, t = **4.262**).

DISCUSSION

The objective of this study aimed at investigating the influence of social media disaster planning and training (SMDPT) on the resident's participation in flood disaster management. Social media disaster planning and training is the engagement of the community in public education and emergency preparedness activities, training exercises, and advocacy through social media networks (Yates & Partridge, 2015). Three hypotheses were developed to accomplish this objective and tested in relation to the influence of social media disaster planning and training on resident's participation in flood disaster management (disaster preparedness, response, and recovery). The study found a significant influence of social media disaster planning and training (SMIDPT) on residents' flood disaster preparedness (DPRE), disaster responses (DRES), and disaster recovery (DREC).

The findings of the study imply that a unit increase in social media disaster planning and training will improve flood disaster preparedness by 24.5%; flood disaster recovery by 24.1% and flood disaster response by 38.4% as shown by the standardized beta value of the path coefficients. The findings indicate that social media disaster planning and training has more influence on disaster recovery than both preparedness and response. These findings corroborate the findings of previous researchers such as Ortiz and Ostertag (2014), Palen et al. (2007), and Richter (2012).

Table 10
Test of hypotheses

Hypotheses	Path Coefficient	Beta	Std. Err	T-Statistics	Decision
H_{01}	SMDPT -> DPRE	.245	.082	**2.941**	**Significant**
H_{02}	SMDPT -> DREC	.241	.094	**2.539**	**Significant**
H_{03}	SMDPT -> DRES	.384	.090	**4.262**	**Significant**

Palen et al. (2007) described some citizen-led online forums that emerged following Hurricane Katrina, pointing to the challenges facing the scientific community in helping to produce socio-technical solutions that addressed the issues of usability and organizational applicability of citizen-generated information. Likewise, Richter (2012) revealed the role of digital communication platforms during another US natural disaster which was Superstorm Sandy in 2012. Occupy Sandy, a grassroots relief effort, was developed by the original members of Occupy Wall Street using the communication networks built by members of the earlier protest camp (Richter, 2012).

Similarly, Richter (2012) explained that peoples' knowledge and attitudes during disaster management had been improved through social media planning and training. In addition, the study has also been supported by Ortiz and Ostertag (2014) who reported that the formation of a community of "Katrina bloggers" and their engagement in a range of offline collective civic activities during the 2005 Hurricane Katrina in the United States (USA), demonstrated that, digital communication technologies including social media platforms facilitated the advent of new social ties and how the Web served as a mobilizing structure enabling individuals to link their civic engagement with collective civic actions. Therefore, it is evident that social media disaster planning and training significantly influence residents' participation in flood management.

SIGNIFICANCE, RECOMMENDATION, AND CONCLUSIONS

This study has established that social media disaster planning and training have a significant influence on flood disaster preparedness, response, and recovery. The study has found support for the Technology, Organization, and Environment theory which posited that the residents' participation through social media influenced disaster management (disaster preparedness, response, and recovery).

It has theoretically been able to contribute to knowledge by conducting its investigation in a flood disaster-prone environment in a developing nation. It has majorly contributed to knowledge by providing evidence in theorizing the optimization of social media for effective management of flood disasters in Nigeria. Findings of the previous studies relating to the significance of social media in flood management have shown that research into resident's use of social network sites in disaster situations especially in a developing country like Nigeria has been limited (Yates & Partridge, 2015). Therefore, this research has been able to contribute to expanding the literature available in the field of flood disaster management. It has excellently, found support for the TOE theory which posited that the residents' participation through social media influenced disaster management (disaster preparedness, response, and recovery).

This study is practically beneficial to the relevant policymakers on disaster management in Nigeria by providing institutional, regulatory, and enforcement frameworks in disaster management, especially with respect to flood disaster management. The study has complemented the efforts of the Federal and States governments of Nigeria such as the National and State Emergency Management Agency (NEMA), Oyo state emergency management agency (OYSEMA), Lagos state emergency management agency (LASEMA), Red Cross Association of Nigeria, Nigeria Security and Civil Defence Corps (NSCDC), Federal Environment Protection Agency (FEPA), and Nigerian Meteorological Agency (NIMET) towards alleviating flood hazards in a coordinated manner. It has notified stakeholders such as the government, emergency management agencies, and the residents on how to employ social media in flood management.

Recommendations

The descriptive analysis of disaster response (DRES) revealed that managing recovery operations in an organized and effective manner had a mean value of 2.85 indicating that residents of the flood-prone area in Ibadan were undecided regarding the use of social media during flood disaster. Therefore, this study recommends that governments and disaster management agencies should encourage the use of social media in information gathering and dissemination, awareness creation, and promote planning and training across the nation especially among the residents of flood-prone disaster environments.

Conclusion

This study has been able to establish the linkage and relationships between the resident's social media participation and flood disaster management in Nigeria and has tested the relationships in order to provide answers to the aforementioned research questions in relation to the corresponding research objectives stated in the introductory part of this study.

It is revealed in this result that residents' social media experience did not automatically translate into their participation in flood management unless they have undergone the social media disaster planning and training. Therefore, it is concluded that the research objective of this study as highlighted in the research objective part has been achieved.

ACKNOWLEDGEMENT

A special thanks to the members of the Red cross association of Nigeria (Oyo state chapter), members of the Nigerian meteorologist agency (NiMET Oyo chapter), and members of the National emergency management agency (NEMA Oyo chapter) who helped in the completion of the data instrument used for collation of data used in this study. Thank you all and God bless!

REFERENCES

Abdulfatai, I. A., Okunlola, I. A., Akande, W. G., Momoh, L. O., & Ibrahim, K. O. (2014). Review of gully erosion in Nigeria: Causes, impacts

and possible solutions. *Journal of Geosciences and Geomatics, 2*(3), 125-129. https://doi.org/10.12691/jgg-2-3-8

Agbonkhese, O., Agbonkhese, E. G., Aka, E. O., Joe-Abaya, J., Ocholi, M., & Adekunle, A. (2014). Flood menace in Nigeria: Impacts, remedial and management strategies. *Civil and Environmental Research, 6*(4), 32-41.

Bruns, A., & Stieglitz, S. (2012). Quantitative approaches to comparing communication patterns on Twitter. *Journal of Technology in Human Services, 30*(3-4), 160-185. https://doi.org/10.1080/15228835.2012.744249

Churchill Jr., G. A. (1979). A paradigm for developing better measures of marketing constructs. *Journal of Marketing Research, 16*(1), 64-73.

Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method* (2nd ed.). New York, USA: John Wiley & Sons.

Eguaroje, O., Alaga, T., Ogbole, J., Omolere, S., Alwadood, J., Kolawole, I., ... & Adewoyin, J. E. (2015). Flood vulnerability assessment of Ibadan City, Oyo state, Nigeria. *World Environment*, *5*(4), 149-159. https://doi.org/10.5923/j.env.20150504.03

Evers, M. (2012). *Participation in flood risk management: An introduction and recommendations for implementation*. Bonn, Germany: Karlstads Universitet.

Grove, K. (2014). Agency, affect, and the immunological politics of disaster resilience. *Environment and Planning D: Society and Space, 32*(2), 240-256. https://doi.org/10.1068/D4813

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Uppersaddle River, USA: Pearson Education International.

Hair, J. F., Hult, G. T., Ringle, C. M., & Sarstedt, M. (2013). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Thousand Oaks, USA: Sage Citizenship Ltd.

Houston, J. B., Hawthorne, J., Perreault, M. F., Park, E. H., Hode, M. G., Halliwell, M. R., ... & Griffith, S. A. (2015). Social media and disasters: A functional framework for social media use in disaster planning, response, and research. *Disasters, 39*(1), 1-22. https://doi.org/10.1068/d4813

Jamali, M., Nejat, A., Ghosh, S., Jin, F., & Cao, G. (2019). Social media data and post-disaster recovery. *International Journal of Information Management, 44*, 25-37. https://doi.org/10.1016/j.ijinfomgt.2018.09.005

Kim, J., & Hastak, M. (2018). Social network analysis: Characteristics of online social networks after a disaster. *International Journal of Information Management*, *38*(1), 86-96. https://doi.org/10.1016/j.ijinfomgt.2017.08.003

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, *30*(3), 607-610. https://doi.org/10.1177/001316447003000308

Lindell, M. K., & Whitney, D. J. (2000). Correlates of household seismic hazard adjustment adoption. *Risk Analysis*, *20*(1), 13-26. https://doi.org/10.1111/0272-4332.00002

Liu, S. B., & Palen, L. (2010). The new cartographers: Crisis map mashups and the emergence of neogeographic practice. *Cartography and Geographic Information Science*, *37*(1), 69-90. https://doi.org/10.1559/152304010790588098

Ngamassi, L., Ramakrishnan, T., & Rahman, S. (2019). Use of social media for disaster management: A prescriptive framework. In *Emergency and disaster management: Concepts, methodologies, tools, and applications* (pp. 240-260). Prairie View, USA: IGI Global. https://doi.org/10.4018/978-1-5225-6195-8.ch011

Nwigwe, C., & Emberga, T. T. (2014). An assessment of causes and effects of flood in Nigeria. *Standard Scientific Research and Essays*, *2*(7), 307-315.

Obeta, M. C. (2014). Institutional approach to flood disaster management in Nigeria: Need for a preparedness plan. *Current Journal of Applied Science and Technology*, *4*(33), 4575-4590. https://doi.org/10.9734/BJAST/2014/11844

Odufuwa, O., Adedeji, O. H., Oladesu, J. O., & Bongwa, A. (2012). Floods of fury in Nigerian cities. *Journal of Sustainable Development*, *5*(7), 69-79. https://doi.org/10.5539/jsd.v5n7p69

Oh, O., Agrawal, M., & Rao, H. R. (2011). Information control and terrorism: Tracking the Mumbai terrorist attack through Twitter. *Information Systems Frontiers*, *13*(1), 33-43. https://doi.org/10.1007/s10796-010-9275-8

Olanrewaju, C. C., Chitakira, M., Olanrewaju, O. A., & Louw, E. (2019). Impacts of flood disasters in Nigeria: A critical evaluation of health implications and management. *Jàmbá: Journal of Disaster Risk Studies*, *11*(1), 1-9. http://dx.doi.org/10.4102/jamba.v11i1.557

Oliveira, T., & Martins, M. F. (2010). Information technology adoption models at firm level: Review of literature. In *The European Conference on Information Systems Management* (p. 312). Lisbon, Portugal: Academic Conferences International Limited.

Ortiz, D. G., & Ostertag, S. F. (2014). Katrina bloggers and the development of collective civic action: The web as a virtual mobilizing structure. *Sociological Perspectives*, *57*(1), 52-78. https://doi.org/10.1177/0731121413517558

Owolabi, T. O. S., & Ekechi, C. O. (2014). Communication as critical factor in disaster management and sustainable development in Nigeria. *International Journal of Development and Economic Sustainability*, *2*(3), 58-72.

Palen, L., Hiltz, S. R., & Liu, S. B. (2007). Online forums supporting grassroots participation in emergency preparedness and response. *Communications of the ACM*, *50*(3), 54-58. doi:10.1145/1226736.1226766

Paton, D. (2003). Disaster preparedness: A social-cognitive perspective. *Disaster Prevention and Management: An International Journal, 12*(13), 210-216. https://doi.org/10.1108/09653560310480686

Richter, M. (2012). Occupy sandy. *Disaster Medicine and Residents Health Preparedness, 6*(4), 324. https://doi.org/10.1001/dmp.2012.75

Robinson, O. C. (2014). Sampling in interview-based qualitative research: A theoretical and practical guide. *Qualitative Research in Psychology*, *11*(1), 25-41. https://doi.org/10.1080/14780887.2013.801543

Sekaran, U., & Bougie, R., (2016). *Research methods for business: A skill-building approach* (7th ed.). Chichester, England: John Willey and Sons Ltd.

Sharma, S. (2000). Managerial interpretations and organizational context as predictors of corporate choice of environmental strategy. *Academy of Management Journal*, *43*(4), 681-697. https://doi.org/10.5465/1556361

Takao, K., Motoyoshi, T., Sato, T., Fukuzondo, T., Seo, K., & Ikeda, S. (2004). Factors determining residents' preparedness for floods in modern megalopolises: The case of the Tokai flood disaster in Japan. *Journal of Risk Research*, *7*(7-8), 775-787. https://doi.org/10.1080/1366987031000075996

Terpstra, T., & Gutteling, J. M. (2008). Households' perceived responsibilities in flood risk management in the Netherlands. *International Journal of Water Resources Development*, *24*(4), 555-565. https://doi.org/10.1080/07900620801923385

Whitmarsh, L. (2008). Are flood victims more concerned about climate change than other people? The role of direct experience in risk perception and behavioral response. *Journal*

of Risk Research, 11(3), 351-374. https://doi.org/10.1080/13669870701552235

Yates, D., & Paquette, S. (2011). Emergency knowledge management and social media technologies: A case study of the 2010 Haitian earthquake. *International Journal of Information Management*, *31*(1), 6-13. https://doi.org/10.1016/j.ijinfomgt.2010.10.001

Yates, C., & Partridge, H. (2015). Citizens and social media in times of natural disaster: Exploring information experience. *Information Research*, *20*(1), 110-121.

Yeh, Y. C. (2010). Analyzing online behaviors, roles, and learning communities via online discussions. *Journal of Educational Technology & Society*, *13*(1), 140-151.

Zhang, C., Fan, C., Yao, W., Hu, X., & Mostafavi, A. (2019). Social media for intelligent public information and warning in disasters: An interdisciplinary review. *International Journal of Information Management*, *49*, 190-207. https://doi.org/10.1016/j.ijinfomgt.2019.04.004