Research Journal for Societal Issues

Vol 6 No 2 (2024): 102-120

E-Governance for Crisis Communication: A Study of Environmental Disaster in Pakistan

Sumera Batool*[1], Aqsa Zaffer[2], Aaima Batool[3]

[1*]Associate Professor, Department of Mass Communication, Lahore College for Women University, Lahore, Punjab, Pakistan.

[2]Mphil Scholar, Department of Mass Communication, Lahore College for Women University, Lahore, Punjab, Pakistan.

[3]Visiting Lecturer, Department of Mass Communication & Media, University of Narowal, Narowal, Punjab, Pakistan.

Corresponding author: Sumera.batool@lcwu.edu.pk

Keywords: *Disaster Management Authority, E-governance, Murree Snowstorm, Karachi Monsoon Rainfall, Flood, Social Media ,Twitter, Facebook, Crisis Communication*

DOI No:
https://doi.org/10.56976/rjsi.v6i2.211

This study explores the state of social media as an e-governance platform which is currently in preliminary stage in crisis communication during three major climate disasters in Pakistan. The researchers aim to scrutinize the proactive or reactive approach of social media handles belonging to Disaster Management Authorities (DMA's) of Pakistan during the natural calamities of 2022: During Murree Snowstorm, Karachi Monsoon Rainfall, and Floods. This study targets various authorities, namely the National Disaster Management Authority (NDMA) and the Provincial Disaster Management Authorities of Punjab, Sindh, KPK, and Baluchistan. Using quantitative content analysis techniques, the Social Mediated Crises Communication Model provided theoretical implications to determine which authority gathered more feedback likes, comments, and shares/retweets. The data is purposively sampled from the Twitter and Facebook handles of the National Disaster Management Authority and Provincial Disaster Management Authorities beginning from 1 January 2022 till 31 December 2022. The descriptive analysis on SPSS indicated that, most of the times, disaster management authorities adopted a reactive approach, with Twitter being a more active platform than Facebook. Additionally, contrary to other DMA's, the Punjab Disaster Management Authority received more feedback on their social media platforms.

1. Introduction

The upshots of climate change are evident in the ecosystem of Pakistan (Diakakis et al., 2018). Excessive rains, unpredictable weather, and floods have caused deterioration to human lives (Rana et al., 2021). Human lives have lost their worth and are prone to the disastrous consequences of climate change. Governments are responsible for addressing climate change and introducing policies to cope up with climate disasters. Disaster management requires government to apprise the public with neoteric information. The adequate dissemination of required information to create awareness about crisis communication the first step towards solving any problem. However, at the right time can turn out to be effective in preventing the destruction of human lives and respective resources (Ahmad, 2022). In 2022, the excessive Karachi monsoon rainfall, snowstorms in Murree, and floods affected Pakistan on a large scale. These two factors together contributed to the helplessness of people. Who are already living from hand to mouth further instability pushed them below the poverty line. The upshots of these disasters made Pakistan face the destruction of infrastructure as well as other valuable resources.

However, during summer 2022, Pakistan witnessed massive rainfall; Karachi paid the price of this urban flooding which caused havoc to the citizens of Karachi (Sattar & Nadeem, 2022). On Jan 9th, 2022, a record number of citizens entered the premises of Murree a hill town situated northeast of Islamabad to witness the snowfall on the weekend. Due to heavy snow storms, the roads were blocked. Since the city did not have enough capacity to accommodate a record number of citizens, the unfriendly management turned the weekend into a nightmare for many families who had to spend the night in their vehicles. Due to the lack of awareness and cold temperature families along with children, lost their lives in vehicles (Meo et al., 2022). Not just but is, the snowstorm slowed down the whole rescue operation. The concerned authorities did not issue warnings about weather and traffic situations to the families who had planned to visit Murree on that weekend. Moreover, families also failed to tackle this disaster (Qureshi, 2022). Moreover, since mid-July 2022, Pakistan has been highly affected by monsoon rainfall-induced floods. This flood broke the record of destruction caused by all previous floods in the history of Pakistan: one-third of the whole area was covered with water it was affected almost 33 million citizens, destroyed 2 million homes in Pakistan,1600 citizens died, whereas, the rest were forced to live under the sky in upcoming winters (Wise, 2022). Sindh and Baluchistan were the worst-hit areas in Pakistan. The water-borne diseases were spreading at a faster rate. However, this flood washed away homes, hospitals, and schools (Ochani et al., 2022).

1.1 E-Governance assistance in Crisis Communication

Information and Communication Technology provides an effective model in Third-world countries for development. E-governance is the consolidation of Information and Communication technology in the governance process (Cho, 2022). It seems efficient in developing countries as it's a less-costly mode of communication which gives an opportunity to governments to deliver more on less budget, and has more likelihood to get penetrate into the society. However, Crisis communication has become convenient for disaster management

authorities due to the incorporation of social media in the governing process. (Sarangi et al., 2022; Umbach, 2022). E-governance has become a significant ally in modern crisis communication as it assists disaster management authorities with impactful tools to communicate with citizens effectively during a crisis. Not just this, e-governance improves the working conditions within the public sector and paves the way for them to work efficiently in a composed way (Ramaswamy, 2021). Furthermore, it has also contributed to creating a close association/network between the governments and citizens which turns out to be compatible for both of them. Citizens have the power to give feedback on government policies and question any immoral act that doesn't abide by the society. Likewise, the governments have citizens' feedback which directs them to derive policies that align with the public interest. However, the policies must reflect the actual concerns of the public as they can actually shape the lives of citizens (Heeks, 2001; Mulder, 2020). The E-governance model provides support in third-world countries to cope with hurdles in managing environmental disasters.

1.2 E-governance and social media in Pakistan

In Pakistan the lack of technological literacy created hurdles in the implementation of E-governance as the majority of citizens lack IT skills. Nevertheless, the infrastructure of Pakistan does not possess the capacity to provide grounding support to e-governance. Pakistan needs efficient efforts. Timely investment in required resources is the basic need to get benefits of E-governance (Mathrani et al., 2022). Moreover, E-governance can operate in Pakistan only if it gives due attention to enhancing citizen literacy to develop IT-skilled human resources. One cannot ignore the fact that both the government as well as the education level of the people of Pakistan are technology friendly. Technological innovation has to go through a lot of barriers to get penetrated into the society. Furthermore, the public sector provides few e-services to ease the lifestyle of citizens; however, the public is not aware of available e-services which deprives it of its intended benefit (Bhagat et al., 2021; Nagpal, 2020).

In Pakistan, e-governance is informational-based. Website and social media handles of institutes of Pakistan share informational e-copies. E-governance is merely the dissemination of information. The E-governance model is not properly interactively implemented in Pakistan. It is a one-sided official information-sharing platform. Citizen engagement in policymaking is at a low level. Authorities acknowledge the lack of public engagement. Furthermore, the public engagement level is low due to a lack of trust in e-services, and a lack of awareness, and skills. Citizens do not expect a timely response in e-services. However, E-services are convenient for a small number of citizens (Aman & Jan, 2022).

1.3 Disaster Management Authorities of Pakistan

National Disaster Management Authority (NDMA) is a federal institution to oversee disasters in Pakistan. Provincial Disaster Management Authority (PDMA) operates at the provincial level working to respond to any kind of natural or man-made crisis (Braam et al., 2021). National Disaster Management Authority is responsible to manage the whole cycle of disasters. The role of Twitter and Facebook handles of NDMA and PDMA during the Karachi Monsoon rainfall 2022, Murree Snowstorm 2022, and Floods 2022 need to be analyzed to better assess their approach with respect to dealing with these disasters. The majority looked

towards social media to get updates; citizens actively participated on social media rather than on traditional media. During an environmental crisis, social media is more exclusive when it comes to communicating the updated as well as revised policies (Schwaiger, 2022). The trend of picking news from social media is at its peak in Pakistan. Moreover, citizens can access information from social media as per their needs (Kabata et al., 2022). NDMA and PDMA cater to the outcomes of disasters rather than working on the measures to minimize the factors for disaster. During a crisis, citizens look up to concerned authorities for information that can help them to survive the crisis (Denisova, 2022).

Climate disasters in Pakistan have become increasingly frequent and severe significant challenges to the well-being of its citizens. Effective disaster management is an essential to make the adverse impacts of these disasters and to facilitate the affected population. In today's digital age, incorporating e-governance models can potentially enhance disaster management capabilities, particularly in third-world countries. However, there is a critical need to assess and understand the performance of disaster management authorities in Pakistan, specifically concerning their utilization of digital platforms for crisis communication. In light of this, the problem addressed in this study is to what extent and how effectively are disaster management authorities in Pakistan utilize social media platforms like Twitter and Facebook, to manage and communicate during climate-related crises, such as the Murree snowstorm, Karachi monsoon rainfall, and floods in 2022?

Furthermore, this study aims to uncover the reactive or proactive approach positioned by the social media handles of the National Disaster Management Authority and Provincial Disaster Management Authorities in dispersing the basic information to create awareness before, during, and after three main disastrous events: Karachi Monsoon Rainfall, Murree Snowstorm, and Floods. The proactive approach involves issuing timely warnings before climate disasters occur and cause damage. In contrast, the reactive approach involves issuing warnings after climate disasters have occurred and damage has already been done. Likewise Social media handles are a convenient way to tackle misinformation. Moreover, the propaganda attempts that float during any crisis and boost the panic situation (Lee et al., 2022). The misinformation circulating on social media makes the circumstances even more entangling to deal with, therefore, the delay in addressing as well as rectifying these rumors can direct the authorities towards the panic situation at the national level, aggravating the agitation (Muhammad, 2022). Likewise, Public engagement on social media in disastrous activities indicates the awareness at all level of citizens. These disasters require the authorities to ensure the accessibility of this rectifying knowledge which being circulated at their social media handles among all social classes of the country.

1.4 Objectives

1. To explore the approach of Facebook and Twitter handles of NDMA and PDMA's in their coverage of the Murree Snowstorm, Karachi Monsoon Rainfall, and Floods in 2022.
2. To examine the level of public engagement on the Facebook and Twitter handles of NDMA and PDMA's during the Murree Snowstorm, Karachi Monsoon Rainfall, Murree, and Floods of 2022 (The level of public engagement indicates the count of likes, retweets, quote tweets, and comments on a tweet).

1.5 Research Question

RQ1. What was the approach of NDMA and PDMA's Twitter and Facebook handles in disseminating information regarding climate disasters? Whether their approach was proactive or reactive?

RQ2. Which social media platforms (Twitter or Facebook) of NDMA and PDMA was more active?

RQ3. What is the status of e-governance in Pakistan?

2. Literature Review

2.1 Information Communication Technology and E-Governance in developing countries

In the government system, the integration of Information and Communication Technology ICTs to make the process of governance more efficient is described as E-governance. Information and Communication technology are utilized to achieve good governance (Burlacu et al., 2021). Adu et al (2018) suggested that Information and Communication Technologies (ICTs) transform and supports government working conditions in managing affairs through processing and communicating the data. E-Governance ensures connection within the government (Adjei-Bamfo et al., 2019). Lee (2022) put forward that public sector internal work is improved through E- Administration. Connection with the citizens in E-Governance provides an edge to citizens to help the government be accountable in a more direct way (Hofmann et al., 2020). Government Connection with a citizen is maintained through initiatives such as talking to the citizen about the responsibility of government sectors and considering citizen's views and needs in public sectors decision (Adu et al., 2018). Information about the services of the public sector is accomplished through utilizing Information and Communication Technologies ICTs. Heeks (2001) put forward that the information is published online, and citizen interaction is received.

In third-world countries, governments cost way more than their performance in the development of the country. E-governance tackles the issues of third world countries as it is cheaper, quicker, and provides outpost more than the cost (Meiyanti et al., 2018). To make full use of e-governance benefits developing nations need efficient IT skills and sufficient infrastructure. Investments and expert human resources are mandatory. Developing nations need to expand access to e-services at a wider level. Limited access to slow-speed internet and lack of Infrastructure is a huge hurdle for citizens to access e-services (Nagpal, 2020). Moreover, Umbach (2022) suggested that E-governance has made it easy for citizens to access and utilize services offered by the government. It is the need of the hour that government implements artificial intelligence techniques to improve their service delivery to the citizens (Al-Besher, 2022). Sinha (2021) said that access of public to the e-services indicated the success of the government; utilization of information technology and governments progress is interlinked in this digital era.

Likewise, E-governance has proved itself as a better medium to disseminate information to citizens (Sepasgozar et al., 2020). Lee (2022) put forth that citizens' interaction on government websites is continuously increasing to utilize e-services. E-governance has an impact on citizens' trust in government, as e-governance platforms create a perception of accountability among citizens. E-governance has made government work flexible. This model has the ability to introduce flexibility in government affairs (Hanafizadeh et al., 2020).

Furthermore, E-governance has revolutionized other public sectors working as well. This is the era of Information Technology, without e-government it is non-viable to have good governance. This model received appreciation and acceptance all over the world. Kumar (2019) suggested that the appreciation and acceptance are due to its transparency and accountability. China's e-governance model proved to be effective in managing government affairs during the outbreak of Covid-19 pandemic. Implementation of E- governance model minimized the deadly impacts of Covid-19 pandemic in China. Through e-governance model China was successful in achieving Sustainable Development Goals and controlling the Covid-19 Pandemic. Pakistan and China share a strong brotherly bond. Pakistan needs to implement China's E-governance model to achieve development (Ullah et al., 2021).

2.2 Impact of E-governance in public sectors

Integration of Information and Communication Technologies in health and medical care enables the control over emergencies (Lee et al., 2022). E-governance has aided health initiatives It has increased the patient's quality of care. Technical support has advanced e-health services (Ijaz & Chaudhry, 2021). During Covid-19, digitalization of health services prepared humanity to tackle the uncertain time (Kaur et al., 2022).

Pakistan adopted e-learning during Covid-19 as it became the need of the hour. Before the Pandemic, educational activities were campus-based. The availability of devices and the internet is a challenge in the e-learning process. E-learning adoption has mixed reactions. This process enabled the smooth way to carry on the activities along with the difficulty in the evaluation process (Butt, 2022).

However, E-police station is a service of the government through e-governance (Obagbuwa & Abidoye, 2021). Police Stations are connected and share databases for warrants and matching fingerprints with the help of advanced technology. The websites of police stations disseminate the required information. They share the list of people under custody, wanted, criminals. Their websites provide information about citizens involved in accidents (Swetha et al., 2022).

2.3 Impact of Social Media (Twitter, Facebook) on Crisis Communication

Given the escalating frequency of climate-related disasters, authorities must connect the communicative power that social media offers (Moghadas et al., 2023). By doing so, they can adeptly convey crucial information about disasters and contribute to minimizing their adverse effects. E-governance and crisis communication are interlinked due to their reliance on digital platforms. Furthermore, E-governance on social media provides information to the citizens about the services and addresses complaints by citizens filed online. Agarwal (2017) put forth that E-governance is to direct public institutes to respond to complaints and provide

better services to improve the government citizen's relations. Social Media, especially Twitter, is a reliable and good source of communication in a crisis. Twitter is a popular form of social media for communication (Pershad, 2018). Official Government Twitter accounts are a good communication tool for the government to discuss public concerns as the source of citizens' information. Kamaludin (2022) claimed that the quality of Twitter handles and the website is important for citizens' welfare. Twitter provides space to climate activists to reach the audience which traditional media do not provide (Moernaut et al., 2020).

When an issue affecting citizens is going on, activity of the government's Twitter accounts increases (Prastya, 2022). Social media has become a convenient source for citizens to react to the government's policies. Citizens' feedback on the government's policies can impact the policies. Citizens' interaction on government social media handles is e-participation. Moreover, E-participation is interrelated with the activity on the government's social media handles. When the activity on social media handles is low, e-participation is low. Matyek (2022) suggested that when the activity on social media handles is high, the e-participation is high.

2.4 Theoretical Framework

2.5 Social Mediated Crisis Communication Model

The social-mediated crisis communication model explains the organization's interaction with the public (Jin & Liu, 2010; Austin et al., 2012). The organization in crisis interacts with the three types of public. The public consumes and produces the information during, before, and after the crisis. The first type of public is influential social media creators. They create information in crisis that is consumed by others. The second type of public is social media followers. They consume the information in crisis which is created by influential social media creators. The third type of public is social media inactive. The SMCC model utilizes social media to address the crisis. Audiences react and engage on social media platforms with the information posted by organizations. (Austin & Jin, 2016).

The interaction of the National Disaster Management Authority and Provincial Disaster Management Authorities with the public on social media during a crisis is under study. The Twitter and Facebook accounts of the National Disaster Management Authority (NDMA) and Provincial Disaster Management Authorities (PDMA) are influential creators. They created information before, during, and after the Karachi Monsoon rainfall 2022, Murree Snowstorm, and Floods 2022. Citizens of Pakistan who follows these influential creators are social media followers. They engage and react to the information posted by influential creators.

3. Methodology of the study

This study used quantitative content analysis method to determine the proactive or reactive approach of Tweets, Facebook posts, and responses on NDMA and PDMA's social media handles concerning the Murree Snowstorm, Karachi Monsoon Rainfall, and Floods from 1st January till 31st December 2022, with the intent of evaluating which platform of which authority garnered more feedback in the form of likes, comments, shares/retweets. Coding sheet was used as a tool to systematically collect data. The data was purposively sampled from

the Twitter and Facebook handles of NDMA and PDMA's of Punjab, Sindh, Baluchistan, and KPK that communicate above-mentioned environmental crisis. The data was analyzed through descriptive analysis on Statistical Package for Social Sciences (SPSS). The Categories for Tweet and Facebook post of NDMA and PDMA's of Punjab, Sindh, Baluchistan, and KPK during Murree Snowstorm, Karachi Monsoon Rainfall, and Floods are as follow

- Before
- After
- During

1.1 Conceptualization & Operationalization

The conceptualization and operationalization of key terms used in this study is as follow:

Table No 1: Conceptualization & Operationalization

Conceptualization	Operationalization
Proactive Approach Measures are taken before a slight inconvenience turn into a major disaster (Grant-Skiba, 2023)	Disaster Management authorities use social handles to disseminate timely alerts before the climate disaster causes major casualties.
Reactive Approach Measures are taken after a slight inconvenience turns into a major disaster (Grant-Skiba, 2023).	Disaster Management Authorities use social media to disseminate alerts when a climate disaster caused major casualties. They share what has already happened.

4. Analysis & Discussion

RQ1. What were the approach of NDMA and PDMA's Twitter and Facebook handles in disseminating information regarding climate disasters? Whether their approach was proactive or reactive?

The approach of National Disaster Management Authority on Twitter during the Murree snowstorm was proactive as shown in Figure 1. They disseminated the information before the snowstorm hit the city. After the snowstorm, no updates were disseminated through their Twitter handle but they did not share the information on their Facebook page.

During Murree Snowstorm the approach of the Punjab Disaster management authority on the Twitter handle account was reactive as shown in table no. 02. They disseminated information related to the snowstorm after the disaster happened. The approach of the Punjab Disaster Management Authority on the Facebook page was proactive during Murree Snowstorm as shown in table no. 02. They disseminated the information on their Facebook page before the climate disaster happened. No tweets and Facebook posts from PDMA Sindh, KPK, and Baluchistan was recorded during Murre Snowstorm as Murree does not come under their jurisdiction. However, as Murree Snowstorm became a national calamity their activity regarding this incident would have been helpful for the citizens.

The approach of the National Disaster Management Authority's Twitter handle during Karachi monsoon rainfall was 85.71% proactive and 14.29% reactive as shown in Figure no 4. Their Twitter handle disseminated the warnings and guidelines for protection before the

monsoon rainfall started. They also kept their Twitter handle up to date with required information during and after the Karachi monsoon rainfall as their reactive approach is 14.29%. Figure 5 depicts the proactive approach of the National Disaster Management Authority on their Facebook Page during the Karachi Monsoon rainfall. Their approach was 74.07% proactive and 25.93% reactive. Their reactive approach shows that they were disseminating the information regarding monsoon rainfall during and after the monsoon rainfall.

Table No 2: Approach of Social Media Platforms of Disaster Management Authority during Murree Snowstorm

Event	**Murree Snowstorm**			
Social Media Platform	Twitter		Facebook	
Approach	Proactive	Reactive	Proactive	Reactive
National Disaster Management Authority	100%	-	-	-
Punjab Disaster Management Authority	-	100%	100%	-
Sindh Disaster Management Authority	-	-	-	-
KPK Disaster Management Authority	-	-	-	-
Baluchistan Disaster Management Authority	-	-	-	-

Table no. 3 shows the approach of the Twitter handle of the Sindh Disaster Management Authority, during Karachi monsoon rainfall, was 0.61% proactive and 99.39% reactive. Their 0.61% proactive approach indicates that weather updates and guidelines for protection were not shared on their Twitter handle, however, they shared weather updates during and after the monsoon rainfall their reactive approach is 99.39%.

Table no. 3 represents the 0.61% proactive and 99.39% reactive approach of the Sindh Disaster Management Authority on their Facebook Page during Karachi monsoon rainfall. The extremely low percentage of proactiveness indicates that no information regarding the monsoon rainfall was shared on their Facebook page. 99.39% indicated that their Facebook page disseminated information regarding monsoon rainfall in high numbers. No tweets and Facebook Posts from PDMA Punjab, KPK, and Baluchistan was recorded during Monsoon Rainfall as they are not concerned regarding any calamity in Karachi.

Table No 3: Approach of Disaster Management Authorities Social Media Platform during Karachi Monsoon Rainfall

Event	**Karachi Monsoon Rainfall**			
Social Media Platform	Twitter		Facebook	
Approach	Proactive	Reactive	Proactive	Reactive
National Disaster Management Authority	85.71%	14.29%	74.07%	25.93%
Punjab Disaster Management Authority	-	-	-	-
Sindh Disaster Management Authority	0.61%	99.39%	0.61%	99.39%
KPK Disaster Management Authority	-	-	-	-
Baluchistan Disaster Management Authority	-	-	-	-

During Floods, the Twitter handle of National Disaster Management Authority was 29.17% proactive and 70.83% reactive as shown in table no. 4. They were actively sharing information on their Twitter account before, during, and after the flood. Their approach was more reactive than proactive. During Floods, the Facebook page of National Disaster Management Authority was 35% proactive and 65% reactive as shown in table 4. They were

actively sharing information on their Twitter account before, during, and after the flood. Their approach was more reactive than proactive.

During Flood, the approach of the Punjab Disaster Management Authority on their Twitter handle was 4.03% proactive and 95.97% reactive. Their Twitter handle was more active during and after the floods as their reactive approach is 95.97% than before the floods which was 4.03%. During Flood, the approach of the Punjab Disaster Management Authority on their Facebook Page was 3.23% proactive and 96.77% reactive as indicated in table no. 4. Their Facebook Page was more active during and after the floods as their reactive approach is 95.97% than before the floods as their 4.03% proactivity indicates.

During Floods, the approach of the Sindh Disaster Management Authority on their Twitter account was 100% reactive. Their approach was 0% proactive. They disseminated the information during and after the floods as their 100% reactive approach indicates. During Floods, the approach of the Sindh Disaster Management Authority on their Facebook Page was 100% reactive as shown in table no. 4. Their approach was 0% proactive. They disseminated the information during and after the floods as their 100% reactive approach indicates.

Table 4: Approach of Disaster Management Authorities social media platform during Flood

Event	**Flood**			
Social Media Platform	Twitter		Facebook	
Approach	Proactive	Reactive	Proactive	Reactive
National Disaster Management Authority	29.17%	70.83%	35%	65%
Punjab Disaster Management Authority	4.03%	95.97%	3.23%	96.77%
Sindh Disaster Management Authority	-	100%	-	100%
KPK Disaster Management Authority	5.88%	94.12%	4.72%	95.28%
Baluchistan Disaster Management Authority	-	100%	-	100%

During Floods, the approach of Khyber Pakhtunkhwa Disaster Management Authority on their Twitter handle was 5.88% proactive and 94.12% reactive as shown in table no. 4. They disseminated information regarding floods more actively during and after the floods then before they happened. During Floods, the approach of Khyber Pakhtunkhwa Disaster Management Authority on their Facebook Page was 4.72% proactive and 95.28%. They disseminated information regarding floods more actively during and after the floods than before they happened.

During Floods, the approach of the Baluchistan Disaster Management Authority on their Twitter handle was 100% reactive as shown in table no. 4. Their approach was 0% proactive. They disseminated the information during and after the floods as their 100% reactive approach indicates.

During Floods, the approach of the Baluchistan Disaster Management Authority on their Facebook Page was 100% reactive. Their approach was 0% proactive. They disseminated the information during and after the floods as their 100% reactive approach indicates.

The prevalent approach is reactive. NDMA and PDMA's cater to the outcomes of disaster rather than working on the measures to minimize the factors for disaster. Pakistan's approach is disaster management instead of disaster reduction measures. Pakistan's policies are managing the outcomes of climate disasters citizens' lives can improve if the policies are about to minimize the risk of climate disasters.

RQ2. Which Social media platforms (Twitter and Facebook) of NDMA and PDMA's were more active?

National Disaster Management Authority's Twitter and Facebook page was equally active during the Murree Snowstorm. The frequency of tweets and Facebook posts were equal. The Twitter handle of the Punjab Disaster Management Authority was 58.62% active and Facebook Page was 41.38% active. The high percentage of Twitter handle indicate Twitter handle was more active than their Facebook Page.

During the Karachi Monsoon Rainfall, the Twitter handle of the National Disaster Management Authority was 60% active and Facebook Page was 40% active. The high percentages of Twitter handle indicate Twitter handle was more active than their Facebook Page. During the Karachi Monsoon Rainfall, the Twitter handle of the Sindh Disaster Management Authority was 51.51% active and Facebook Page was 48.09% active. The high percentages of Twitter handle indicate Twitter handle was more active than their Facebook Page.

During the Floods, the Twitter handle of the National Disaster Management Authority was 62.79% active and Facebook Page was 37.21% active. The high percentages of Twitter handle indicate Twitter handle was more active than their Facebook Page. During the Floods, the Twitter handle of the Punjab Disaster Management Authority was 52.77% active and Facebook Page was 47.23% active. The high percentages of Twitter handle indicate Twitter handle was more active than their Facebook Page. During the Floods the Twitter handle of the Sindh Disaster Management Authority was 100% active and Facebook Page was 0% active. The high percentages of Twitter handle indicate Twitter handle was more active than their Facebook Page. During the Floods the twitter handle of the Khyber Pakhtunkhwa Disaster

Management Authority was 29.1 4% active and Facebook Page was 70.86% active. The high percentage of Facebook Page indicates Facebook Page was more active than their Twitter Handle. Twitter handle of Baluchistan Disaster Management Authority was more active than the Facebook page. Twitter handle was 58.68% and Facebook page was 41.32% active.

Mostly Twitter seems more active as Pershad (2018) endorsed that Twitter is a reliable and good source of information. Twitter is a popular form of social media for communication and Official Government Twitter accounts are a good communication tool for the government to discuss public concerns as the source of citizens' information. Kamaludin (2022) claimed that the quality of Twitter handles is important for citizens' welfare.

Table No 5: Activeness of Disaster Management Authorities during Natural Climate Disaster

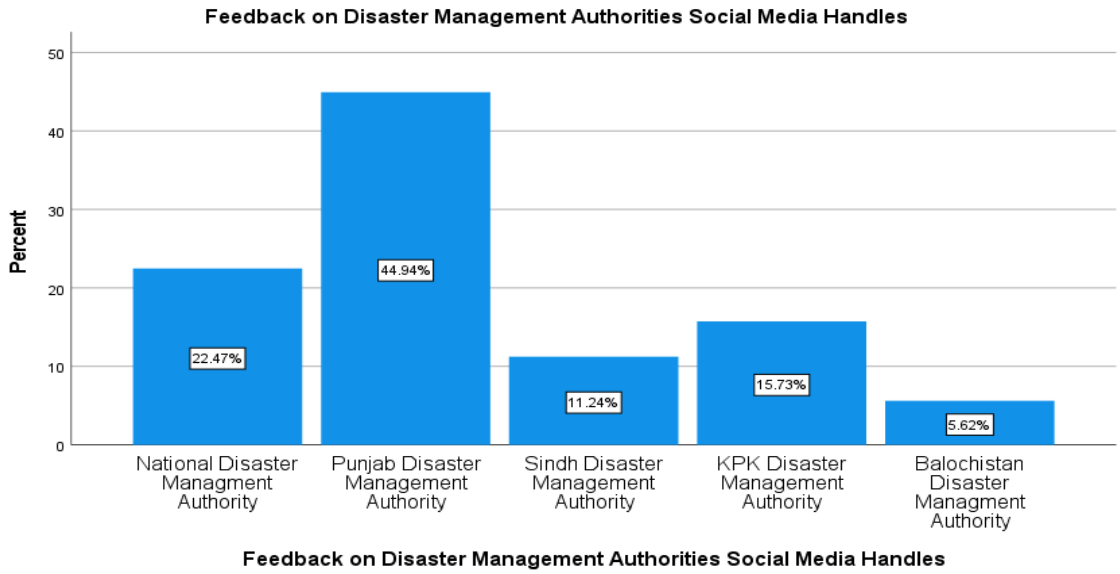
	Natural Climate Disasters 2022					
	Murree Snowstorm		**Karachi Monsoon Rainfall**		**Floods**	
	Twitter	**Facebook**	**Twitter**	**Facebook**	**Twitter**	**Facebook**
National Disaster Management Authority	50%	50%	60%	40%	62.79%	37.21%
Punjab Disaster Management Authority	58.62%	41.38%	-	-	52.77%	47.23%
Sindh Disaster Management Authority	-	-	51.91%	48.09%	100%	-
KPK Disaster Management Authority	-	-	-	-	29.14%	70.86%
Baluchistan Disaster Management Authority	-	-	-	-	58.68%	41.32%

RQ3. Which disaster management authority received more feedback?

Social media has become a convenient source for citizens to react to the government's policies. Citizens' interaction on government social media handles is e-participation. E-Participation is interrelated with the activity on the government's social media handles. As shown in Figure 1, Provincial Disaster Management Authority of Punjab received more feedback on their social media handles. They received 44.94% feedback in the form of number of likes, comments and share/retweets on their Facebook Page and Twitter Handles. Public engagement on social media handles rises during a crisis as they seek information through these platforms to keep themselves updated about their community (Kainat, 2022).

Moreover, Matyek (2022) suggested that when the activity on social media handles is high, the e-participation is high. Then comes the National Disaster Management Authority on the second number with 22.47% of Feedback on Facebook Page and Twitter Handle. On third number stands the Provincial Disaster Management Authority of KPK with 15.73% feedback on their social media handles. The provincial Disaster Management Authority of Sindh stands at fourth position with the percentage of 11.24% feedback on social media platforms. Provincial Disaster Management Authority of Sindh stands at the last position with a percentage of 5.62% of feedback received on their Facebook and Twitter handles during Murree Snowstorm, Karachi Monsoon Rainfall and Floods'22. When the activity on social media handles is low, e-participation is low.

Figure No 1: Feedback on Disaster Management Authorities Social Media Handles



RQ4. What is the status of e-governance in Pakistan?

In Pakistan, e-governance is informational-based. Website and social media handles of institutes of Pakistan share informational e-copies as influential creators share information on social media during a crisis. E-governance is merely the dissemination of information. It is a one-sided official information-sharing platform. Authorities acknowledge the lack of public engagement. The public engagement level is low due to a lack of trust in e-services, and a lack of awareness, and skills (Aman & Jan, 2022). Pakistan is on its way to adopting information and communication technology. Lack of adequate resources and IT skilled human resources are hurdles in incorporating ICTs at a high level. Disaster Management Authorities have

established online platforms for the betterment of citizens in disasters but their approach is mostly reactive while managing climate disasters. The social-mediated crisis communication model advocates communication through influential authorities during a crisis for citizens to stay aware of the crisis. The Social Mediated crisis communication model's potential to overcome the crisis through social media is not fully implemented in Pakistan. Disaster management authorities post information on social media during a crisis for their citizens but that information isn't adequate to overcome the impact of climate disasters.

5. Conclusion

This study explored the approach of social media handles of Disaster Management Authorities of Pakistan during three natural disasters of 2022: Murree Snowstorm, Karachi Monsoon Rainfall, and Floods. The social-mediated crisis communication model guided this study to analyze the proactive or reactive approach of social media handles, and to determine which social media platform was more active. The study further aimed to identify which disaster management authority received more feedback in the form of likes, comments, and shares/retweets. The descriptive analysis on SPSS indicated that, most of the times, the disaster management authorities adopted a reactive approach while addressing these environmental disasters, with Twitter being more active as compared to their Facebook pages. The Punjab disaster management authority received more feedback than other provincial authorities.

The findings of this study have various implications. Firstly, the study evaluated the situation of e-governance in Pakistan, which is partially active. The study highlights the need for disaster management authorities to adopt a more proactive approach to social media, as reactive approaches tend to generate negative feedback. By adopting a proactive approach, disaster management authorities can engage with their audience more effectively and build trust among the public. Overall, this study contributes to the literature on disaster management and social media and highlights the importance of effective communication in disaster management.

5.1 Limitations of the Study

This study primarily concentrates on analyzing the social media accounts of the National Disaster Management Authority (NDMA) and Provincial Disaster Management Authorities. It does not encompass an examination of the social media activity of other influential entities such as journalists and politicians, which could offer a more comprehensive view of crisis communication dynamics. The research does not consider the information posted on the websites of disaster management authorities. Given that websites serve as another crucial platform for disseminating crisis-related information, the future studies can analyze the content on website to get complete understanding of the authorities' overall communication strategies. The study does not include District Disaster Management Authorities, as they do not maintain a social media presence. This omission limits the scope of the research and potentially overlooks critical insights at the local level.

5.2 Recommendation of the Study

Future research in this domain could benefit from a broader scope, encompassing the social media activities of other influential entities like journalists and politicians. This

expanded analysis would provide a more holistic perspective on the dynamics of crisis communication in the digital sphere. To gain a comprehensive understanding of disaster management authorities' communication strategies, future studies should consider analyzing the content posted on their official websites. This would ensure a more thorough examination of their crisis communication efforts across various online platforms. Analyze the effectiveness of visual content, such as infographics, videos, and images, in conveying critical information during crises. Visual communication has become increasingly important in the digital age.

6. References

Adjei-Bamfo, P., Maloreh-Nyamekye, T., & Ahenkan, A. (2019). The role of e-government in sustainable public procurement in developing countries: A systematic literature review. *Resources, Conservation and Recycling*, 142, 189- 203.

Adu, K. K., Patrick, N., Park, E. G., & Adjei, E. (2018). Evaluation of the implementation of electronic government in Ghana. Information polity, 23(1), 81-94.

Agarwal, S., & Sureka, A. (2017, December). *Investigating the role of Twitter in E-governance by extracting information on citizen complaints and grievances reports. In International conference on big data analytics (pp. 300-310)*. Springer, Cham. https://doi.org/10.1007/978-3-319-72413-3_21

Ahmad, D., & Afzal, M. (2022). Flood risk public perception in flash flood-prone areas of Punjab, Pakistan. *Environmental Science and Pollution Research*, 1-13. https://doi.org/10.1007/s11356-022-19646-5

Al-Besher, A., & Kumar, K. (2022). Use of artificial intelligence to enhance e-government services. *Measurement: Sensors*, *24*, 25-40. .https://doi.org/10.1016/j.measen.2022.100484

Aman, S., & Jan, M. A. (2022). Are we moving towards a managerial model of e governance? building a case for citizen centric e-participation in Khyber Pakhtunkhwa, *Pakistan. Journal of Humanities, Social and Management Sciences*, 3(1), 501-524. https://doi.org/10.47264/idea.jhsms/3.1.35.

Austin, L., & Jin, Y. (2016). *Social media and crisis communication: Explicating the social-mediated crisis communication model. In Strategic Communication (pp. 175-198)*. Routledge.

Austin, L., Fisher Liu, B., & Jin, Y. (2012). How audiences seek out crisis information: Exploring the social-mediated crisis communication model. *Journal of applied communication research*, *40*(2), 188-207. https://doi.org/10.1080/00909882.2012.654498

Bhagat, C., Sharma, B., & Kumar Mishra, A. (2021). Assessment of E Governance for National Development: A Case Study of Province 1 Nepal. *Chandan Bhagat*, 46-52.

Braam, D. H., Chandio, R., Jephcott, F. L., Tasker, A., & Wood, J. L. (2021). Disaster displacement and zoonotic disease dynamics: The impact of structural and chronic drivers in Sindh, Pakistan. *PLOS Global Public Health*, *1*(12), 25-39. https://doi.org/10.1371/journal.pgph.0000068

Burlacu, S., Patarlageanu, S. R., Diaconu, A., & Ciobanu, G. (2021). E-government in the era of globalization and the health crisis caused by the covid-19 pandemic, between standards and innovation. In *SHS Web of Conferences* (Vol. 92, p. 08004). EDP Sciences. https://doi.org/10.1051/shsconf/20219208004

Butt, S. (2022). Challenges and Benefits of E-Governance in the Education Sector of Pakistan during COVID-19. *Pakistan social science review*. 12(2), 76-91. http://doi.org/10.35484/pssr.2022(6-II)49

Cho, Y., Oh, J., Kwon, D., Son, S., Yu, S., Park, Y., & Park, Y. (2022). A secure three-factor authentication protocol for E-governance system based on multiserver environments. *IEEE Access*, 10, 135-149. https://doi.org/10.1109/ACCESS.2022.3191419

Denisova, A. (2022). Viral journalism. Strategy, tactics and limitations of the fast spread of content on social media: Case study of the United Kingdom quality publications. *Journalism*, 106-119. https://doi.org/10.1177/14648849221077749

Diakakis, M., Priskos, G., & Skordoulis, M. (2018). Public perception of flood risk in flash flood prone areas of Eastern Mediterranean: The case of Attica Region in Greece. *International journal of disaster risk reduction*, 28, 404-413. https://doi.org/10.1016/j.ijdrr.2018.03.018

Hanafizadeh, P., Khosravi, B., & Tabatabaeian, S. H. (2020). Rethinking dominant theories used in information systems field in the digital platform era. *Digital Policy, Regulation and Governance*. 122-139. https://doi.org/10.1108/DPRG-09-2019-0076

Heeks, R. (2001). Understanding e-governance for development. *SSRN*. 12, 155-169.https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3540058#references-widget

Hofmann, S., Madsen, C. Ø., & Distel, B. (2020, August). Developing an analytical framework for analyzing and comparing national e-government strategies. In *International conference on electronic government* (pp. 15-28). Springer, Cham. https://doi.org/10.1007/978-3-030-57599-1_2

Ijaz, F., & Chaudhry, N. I. (2021). Impact of health information technology adoption and its drivers on quality of care & patient safety in the health care sector of Pakistan. *Pakistan Journal of Commerce and Social Science*s, 15(1), 196-212.

Jin, Y, & Lin, B. F. (2010). How publics respond to crisis communication strategies: The interplay of information form and source. *Public relations review*, *37*(4), 345-353.

Kabata, P., Winniczuk-Kabata, D., Kabata, P. M., Jaśkiewicz, J., & Połom, K. (2022, February). Can Social Media Profiles Be a Reliable Source of Information on Nutrition and Dietetics?. *In Healthcare*, *10*(2), 37-58. https://doi.org/10.3390/healthcare10020397

Kamaludin, N. K., & Nurmandi, A. (2022). How Does the Local Government Provide Official Website and Twitter Quality? Case Study of Three Local Governments of Indonesia. In *Proceedings of Sixth International Congress on Information and Communication*

Technology (pp. 137-147). Springer, Singapore. https://doi.org/10.1007/978-981- 16-2102-4_3

Kaur, N., Kaur, P., Singh, J., & Malik, N. (2022, October). *E-governance policies and the importance of industry 4.0 in global pandemics like COVID-19. In AIP Conference Proceedings (Vol. 2555, No. 1, p. 040019)*. AIP Publishing LLC. https://doi.org/10.1063/5.0109179

Lee, C. H., Wang, D., Lyu, S., Evans, R. D., & Li, L. (2022). A digital transformation-enabled framework and strategies for public health risk response and governance: China's experience. *Industrial Management & Data Systems,12,* 76-91. https://doi.org/10.1108/IMDS-01-2022-0008

Lee, Y. (2022). Can Digital Authoritarianism Deter Political Freedom?: Innovation in Digital Technology and Democratization. *Korean Journal of International Studies*, 20(1), 21-53. https://doi.org/10.14731/kjis.2022.04.20.1.21

Mathrani, A., Sarvesh, T., & Umer, R. (2022). Digital divide framework: online learning in developing countries during the COVID-19 lockdown. *Globalisation, Societies and Education, 20*(5), 625-640. https://doi.org/10.1080/14767724.2021.1981253

Matyek, J., Kaze, S., Ohaji, K., & Etumnu, E. (2022). An Investigation of Social Media as a Government Digital Public Relations Tool: The Nigerian Experience. *Journal of New Media and Mass Communication, 8*(1), 1-13. https://doi.org/10.18488/91.v8i1.3025

Meiyanti, R., Utomo, B., Sensuse, D. I., & Wahyuni, R. (2018, August). e-Government challenges in developing Countries: A literature review. In 2018 6th International Conference on Cyber and IT Service Management (CITSM) (pp. 1-6). IEEE.

Moernaut, R., Mast, J., Temmerman, M., & Broesrsma, M. (2022). Hot weather, hot topic. Polarization and skeptical framing in the climate debate on Twitter. *Information and Communication & Society, 25*(8), 1047-1066. https://doi.org/10.1080/1369118X.2020.1834600

Meo, M. Z. S., Meo, M. O. S., & Meo, A. S. (2022). Snowfall and carbon monoxide poisoning in murree pakistan. *Pakistan Journal of Medical Sciences, 38*(8), 55-68. https://doi.org/10.12669/pjms.38.8.6936

Mohammad Ebrahimzadeh Sepasgozar, F., Ramzani, U., Ebrahimzadeh, S., Sargolzae, S., & Sepasgozar, S. (2020). Technology acceptance in e-governance: A case of a finance organization. *Journal of Risk and Financial Management, 13(*7), 138. https://doi.org/10.3390/jrfm13070138

Moghadas, M., Fekete, A., Rajabifard, A., & Kötter, T. (2023). The wisdom of crowds for improved disaster resilience: a near-real-time analysis of crowdsourced social media data on the 2021 flood in Germany. *GeoJournal,* 25, 1-27. https://doi.org/10.1007/s10708-023-10858-x

Nagpal, V., Sharma, A., & Rajotiya, R. N. (2020). Implementing e-governance in india–challenges, Opportunities and Prospects. *International Journal of Professional Development*, 9 (1), 15-31.

Obagbuwa, I. C., & Abidoye, A. P. (2021). South Africa crime visualization, trends analysis, and prediction using machine learning linear regression technique. *Applied Computational Intelligence and Soft Computing*. *18*(4), 155-162. https://doi.org/10.1155/2021/5537902

Ochani, S., Aaqil, S. I., Nazir, A., Athar, F. B., Ochani, K., & Ullah, K. (2022). Various health-related challenges amidst recent floods in Pakistan; strategies for future prevention and control. *Annals of Medicine and Surgery*, 82. https://doi.org/10.1016/j.amsu.2022.104667

Qureshi, H. H. (2022). Sequestering And Rhetoric: Cda on natural disaster in Pakistani print media discourse. *Harf-o-Sukhan*, 6(1), 12-22. Retrieved from http://www.harf-o-sukhan.com/index.php/Harf-o-sukhan/article/view/261

Pershad, Y., Hangge, P. T., Albadawi, H., & Oklu, R. (2018). Social medicine: Twitter in healthcare. *Journal of clinical medicine*, 7(6), 121-139. https://doi.org/10.3390/jcm7060121

Prastya, D. E., & Nurmandi, A. (2022). Analysis of Website Quality and City Government's Twitter Accounts in East Java Province, Indonesia. In *Proceedings of Sixth International Congress on Information and Communication Technology* (pp. 113-126). Springer, Singapore. https://doi.org/10.1007/978-981-16-1781-2_12

Ramaswamy, M. (2021). Reengineering bureaucracy for effective e-governance. *Issues in Information Systems*, *22*(3), 112-127. https://doi.org/10.48009/3_iis_2021_96-106

Rana, I. A., Asim, M., Aslam, A. B., & Jamshed, A. (2021). Disaster management cycle and its application for flood risk reduction in urban areas of Pakistan. *Urban Climate*, 38, 66-74. https://doi.org/10.1016/j.uclim.2021.100893

Sattar, M. A., & Nadeem, H. (2022). Recurring battle with Dengue; post heavy monsoon in Pakistan. *Annals of Medicine and Surgery*, 82. https://doi.org/10.1016/j.amsu.2022.104400

Sarangi, D., Pal, M. K., Prusty, S., & Chen, Q. (2022). Smart City E-Governance Through Intelligent ICT Framework. *International Journal of Information Systems in the Service Sector (IJISSS)*, *14*(2), 1-22. https://doi.org/10.4018/IJISSS.290543

Schwaiger, L., Vogler, D., & Eisenegger, M. (2022). Change in news access, change inexpectations? How young social media users in switzerland evaluate the functions and quality of news. *The International Journal of Press/Politics*, *27*(3), 609-628. https://doi.org/10.1177/19401612211072787

Sinha, C. G. (2021). *E-Governance: Impact on society. In S. B. Mukherjee, S. G. N. Ghatak, N. Ray (Eds.), Digitization of economy and society (pp. 93-117)*. Apple Academic Press. ISBN 9781003187479

Swetha, M. S., Praveen, N. M., Muneshwara, M. S., & Danti, R. (2022, May). Developing Virtual Police Station to Receive FIR through Digital Signature. In *2022 6th International Conference on Intelligent Computing and Control Systems* (ICICCS) (pp. 837-844). *IEEE*. https://doi.org/10.1109/ICICCS53718.2022.9788418

Umbach, G., & Tkalec, I. (2022). Evaluating e-governance through e-government: Practices and challenges of assessing the digitalisation of public governmental services. Evaluation and program planning, 93, 102118. https://doi.org/10.1016/j.evalprogplan.2022.102118

Wise, J. (2022). Pakistan: UN renews appeal to avert public health disaster in wake of climate induced floods. Retrieved from https://doi.org/10.1136/bmj.o2407