KnE Social Sciences
6th SoRes
6th Social and Humaniora Research Symposium: Ethical Governance
Volume 2024

Research Article

Optimizing Disaster Response and Mitigation through Digital Communication, Visualization, and Jabar Command Center: A Comprehensive Analysis

Ferry Darmawan*, Dedeh Fardiah, Rini Rinawati

Universitas Islam Bandung, Bandung, Indonesia

ORCID
Ferry Darmawan: https://orcid.org/0000-0002-3095-1697
Dedeh Fardiah: https://orcid.org/0000-0003-4000-4105
Rini Rinawati: https://orcid.org/0000-0001-8530-211X

Abstract.
Effective disaster response and mitigation requires integrating advanced technologies in an increasingly connected world. This research investigates the synergistic role of digital communication, visualization, and the Jabar Command Center (JCC) in optimizing disaster management strategies. Focusing on the West Java region, this research comprehensively analyzes how digital communication channels enhance information dissemination, and how visualization techniques aid situational awareness during disasters. By exploring the functions of the JCC, this research assesses the effectiveness of utilizing integrated digital communication for a timely and coordinated response. The case study research method was used to analyze qualitative and quantitative data collected through observation and focus group discussions, so that this research contributes to understanding the interaction between digital communication, visualization, and disaster response to provide optimal recommendations for optimizing these components in building a resilient disaster management system. The results show the role of integrated digital communication as a key factor in disaster mitigation in today's digital era.

Keywords: disaster management, digital communication, visualization techniques, comprehensive analysis

Corresponding Author: Ferry Darmawan; email: ferry@unisba.ac.id

Published: 15 August 2024

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the 6th SoRes Conference Committee.

1. INTRODUCTION

Communication is crucial in disaster management and community protection in this increasingly sophisticated digital era. One prominent example is the Jabar Command Center (JCC), a command center in West Java tasked with responding to disaster-related information by utilizing digital communication patterns. Through digital technology and the latest data from the BPBD Jabar database, this command center can provide rapid response, effective coordination, and precise information to the community and related agencies. Disaster communication is also essential not only during disasters but

also during pre-disasters. Communication is definitely present whenever and wherever humans are, including during disasters. Pre-disaster, emergency or post-disaster both involve communication. It's just necessary to understand how the function of communication is present in each condition. By applying the right technology in disaster mitigation, those affected can receive the needed resources on time, which can save many lives. [1], [2]

Several studies on the utilization of communication technology in disasters in various regions in Indonesia have been conducted, including information system/IT-based disaster management applications in Jogyakarta, namely Jogya Tanggap Cepat (JTC). [3] Disaster management of the Merapi eruption in Yogyakarta utilizes information systems to help victims and organize the process of distributing aid to be right on target. Jogja Tanggap Cepat (JTC) is a collective movement-collaborative network with some elements of Jogyakarta society who strive to provide the best offerings for their city consisting of various pentahelix components in Jogjakarta.

In South Kalimantan, an application called the Disaster Management Information System is used to manage various types of data, such as disaster data, affected data, logistics data, and regional mapping, and assist in decision-making for provincial, city/district, and coordination elements below. The Disaster Management Information System report results can be used as evaluation material for future disaster-responsive policies in the South Kalimantan province area.[4]

Digital communication is a form of communication that depends on stable internet access and connection. The smoothness of the internet is the primary key to ensuring the optimal performance of various applications supporting digital communication. The development of the current digital era has changed people's communication patterns to digital communication, significantly when the country was affected by the COVID-19 disaster.[5], [6] In the context of JCC, two primary forms of digital communication are carried out. The first involves public services, and the second is related to interaction services.

The head of the JCC explained that the JCC acts as an essential symbolization, visualization, and information integration center (interview on April 18, 2023, at the JCC office). In carrying out its functions, the JCC relies on an *Ekosistem Data Jabar* (EDJ) system to collect data from various devices and information sources throughout the region. The data collected from EDJ is then processed and incorporated into core data before being transformed into visualizations that can be accessed through

various dashboards. The JCC can respond to disaster information more effectively and efficiently with this approach.

The visualization technique applied by the Jabar Command Center (JCC) plays an essential role in improving situational awareness during disasters in the West Java region. Visual mapping can be a methodological tool that makes it possible to recognize patterns, condense data, and compare and examine relationships over time that are not necessarily visible independently of their representation. [7] This technique utilizes various forms of visualization, such as interactive maps, graphs, diagrams, and animations, to present information clearly and comprehensively to the public and related parties.

From several previous studies, there are still differences in disaster mitigation carried out in several disaster-prone areas, especially associated with the current era of information technology. The utilization of digital communication is still limited to data collection only but has not involved the participation of affected communities intensively. Therefore, this research tries to analyze the digital communication of the West Java provincial government in dealing with disasters. Therefore, this research aims to describe the interaction between digital communication, visualization, and disaster response and provide recommendations to optimize these components to build a resilient disaster management system. This research was conducted to respond to the digital communication of the Jabar Command Center to disaster information in West Java.

2. METHOD

This qualitative research aims to obtain an authentic understanding of individual experiences as perceived by the subject concerned. The study conducted by this researcher is descriptive and tends to use analysis with an inductive approach. Process and meaning (subject perspective) are more emphasized in this research. Through this qualitative research, researchers hope to produce findings that cannot be achieved (obtained) using statistical procedures or other ways of quantification (measurement). Based on the problems and research objectives, this research uses qualitative research methods with a case study model.

As a research instrument, the researcher will carry out several techniques in collecting the data needed for analysis. Of the four data collection techniques proposed by

TABLE 1: Research Design with Case study.

Single Cases	Aspect Analysis	Unit of Observation
Digital Communication "Jabar Command Center (JCC)" in Responding to Disaster Information in West Java	Responses from leaders (authorities) or stakeholders involved in handling disaster information in 27 West Java cities/regencies regarding JCC digital communication.	1. Forms of digital communication carried out by the "Jabar Command Center" in responding to disaster information in West Java. 2. Digital communication patterns carried out by "Jabar Command Center" in responding to disaster information in West Java

Cresswell [8], The researcher will use three data collection techniques. Data collection techniques will include: (1) Observation: This technique utilizes field research by observing and visiting the object of study, "Jabar Command Center" located at Gedung Sate West Java. This observation technique allows self-observation, recording, and making observations on ongoing activities. In this case, researchers conducted non-participant observations; (2) Interviews, researchers conducted interviews with the Diskominfo of West Java Province and Jabar Digital Service who were responsible for the JCC program; (3) Documentation, researchers traced secondary data, such as documents relevant to the JCC program; (4) Focus Group Discussion (FGD), a focused discussion to discuss research material, in an informal and relaxed atmosphere. This technique is used to reveal the meaning of a group based on the results of a discussion centered on a research problem. Researchers gathered leaders (authorities) or stakeholders who handled disaster information in 27 West Java cities/regencies regarding JCC digital communication.

3. RESULT AND DISCUSSION

The JCC has become a new tourist destination in West Java that features information about West Java based on data and technology. Visitors can increase their knowledge and have a fun experience through the interactive rides available. The JCC is managed by the Jabar Digital Service (JDS) team or the Technical Implementation Unit for Digital Service Management, Data, and Geospatial Information under the Communication and Informatics Office of West Java Province. This team has a mission to narrow the digital divide, help the efficiency and accuracy of data and technology-based policy making, and revolutionize the use of technology in public life and government in West Java.

One of the functions of the Command Center is to provide rapid response related to emergencies or disasters.

JCC user data in West Java shows that the *jabarprov.go.id* portal has become a very reliable source of information. Based on the latest data, thousands of active users access this portal daily to access information about West Java and the public services provided. The JCC has created an effective information ecosystem where the public can easily access and utilize the services provided by various local government agencies. This aligns with efforts to increase public participation in obtaining relevant information and making public services more affordable and efficient through digital platforms.

One factor that becomes an obstacle in disaster management is the need for more community readiness in anticipating and minimizing the impact of disasters. Although disasters cannot be avoided and predicted, at least the community can take precautions to reduce the effects. In this context, disaster communication is needed in emergencies and pre-disaster situations. Information about potential disasters in an area and the culture of dealing with disaster situations must be carried out continuously.

Based on available data (Fig. 1), most natural disasters occur in the Java Island region, especially in West Java Province. Some types of natural disasters that often occur in the area include landslides, earthquakes, floods, droughts, tornadoes, tidal waves, fires, volcanic eruptions, and tsunamis. Of the various types of natural disasters in West Java, Tornadoes, Landslides, and Floods are the most frequent.

West Java Province has established the Jabar Command Center (JCC) to visualize and integrate West Java data to support effective monitoring, coordination, and decision-making activities. One of its primary functions is as a coordination center in disaster management. Even during the COVID-19 pandemic, the JCC acted as a basecamp for various stakeholders to coordinate and share information about handling COVID-19 in West Java. The public dashboard on the Jabarprov website also has a COVID-19 information menu (Fig.2).

3.1. Forms of Digital Communication

Two types of digital communications (Fig. 3) available at the Jabar Command Center (JCC) are vital in disaster management in West Java Province. The first type is public services, which refers to efforts to provide public information and services that are easily

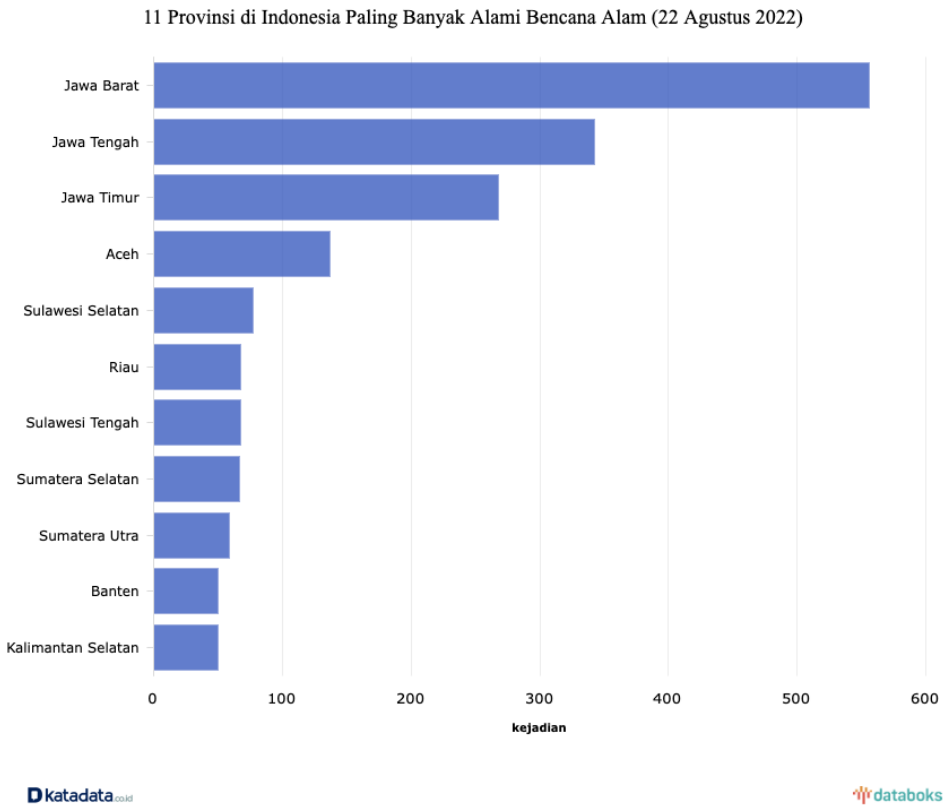

Figure 1: 11 Provinces in Indonesia with the Most Natural Disasters (August 22, 2022).

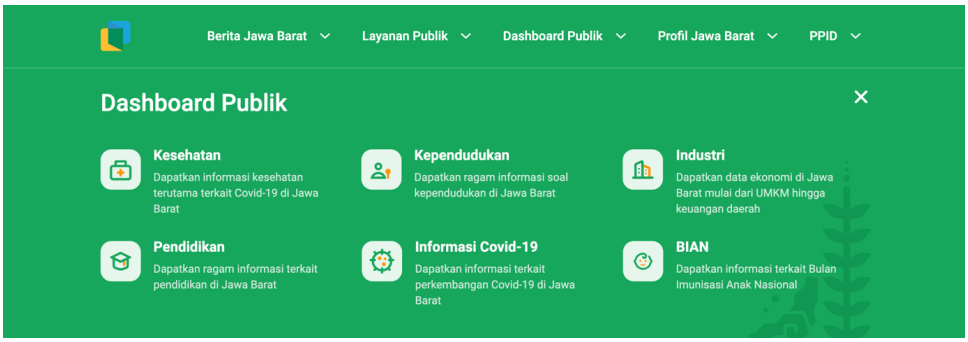

Figure 2: Public Service Dashboard at https://jabarprov.go.id/, Jabarprov one for all. On the dashboard page, several menus can be accessed, such as health, population, industry, education, Covid-19 information, and information about child immunization.

accessible to the general public. Through the JCC's official portal, *jabarprov.go.id*, up-to-date information on disaster situations, early warnings, and evacuation guidelines are available to the public. Disaster-related data collected from various regional apparatus in West Java is also integrated into this portal, creating an up-to-date and comprehensive source of information. The data from this portal is essential as it is the primary source of information for people who want to understand more about disaster conditions and mitigation actions to be taken.

The second type is interaction services, which include direct communication channels between the JCC, the public, and related parties. The JCC activated social media platforms such as Twitter, Facebook, and Instagram as interactive communication channels. Real-time information about disasters, evacuation orders, emergency numbers, and mitigation efforts can be delivered to the public through these official accounts. In addition, downloadable mobile apps also provide interaction capabilities, allowing the public to provide field information, report emergencies, and access needed guidance. The interactive platform uses a digital communication form of public information called SAPAWARGA; the mobile apps can be on Android or iOS. Registration uses the community's ID card number to enjoy public services in West Java. This interaction service makes the JCC more responsive to community needs and questions, enhancing effective collaboration in disaster management.

Figure 3: Two Forms of Digital Communication Developed by the JCC the jabarprov.go.id Website and the SAPAWARGA Mobile Application.

With a combination of public services and intense interaction, the JCC creates a digital communication ecosystem that provides timely information, direct interaction, and effective collaboration between the government, the community, and related parties in a joint effort to face various disaster threats in West Java.

3.2. Cianjur Earthquake Data Information and Coordination Center

This research focuses on digital communication that handles disaster information, namely the Cianjur Earthquake Data Information and Coordination Center (PISO DAPUR). JCC has developed this platform application to manage disaster communication management in Cianjur (Table 1). The 2022 Cianjur earthquake with a magnitude of 5.6 and a depth of 10 km occurred in Cianjur Regency, West Java, on Monday, November 21, 2022, at 13.21 WIB due to the shift of a new fault, "Cugenang Fault."

One of the hallmarks of the West Java Provincial government's coordination is through digital communication, known as the Cianjur Earthquake Data Coordination Information Center (PISO DAPUR), which provides centralized information on Cianjur earthquake disaster management.

Table 2: PISO DAPUR Website Development.

No.	Service data
1.	Spatial Dashboard: Current data, Damage Location, Logistics Distribution Information, Electricity Availability: Sanitation and Water Availability, Public Kitchen Information, Health Facility Information, Sub-district Office Location-Koramil-Polsek Information, Evacuation Command Post Location Information, Disaster Prone Area Information, Cimandiri Fault Information and Epicenter Point.
2.	Request for Logistics Assistance
3.	Public Complaints and Hotline
4.	Emergency Contact
5.	Volunteer Desk
6.	Latest Earthquake Information
7.	West Java Command Post Activity and Donation Report
8.	News
9.	House Rehabilitation

Source: JCC, 2023

JCC through PISO DAPUR, utilizes the internet as a new medium in providing disaster information and raising funds for disaster victims. The development of information technology also helps in knowing the condition of victims and searching for missing people due to disasters. In helping to overcome the impact of existing disasters, technological developments in the internet have significantly contributed to the recovery of the region and victims affected by natural disasters.

Based on observational analysis of the PISO DAPUR website, the visualization on the platform makes it easy for users to obtain the latest data (Fig.4). The public can obtain information such as the number of destroyed homes, the total number of impacted people, and even donations that have been given to catastrophe victims by simply viewing the service data dashboard website.

The JCC presents facts relating to disasters, such as the number of victims, the extent of the damage, and the distribution of help, using graphs and diagrams. These graphs offer a clear visual representation of the disaster's scope and effects. This makes it easier to spot trends, patterns, and regions needing particular attention. Simulations and animations that depict the course of disasters and their potential mitigation are

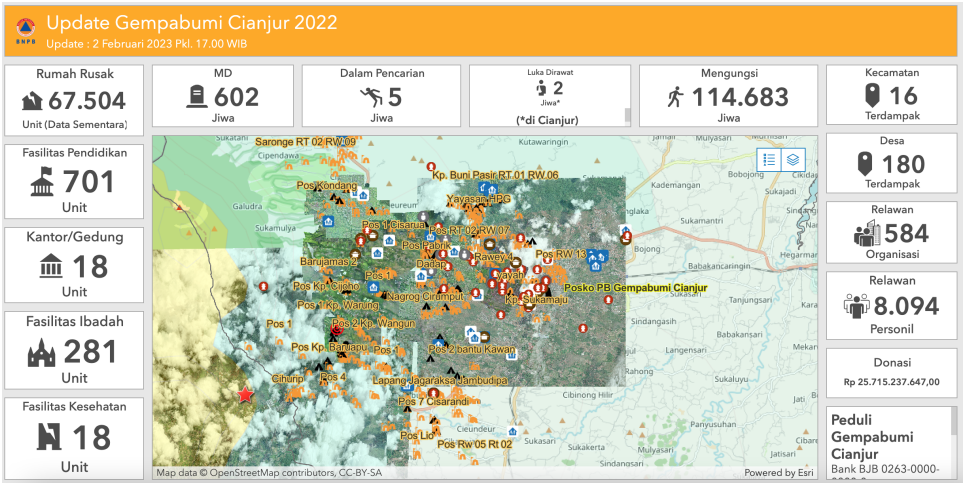

Figure 4: People Can Quickly Get the Most Recent Information Regarding Disasters in Cianjur Thanks to the Visualizations Presented on PISO DAPUR.

also produced using visualization approaches. Using earthquake simulations or flood spirits ' movements, communities can learn more about the possible effects and necessary steps. This helps in improving preparedness and effective response. In addition, visualizations that use layer information allow users to select the information they want to see. For example, users can activate layers that show evacuation positions, weather, or critical infrastructure layers. This gives people the flexibility to understand the information according to their needs.

3.3. Synergistic Role of Digital Communication, Visualization, and Jabar Command Center

The synergistic role of digital communication, visualization, and a Jabar Command Center (JCC) in optimizing disaster management strategies can significantly improve preparedness, response, and recovery efforts in the face of natural or man-made disasters. The synergy between these elements leads to several benefits in disaster management: (1) Enhanced Situational Awareness: Decision-makers clearly understand the disaster's scope, impact, and progression. (2) Rapid Response: Authorities can respond more swiftly to evolving situations, potentially saving lives and minimizing damage. (3) Improved Resource Allocation: Resources, including personnel and equipment, are used more efficiently and strategically. (4) Public Engagement: Citizens can stay informed, report incidents, and receive critical information, contributing to community resilience. (5) Learning and Adaptation: Data and insights collected during disasters can be used for future disaster preparedness and response planning. Ultimately, integrating

digital communication, visualization, and a Jabar Command Center helps optimize disaster management strategies by improving communication, decision-making, and resource allocation during crises. This holistic approach is critical in an increasingly complex and interconnected world where disasters can have far-reaching impacts.

4. CONCLUSION

The digital communication pattern carried out by the "Jabar Command Center" in responding to disaster information in West Java is a communication pattern using complaints through the Cianjur Earthquake Data Coordination Information Center (PISO DAPUR). Integrated coordination through digital communication carried out by the "Jabar Command Center" in responding to disaster information in West Java with stakeholders through website development, which includes a spatial disaster dashboard, requests for logistical assistance, public complaints, emergency contacts, volunteer desks, the latest disaster information, donations, news, and rehabilitation. However, based on observations made on the development of JCC digital communication, it is necessary to develop a particular integrated system that focuses on independent disaster information so that the public can access it directly without going through a diverse dashboard menu.

ACKNOWLEDGMENTS

Thank you to LPPM Unisba and Fikom Unisba for allowing researchers to conduct this research. Also, to those who helped provide the data needed, namely the Jabar Command Center and Diskominfo Jabar.

References

[1] Nurdin R. Komunikasi dalam Penanggulangan Bencana. JURNAL SIMBOLIKA Research and Learning in Communication Study. 2015 Aug;1(1): https://doi.org/10.31289/SIMBOLLIKA.V1I1.49.

[2] Khan M, Khan M, Ali A, Khan MI, Ullah I, Iqbal M. Digitalization for fast, fair, and safe humanitarian logistics. Logistics. 2022 May;6(31):31.

[3] Permana SA. "Sistem Informasi"Jogaj Tanggap Cepat (Jtc)" dengan Memanfaatkan Kearifan Masyarakat sebagai Informasi Ancaman Erupsi Merapi di Wilayah

Cangkringan, Sleman, Yogyakarta," Yogyakarta, 2018. Accessed: Sep. 09, 2023. [Online]. Available: http://repository.upy.ac.id/1886/

[4] Muflih M. Analisis Dan Rancangan Sistem Informasi Manajemen Kebencanaan Wilayah Kalimantan Selatan. Technologia : Jurnal Ilmiah. 2022 Jun;13(1):83–7.

[5] Nguyen MH, Gruber J, Marler W, Hunsaker A, Fuchs J, Hargittai E. "Staying connected while physically apart: Digital communication when face-to-face interactions are limited," vol. 24, no. 9, pp. 2046–2067, 2022, https://doi.org/10.1177/1461444820985442.

[6] Sutrisno I, Sosiawan EA. Covid-19 disaster management through websites and social media regency/city government in the special region of Yogyakarta. Tourism and Sustainable Development Review. 2022 Mar;3(1):62–73.

[7] A. Parmentier-Cajaiba and G. Cajaiba-Santana, "Visual maps for process research: Displaying the invisible," M@n@gement, vol. 23, no. 4, pp. 1–15, Dec. 2020, . https://doi.org/10.37725/mgmt.v23i4.4501.

[8] Creswell JW. Research design: Qualitative, quantitative, and mixed methods approaches. 3rd ed. Thousand Oaks, CA, US: Sage Publications, Inc; 2009.