



Crisis communication in megathrust discourse: Risk preparedness or fear amplification?

*Pipit Fitriyah

Gunadarma University, Depok, Indonesia

pipit.fitriyah@student.uns.ac.id

Ismi Dwi Astuti Nurhaeni

Sebelas Maret University, Surakarta, Indonesia

Andre N Rahmanto

Sebelas Maret University, Surakarta, Indonesia

Drajat Tri Kartono

Sebelas Maret University, Surakarta, Indonesia

ABSTRACT

This research examines how crisis communication influences public responses to the risk of megathrust earthquakes, particularly whether digital discourse fosters preparedness or amplifies fear. More specifically, this research looks at how public engagement, risk awareness, and perceived constraints shape behavioural outcomes in disaster contexts, such as a megathrust earthquake, using the Situational Theory of Publics (Grunig, 1997) and Risk Perception Theory (Slovic, 1987). To address these dynamics, a mixed-methods approach was applied: computational text mining and qualitative interviews. To contextualise the digital discourse, semi-structured interviews were conducted with institutional actors (BMKG, BNPB), disaster communication specialists, and community-based organisations. Using Voyant Tools, incorporating Brown and Yule's (1983) framework to identify thematic patterns through word frequency and co-occurrence analysis, the findings reveal that the corpus consisted of 1,253,214 words, 61,885 unique word forms as well as dominant terms such as "megathrust" (64,160), "gempa" (33,146), and "potensi" (6,553). This also indicates heightened public concern and awareness as well as that public preparedness is strongly influenced by risk perception and involvement. However, high levels of constraint recognition—manifested as distrust in institutions or uncertainty about appropriate actions—diminish proactive responses. While BMKG and BNPB were frequently mentioned, the clear message was lack of clarity, emotional resonance, and educational value. This research underscores the need to formalise empathetic, two-way crisis communication protocols through national SOPs. In summary, integrating adaptive messaging, real-time sentiment monitoring, and inclusive engagement strategies is vital for transforming awareness into preparedness and mitigating fear-driven reactions.

Keywords: *Crisis communication, risk perception, preparedness, social media, situational theory of publics*

INTRODUCTION

By utilising a crisis communication framework, this research looked at how issues related to the megathrust (the potential for a large earthquake in the megathrust zone) are perceived by the public. Anxiety and panic over the tsunami potential of a megathrust zone earthquake keeps recurring. However, it always becomes a polemic and fear. Why does it keep recurring? Is it due to an information gap? This has led to many questions such as what the public should do, what rules are needed, and how to anticipate it. As disaster risk in Indonesia in recent years is on the rise and unpredictable, this necessitates the need for exploring the role of crisis communication. Further, mitigation efforts must be in a state of preparedness. In this regard, the Meteorology, Climatology and Geophysics Agency (BMKG), together with the National Research and Innovation Agency (BRIN) and universities continue to research unmapped faults. Their aim is to compile shock maps and support spatial planning.

It is prudent to learn from past major disasters such as the 2018 Anyer Tsunami that claimed 400 lives, of which 60% were tourists. Many of the victims were tourists as they did not know the land layout and evacuation routes. Moreover, similar to the triple disaster in Palu 2018, earthquake, liquefaction and tsunami occurred simultaneously. In retrospective, when the 2004 Aceh earthquake and tsunami hit, BMKG had 20 sensors to record seismicity. Now, to detect earthquakes in the strong megathrust zone, BMKG has installed 533 sensors, scattered along the megathrust path since 2006. The sensors are expected to automatically record any earthquake's strength, position and depth. This includes analysing whether the earthquake has the potential to cause a tsunami. Earth experts calculate that earthquakes in the megathrust zone have the potential to cause tsunamis as high as a dozen metres to 20 metres. Therefore, it is critical to shape public perceptions regarding megathrust earthquake risks and to ensure that government communication remains coherent and consistent in delivering disaster response messages and early warnings (Widianto, 2024).

BMKG Institute recently issued a statement published on Kompas.com with the headline “Megathrust’, Real Threat” (Daryono, 2024). Strong earthquakes originating in the megathrust zone are generally destructive and can potentially cause tsunamis because the hypocentre is shallow. As a result, public rumours have become rampant, asking questions like ‘What is a megathrust earthquake in Indonesia?; Which areas are affected by megathrust earthquake?; Why is Indonesia threatened by a megathrust earthquake?’ and even ‘How to survive a megathrust earthquake?’ These questions reflect the public's fear and uncertainty in the face of such a major disaster. As such, National Agency for Disaster Countermeasure (BNPB) is concerned with the way narratives are built by journalists so that they do not foster fear but rather lead to public awareness in dealing with disaster crisis situations, in this case, the megathrust issue.

Looking at recent technological developments, Mangones (n.d.) writes that social media platforms have revolutionised disaster management by facilitating efficient communication, information sharing and collaboration among stakeholders. These technologies enable authorities, disaster management professionals and communities at risk to gather information and deliver rescue messages in real time more quickly and effectively. Despite the benefits, there are however inherent risks—social media can inadvertently spread rumours and misinformation, which can be harmful when disaster strikes.

In the crisis communication theory, the preparedness communication approach should focus on providing clear and actionable information without causing panic (Coombs, 2015). Today, social media is an important tool in spreading preparedness messages with real-time updates and public interactions that reflect shared resilience. Research shows that a balanced approach, emphasising risk but involving communities in preparedness can reduce fear and increase public engagement (Austin & Jin, 2017; Stieglitz et al., 2018).

This empowerment-based approach adopts a “sense-giving” strategy, where messages are structured to help people understand risks without causing panic. For example, in the context of disasters, messages that emphasise specific steps for preparedness such as evacuation, simulation practices or logistical preparations are considered more productive in encouraging proactive responses than focusing solely on the negative impacts of disasters (Jin et al., 2014). Empowering messages also help strengthen people’s trust in the government agency or organisation delivering the information, as they show empathy and allow for participation in mitigation efforts (Veil et al., 2011).

However, what remains underexplored in crisis communication literature is how computational approaches such as social media text mining can reveal public perception patterns during crisis discourse, especially for low-frequency but high-impact disaster risks like megathrust. While traditional crisis communication studies have focused on message framing, source credibility, and audience segmentation (Coombs, 2007; Heath & O’Hair, 2010), very few have applied large-scale social media data analysis to assess real-time public reactions and discourse dynamics during natural disaster scenarios (Jin et al., 2014; Stieglitz et al., 2018). Most research have emphasised reputational crises or organisational responses in corporate or political contexts (Avery et al., 2010; Schultz et al., 2011), with limited application to geophysical hazards or slow-onset crises.

The challenge is to avoid “fear appeals” or exaggerated messages about fear, which can trigger defensive reactions or boredom with repeated warnings. Research shows that people respond more positively to crisis communication when messages focus on collective empowerment rather than just the potential for disaster (Jin et al., 2014). Such an approach can encourage people to see themselves as important actors in preparedness, reduce feelings of helplessness and encourage proactive behaviour.

Thus, this research explores the role of crisis communication in mediating fear and preparedness through digital discourse patterns by analysing large-scale social media data on the megathrust issue using a mixed-methods computational approach. Addressing the megathrust crisis issue by focusing on preparedness rather than fear can help communities understand their role, as well as build a culture of preparedness in high-risk areas such as Indonesia.

LITERATURE REVIEW

Megathrust issues in Indonesia and government preparedness

Indonesia, which is located in an earthquake-prone area due to tectonic plates boundaries, has persistently faced the threat of major earthquakes. BMKG has cautioned the potential for Indonesia to experience an 8.9 magnitude megathrust earthquake in the Sunda Strait and Mentawai-Siberut regions. This cautionary approach warrants valid concerns due

to catastrophic consequences such as infrastructure damage and mass casualties. As earthquakes cannot be predicted, mitigation efforts is the foremost priority.

BMKG works with various institutions to prepare for worst-case scenarios, develop shaking maps (real-time maps of ground motion and shaking), and support risk-based spatial planning. At the same time, the BNPB organises preparedness rallies and potential megathrust simulations in earthquake-prone areas such as the Mentawai Islands, West Sumatra, Pandeglang, Banten and Ciamis, West Java. At the community level, *Desa Tangguh Bencana (Destana)*, a community-based approach is adopted where villagers are empowered to adapt and recover immediately from the impact of a disaster. In addition, UNESCO-standard tsunami preparedness trainings are also conducted. However, there is criticism that the megathrust information that is disseminated often focuses only on the threat without clear mitigation measures, which has the potential to create fear. Therefore, action-based education is important to build people's understanding of what to do to face this threat (BNBP, n. d.).

Chen and Mustafa (2023) found that evidence-based refutation strategies are most effective for governments to curtail rumour spreading by the public. Their findings are consistent with previous research on rumour response outcomes where rebuttal response strategies remained the most effective in China (Paek & Hove, 2019; Wang et al., 2021). Moreover, Wang et al. (2021) stated that evidence-based refutation strategies can effectively reduce confusion and identify rumours. Gao et al.'s (2022) research also supports the importance of "dropping hints" in rumour response strategies. In addition, Goh et al. (2017) revealed that online users seek credible and authoritative sources to correct errors and counter rumours through online platforms and social platforms, such as Twitter.

Li and Zhang's work (2020) provided important insights for policymakers and crisis communication practitioners on how to strategically deal with rumours on digital platforms, especially in global crisis situations. The main findings demonstrate that active response strategies, such as providing evidence or clarification, are more effective in curbing public's intention to spread rumours. Further, the study found that anxiety has an important role as a mediator, where high levels of anxiety tend to increase one's intention to spread rumours, unless prevented by credible responses.

In the Indonesian context, especially for BMKG, in providing information about potential earthquakes or megathrusts constantly, a transparent and rapid communication strategy is essential. Moreover, the use of social media platforms to provide accurate information, respond to rumours and clarify any potential uncertainties that arise can reduce public fear. Timely interventions, such as those proposed by Li and Zhang (2020) as well as Chen and Mustafa (2023), can help prevent the escalation of rumours leading to panic or irrational behaviour during a megathrust crisis and this is part of the mitigation that should also be undertaken by BNPB.

Risk communication in the megathrust issue

Risk communication in the context of the megathrust issue is a communication strategy that aims to raise public awareness without inducing excessive fear. Research shows that the effectiveness of risk framing depends on the delivery of clear, fact-based information and narratives that educate rather than alarm. Such a strategy must also consider the socio-cultural and psychological context of the audience to ensure that messages are well-received and appropriate mitigation actions are encouraged.

Megathrust risk communication efforts must also take into account how the media frames information, ensuring that news coverage includes not only threats but also actionable solutions—such as evacuation routes, hazard maps, and preparedness training. This approach can build a disaster-responsive public rather than one paralysed by fear. Sellnow and Seeger (2020), through their Crisis and Emergency Risk Communication (CERC) model, emphasised the importance of pre-crisis communication, including using clear language, acknowledging scientific uncertainty, and maintaining consistent messages to build trust with the public. Veil et al. (2011) further highlighted that early public engagement during the pre-crisis stage can strengthen trust and reinforce effective communication when a crisis eventually unfolds.

Social media plays a crucial role in disseminating megathrust-related information. Its viral nature can significantly enhance public preparedness—but can also spread misinformation or sensational content if not managed carefully. Therefore, understanding how government agencies such as BMKG and BNPB frame and manage megathrust-related narratives online is essential for promoting preparedness and reducing panic.

To strengthen the conceptual framework of risk communication, the inclusion of the Risk Perception Theory (Slovic, 1987) is critical. This theory posits that individuals' responses to risks are shaped not only by objective scientific information, but also by subjective psychological factors—such as familiarity, voluntariness, dread, and trust in institutions. In the case of the megathrust discourse, the high degree of perceived uncontrollability and catastrophic potential can trigger emotional responses such as fear, anxiety, or even apathy. As Slovic argues, people tend to overestimate risks that are unfamiliar, involuntary, and perceived as catastrophic—the exact characteristics associated with megathrust earthquakes.

Thus, effective megathrust risk communication must integrate both cognitive and emotional dimensions of public perception. While the CERC model focuses on the timing, clarity, and consistency of crisis messaging, the Risk Perception Theory reminds communicators to account for the emotional filters through which information is interpreted. For instance, fear-based narratives may backfire if they are not balanced with empowering and constructive guidance. Communicators should not only deliver accurate and timely information but also manage public emotions by offering a sense of agency and control—such as highlighting what individuals can do to stay safe.

By aligning the insights from CERC and Risk Perception Theory, risk communication strategies can move beyond one-dimensional warning systems toward a more holistic model that fosters resilience. This includes using empathetic language, encouraging community-level preparedness, and ensuring that official communication channels build long-term trust. In doing so, government agencies and media platforms can help cultivate a well-informed and emotionally prepared public—critical in the face of low-frequency but high-impact disasters such as megathrust earthquakes.

Public engagement to reduce fear

Public engagement in crisis communication is critical to building public preparedness, especially in the face of major risks such as a megathrust. Public engagement (Jin & Liu, 2010) is an important element that enables two-way interaction between crisis-affected parties and the organisation or government managing the crisis response. Meanwhile,

public preparedness refers to the extent to which individuals and communities possess the knowledge, capacity, and readiness to take preventive or responsive actions before, during, and after a disaster (Paton, 2007).

Several researchers have applied sentiment analysis to analyse social media texts by organisations and/or the public. Zhao et al. (2020) used sentiment analysis to measure Twitter users' reactions to organisational crisis responses, namely situational responses and updated responses, in different crises with varying attribution of responsibility. In a different study, Liu et al. (2020) examined how the level of dialogic communication affects public engagement and positive sentiment during natural disasters. Ji et al. (2019) also examined how public engagement on Facebook is predicted using two sentiment dimensions (i.e., valence and strength) in organisational posts.

For this research, engagement is operationalised as measurable forms of interaction, such as commenting, reposting, or using official hashtags in crisis discourse, as well as more latent expressions such as sentiment alignment and message amplification (Lovejoy & Saxton, 2012). Public involvement also helps create a sense of ownership over mitigation and preparedness efforts. A public that feels valued and involved in the decision-making process is more likely to follow safety guidelines and participate in preparedness programmes organised by the government or relevant agencies (Chen & Mustafa, 2023).

Fear is conceptualised not only as an emotional response to perceived risk, but also as a communicative construct that influences how information is sought, shared, or rejected (Kim & Niederdeppe, 2013; Witte, 1992). When poorly managed, fear may lead to avoidance, denial, or distrust; however, if effectively moderated, it can motivate protective behaviour. In this regard, communication that takes into account people's perceptions and emotions is critical to ensure that communication efforts do not add to confusion or fear, but instead reinforce awareness and productive preventive action.

In addition, disaster preparedness education and training that involves the public at all levels—from children to adults—can strengthen social and collective resilience in the face of a megathrust disaster. Thus, while the potential for disaster remains, the public will be better prepared and not carried away by unwarranted fears, and can cooperate with the government in risk mitigation. It is important to note that managing the megathrust issue through clear and collaborative communication involves not only the government, but also the media, public organisations and the private sector, all of whom must work together to build a comprehensive understanding among the public.

Situational theory of publics (STP)

The Situational Theory of Publics (STP), originally developed by Grunig (1997), offers a foundational lens for understanding how publics respond to issues, particularly in risk-laden contexts such as megathrust disasters. STP identifies three core independent variables that shape public responsiveness: problem recognition (the degree to which individuals are aware of a pressing issue), constraint recognition (perceived barriers to taking action), and level of involvement (the extent to which individuals feel personally connected to the issue). These variables influence the likelihood that a public will engage in information seeking and information processing, which are key outcomes in predicting communication behaviours in crisis situations.

The STP framework helps conceptualise these communicative behaviours and provides a diagnostic tool for improving message targeting and segmentation in disaster

risk communication. However, despite its value, STP has rarely been applied rigorously within the domain of crisis communication, particularly in geophysical disaster scenarios. As a response to this theoretical gap, this research employed STP not just descriptively, but as a structuring model integrated with large-scale computational discourse analysis, allowing empirical validation of how publics interact with megathrust-related messages on social media platforms.

Furthermore, the Risk Perception Theory provides insight into how individuals' interpretations of hazard information are influenced by cognitive biases, cultural frames, and social amplification. The frequent misinterpretation of megathrust information by online audiences, compounded by algorithmic echo chambers, suggests a gap between scientific messages and public understanding—an aspect that STP does not fully address.

The correlation between the Situational Theory of Publics (STP) and Risk Perception Theory (RPT) can be conceptually explained as a complementary relationship, where each theory explains different but interrelated dimensions in the public response to the crisis. Table 1 presents the conceptual correlation.

Table 1. STP and RPT conceptual correlation

Aspects	Situational Theory of Publics (Grunig, 1997)	Risk Perception Theory (Slovic, 1987)	Correlation
Main Focus	It explains when and why the public becomes active on an issue.	It explains how individuals perceive and respond to risk affectively and cognitively.	RPT explains the emotional and cognitive factors that influence the psychological condition of the public in STP (e.g., constraint recognition, involvement).
Cognitive and Affective Dimensions	They are divided into problem recognition, involvement, and constraint recognition.	They are based on dread, unknown risk, trust, and emotional heuristics.	RPT explains why the public can feel afraid and unable to act, even though they are aware of the issue (high problem recognition but low involvement).
Public Response	It focuses on the level of public involvement: non-public, latent, aware, active.	It focuses on risk perception: high or low, depending on fear, control, and trust.	High risk perception but no sense of control (RPT) can cause the public to remain passive (aware but inactive in STP).
Implications for Communication	Communication must reduce constraints and increase involvement so that the public becomes active.	Communication must manage risk perceptions through clarity, trust and a non-fearful narrative.	Both theories suggest that communications that only convey threats (without solutions) will fail to mobilise the public.

Thus, Table 1 confirms that STP explains the structural conditions and segmentation of the public, while RPT explains the psychological-affective dimensions that determine the direction of public engagement. The integration of the two provides a strong analytical basis for understanding why risk communication often fails to mobilise the public, despite high levels of awareness. An effective communication strategy must address both reducing barriers to participation (STP) and balancing risk perceptions with a sense of control and trust (RPT). For further integration, the Framing Theory and

the Mediated Public Engagement model (Chadwick, 2013; Schäfer, 2012) offer promising development directions for unravelling how institutional narratives, media platforms, and public discourses collectively shape meaning in disaster contexts.

METHODS

This research adopted a mixed-methods approach that combined computational text mining and qualitative interviews to examine how megathrust-related crisis communication unfolds in both digital and institutional spaces. The use of the computational approach is motivated by the growing relevance of digital footprints in studying human behaviour and public discourse (Hilbert et al., 2019; Shah et al., 2015). These digital traces—especially from social media—offer ecologically valid data on how individuals communicate and engage with risk information in real-time environments (van Atteveldt & Peng, 2018).

Data were collected through the Meltwater media monitoring platform from August to September 2024, focusing on the keyword “megathrust.” This search produced approximately 18,200 mentions with an average of 602 mentions per day. The data were then cleaned and filtered: only Indonesian-language content was retained, and spam, duplicate posts, advertisements, and unrelated content were excluded. These steps follow best practices for ensuring validity and relevance in big data analysis. The cleaned corpus was then imported into Voyant Tools, a web-based platform for computational discourse analysis. Tools such as word clouds, term frequency analysis, and co-occurrence mapping were used to identify dominant themes and lexical patterns (Sinclair & Rockwell, 2016).

To complement the computational findings and address their limitations in capturing institutional intentions and contextual framing, the research also conducted semi-structured interviews with key stakeholders. These included representatives from BMKG, BNPB, and the Chairman of the Indonesian Disaster Management Society (MPBI). The interviews explored how these institutions frame the megathrust risk, the challenges of public engagement, and how inter-agency coordination is managed. To ensure triangulation, this research compared public discourse patterns derived from social media data with institutional narratives gathered from interviews. This strategy helped identify gaps or convergence between message delivery and public perception, consistent with the practice of methodological triangulation to increase the credibility and robustness of findings (Creswell & Plano Clark, 2017; Denzin, 1978).

FINDINGS AND DISCUSSION

The findings of this research on megathrust crisis communication reveal how risk discourse is constructed, emotionally charged, and shaped by competing narratives within the digital public sphere. A word cloud generated using Voyant Tools—based on a corpus of over 1.2 million words and 61,885 unique terms—visually illustrates dominant lexical patterns that influence public perception and engagement.

The discourse is marked by minimal dialogic interaction and a shortage of action-oriented language, which undermines its effectiveness. Rather than fostering preparedness, such messaging risks fuelling public anxiety—counterproductive to the goal of building resilience. This pattern is demonstrated in the word cloud shown in Figure 1,

which highlights the prominence of threat-based terms over proactive, solution-driven vocabulary.

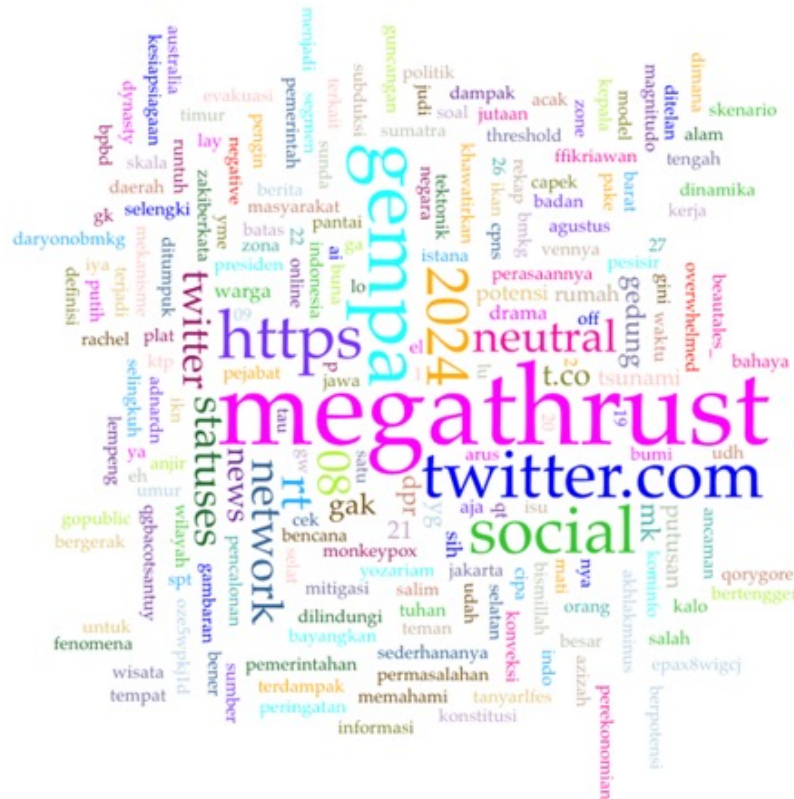


Figure 1. Visualisation of the megathrust discourse word cloud in online news and social media

This word cloud is not a neutral visualisation, but rather a representation of a discursive field dominated by emotionally charged and fear-laden terms—such as “megathrust,” “*gempa*,” “tsunami,” and “*potensi*.” The prominence of these words reflects a threat-focused mode of crisis communication, suggesting that public discourse is largely shaped by uncertainty, anxiety, and a sense of helplessness. In contrast, terms related to proactive risk management—such as “*evakuasi*,” “*simulasi*,” “*kesiapsiagaan*,” and “*mitigasi*”—are either absent or significantly underrepresented. This lexical asymmetry indicates more than a surface-level imbalance; it reveals a deeper discursive deficit in which agency, preparedness, and community resilience are marginalised in favour of alarmist narratives.

Drawing on Brown and Yule's (1983) view that language does not merely reflect reality but actively constructs it, the dominance of fear-oriented terminology contributes to shaping a perception of crisis as inevitable and uncontrollable. This observation aligns with Slovic's (1987) Risk Perception Theory, which argues that affect-laden risk messages—especially in environments marked by institutional distrust or informational ambiguity—are likely to intensify emotional responses while inhibiting cognitive engagement and practical action. The lack of empowering language further erodes public confidence and weakens the connection between institutional communicators and their audiences.

This discursive imbalance also reflects structural communication inequalities, whereby state authorities—rather than fostering participatory, dialogic engagement—

continue to employ top-down, unidirectional messaging strategies. As Thelwall and Stuart (2007) noted, publics navigating unfamiliar crises often rely on speculation when clear guidance is absent. In the megathrust context, social media platforms—evidenced by frequent mentions of “Twitter.com,” “statuses,” and “network”—function not only as dissemination tools but also as interpretive frameworks through which individuals make sense of risk, causality, and impact. According to van der Meer (2018), such platforms can both inform and amplify emotional contagion, particularly when official messaging lacks consistency, empathy, and actionable content.

Ultimately, this word cloud analysis underscores the need to reorient megathrust crisis communication away from fear-driven narratives and toward messaging that fosters preparedness, agency, and collective capacity. Institutions such as BMKG and BNPB must strategically balance risk communication with emotionally attuned, solution-focused narratives. Only by integrating affective clarity with actionable guidance can crisis communication serve as a tool for building public resilience rather than amplifying fear.

More clearly, the following Table 2 shows the frequency of posts from the research findings.

Table 2. Most frequent words in the corpus

No.	Corpus	Frequency (times)
1.	megathrust	64,160
2.	<i>gempa</i>	33,146
3.	social	28,890
4.	Twitter.com	28,846
5.	https	27,714
6.	2024	21,825
7.	neutral	16,533
8.	network	14,495
9.	statuses	14,423
10.	news	8,625
11.	DPR	7,642
12.	<i>potensi</i>	6,553

Table 2, which displays the most frequently occurring words in the corpus derived from online news and social media, offers critical insight into the thematic contours and actor representations within the megathrust discourse. The dominance of terms like “megathrust” (64,160) and “*gempa*” (33,146) underscores the salience of seismic risk in public digital consciousness. These lexical patterns reflect heightened problem recognition, a concept central to the Situational Theory of Publics (Grunig, 1997), whereby publics identify urgent issues but may not progress toward engagement or action due to perceived constraints or lack of direction.

The frequent appearance of platform-related terms—such as “Twitter.com” (28,846), “social” (28,890), “network” (14,495), and “statuses” (14,423)—reveals the central role of social media, particularly Twitter, as a discursive arena where risk is not only disseminated but also interpreted, negotiated, and emotionally experienced. This affirms Stieglitz et al.’s (2018) argument that social media enables dialogic crisis communication.

However, the potential for such dialogic engagement remains largely untapped by state institutions, whose digital presence is limited and often passive.

One of the most striking findings is the absence of key crisis institutions such as BMKG and BNPB among the most frequent terms. This absence raises concerns about the visibility and perceived legitimacy of official actors in shaping public understanding of megathrust risks. In contrast, the relatively high frequency of DPR (7,642) suggests a politicisation of seismic discourse, whereby political narratives overshadow scientific or technocratic voices. This fragmentation points to a shifting power dynamic in crisis communication, where ideological interests often dominate over evidence-based guidance.

Furthermore, anomalous terms like “neutral,” “https,” and “statuses” reflect the influence of platform infrastructure and metadata extraction on discourse formation. These elements highlight the importance of examining not only content but also the architectures through which risk narratives are circulated. Collectively, the frequency analysis reveals that while public attention to seismic risk is high, the discourse remains fragmented, institutionally disconnected, and shaped more by fear and politics than preparedness or clarity. Reframing crisis communication to emphasise inclusion, emotional resonance, and actionable guidance is essential for building trust and promoting readiness.

Based on the word occurrence frequency data, the top five words that have high engagement are as shown in Figure 2.

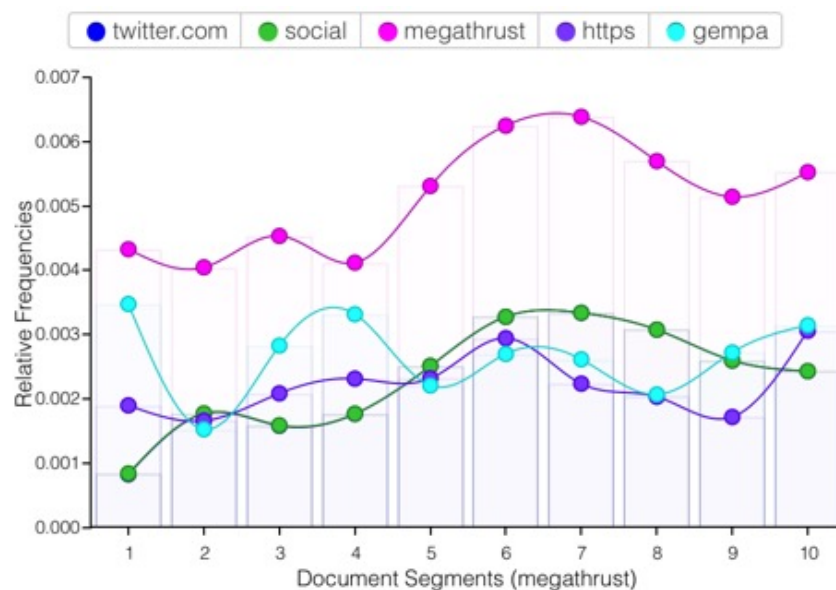


Figure 2. Frequency of engagement on megathrust issues

Word cloud and frequency analyses reveal that online public discourse—particularly on Twitter—is dominated by terms evoking seismic threat, such as “megathrust” (64,160 mentions) and “gempa” (33,146). This lexical pattern reflects strong problem recognition, a key component of the Situational Theory of Publics (Grunig, 1997), suggesting that the public is highly aware of the risks posed by large-scale tectonic disasters. However, this heightened awareness does not translate into proactive engagement. Terms that signal preparedness, such as “BMKG,” “BNPB,” “evakuasi,” and “simulasi,” appear infrequently, indicating limited public involvement and weak mitigation discourse.

Although public interaction on social media—evidenced by frequent mentions of “social” and “Twitter.com”—is substantial, it primarily reflects passive information sharing and collective sense-making rather than mobilisation for preparedness. This supports findings by van der Meer (2018) as well as Thelwall and Stuart (2007), who observed that in crises without prior lived experience, the public often seeks to navigate uncertainty rather than take direct action.

From the perspective of the Risk Perception Theory (Slovic, 1987), this affective engagement is shaped by anxiety, distrust, and perceived lack of control. The low visibility of institutions like BMKG and BNPB in high-frequency discourse suggests weak institutional presence and credibility, reinforcing constraint recognition—barriers to action due to doubts about information clarity, transparency, or relevance.

Discursively, these patterns indicate asymmetrical power relations in the digital crisis communication landscape. While official institutions fail to assert themselves as trustworthy narrators, media outlets and civil society actors fill the gap—often without institutional support or factual consistency. This failure to engage in dialogic, empathetic communication contradicts the principles of the Social-Mediated Crisis Communication (SMCC) model (Jin et al., 2014), which emphasises reciprocal trust and public empowerment.

In conclusion, although public awareness of megathrust risk is high, the prevailing communication structure remains top-down and alarm-driven. An effective crisis communication strategy must go beyond risk warnings, focusing instead on restoring institutional trust, reducing perceptual barriers, and fostering shared agency. A conceptual integration of the Situational Theory of Publics and Risk Perception Theory offers a promising framework to redesign crisis messaging based on real-time public discourse and emotional responsiveness.

The main assumptions underpinning this research are rooted in four key constructs: preparedness, fear, risk awareness, and perceived constraints. These assumptions inform the development of a strategic crisis communication model tailored to megathrust earthquake scenarios.

1. Preparedness

Preparedness assumes that strategic and empathetic crisis communication significantly enhances public readiness to respond to megathrust risks. This includes transparent, evidence-based dissemination of actionable content such as evacuation routes, hazard maps, and early warning systems. Social media plays a critical role in this process, enabling real-time education and public mobilization. As Austin et al. (2017) argue, messages that emphasise specific, preventive actions—rather than abstract risks—enhance public efficacy. Communication that builds a sense of agency and control is essential for fostering a proactive, rather than a paralysed public.

2. Fear

Fear is considered an affective reaction triggered by crisis messaging that lacks contextual clarity, emotional sensitivity, or participatory framing. Catastrophic narratives without actionable guidance may incite panic, fatalism, or institutional distrust. As Sandman et al. (1993) and Seeger (2006) caution, overemphasis on threat severity without enabling public response tends to reduce preparedness. In highly mediated environments like Twitter, misinformation or sensationalised warnings can amplify public anxiety. Thus, communicators must strike a balance between alarm

and assurance, ensuring that risk is acknowledged without being overstated. The model is shown in Figure 3.

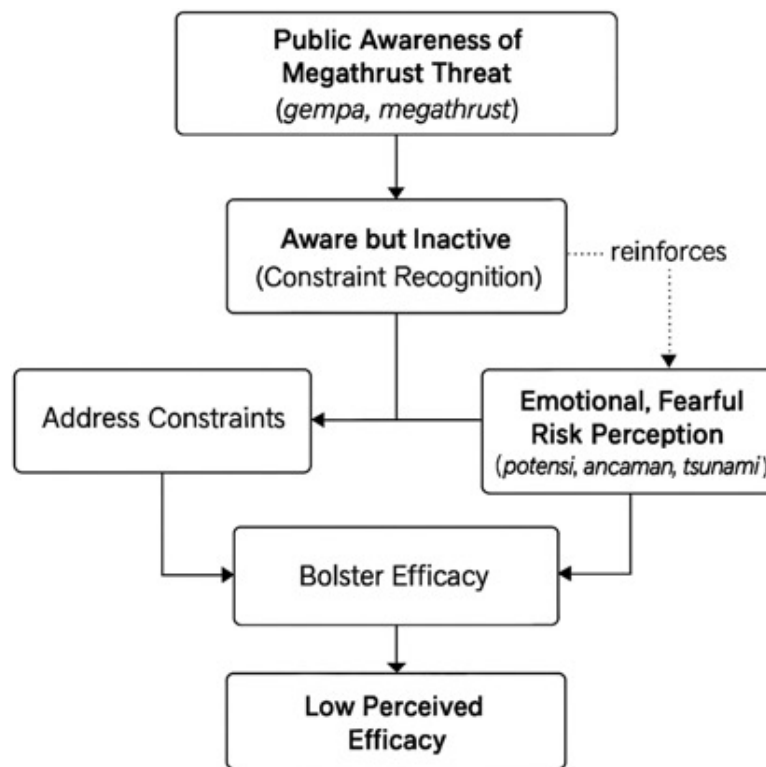


Figure 3. Strategic crisis communication model for megathrust based on STP and RPT frameworks

In this context, the Strategic Crisis Communication Model (Figure 3) functions both as a visual synthesis of findings and a roadmap for designing more balanced interventions—bridging the gap between awareness and empowerment. By integrating the Situational Theory of Publics (Grunig, 1997) and Risk Perception Theory (Slovic, 1987), the model explains why public awareness does not always translate into action, particularly when emotional risk perceptions reinforce feelings of helplessness and constraint recognition.

Recommendations such as efficacy-based messaging, community engagement, and optimizing social media for real-time education are essential to shift the narrative from fear to readiness. Crisis communication must go beyond informing about risk—it must foster control, trust, and collective capacity to act. Through this approach, communication becomes a transformative instrument in cultivating disaster-resilient publics.

CONCLUSION

This research demonstrates that digital discourse surrounding megathrust risk is predominantly characterised by fear-inducing language, with limited use of solution-oriented or empowering terminology. The dominance of emotionally charged words—such as “megathrust,” “*gempa*,” and “*potensi*”—as revealed through word cloud

visualisation and corpus analysis, indicates a public narrative shaped by anxiety and perceived helplessness.

Drawing on the Situational Theory of Publics, the findings suggest that while problem recognition among the public is high, engagement and responsive behaviour remain limited. This is largely due to unclear messaging, low trust in institutions, and minimal visibility of official voices. Similarly, the Risk Perception Theory helps explain how affective responses are intensified by uncertainty, media amplification, and the absence of dialogic communication. The near invisibility of institutional actors such as BMKG and BNPB in the corpus underscores a critical communication gap: official crisis messages fail to assert relevance, foster trust, or promote agency among the public.

This imbalance highlights that current crisis communication strategies are insufficiently participatory, emotionally attuned, or empowering. Effective communication in the context of megathrust threats must move beyond the mere dissemination of risk information. It should embrace two-way engagement, incorporate emotional framing that balances alarm with actionable guidance, and ensure consistent visibility of credible institutional voices. Bridging this communicative divide is vital not only for enhancing public preparedness, but also for rebuilding institutional trust, fostering collective resilience, and transforming passive awareness into meaningful action.

Implications

This research underscores a critical insight: while public awareness of megathrust risk is relatively high, the prevailing crisis communication structure has yet to facilitate a meaningful transition from awareness to preparedness. Current discourse remains predominantly top-down, emphasising threat narratives over empowering messages. As a result, crisis communication must evolve not only to convey risks but also to rebuild trust, reduce perceived constraints, and cultivate a shared narrative grounded in community resilience.

The integration of the Situational Theory of Publics (STP) and Risk Perception Theory (RPT) in this study offers a valuable conceptual framework for redesigning crisis messaging strategies that are evidence-based and socially responsive. Institutions such as BMKG and BNPB should formulate communication campaigns that pair technical risk terms—like “megathrust” or “*ancaman*”—with solution-oriented language such as “*evakuasi*,” “*simulasi*,” and “*kesiapsiagaan*.” This linguistic shift can help lower psychological and structural barriers, encouraging the public to move from passive awareness to proactive engagement.

Mass media and journalists play a pivotal role in shaping public risk perception. The findings indicate that excessive focus on destructive outcomes in media coverage reinforces emotional responses such as fear, uncertainty, and helplessness. Therefore, disaster journalism should not only prioritise timeliness but also deliver educational content that guides the public through actionable steps. In doing so, media can function as a vehicle for civic learning and strengthen collective disaster readiness.

For future research, the identified discourse imbalance points to the need for interdisciplinary studies exploring how public perception is influenced by media framing, institutional messaging, and emotional resonance. Expanding this work through methodological integration—such as natural language processing (NLP), discourse

analysis, and social network analysis (SNA)—can deepen our understanding of crisis communication ecologies and their impact on public resilience.

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Pipit Fitriyah

is a doctoral student in Communication Science at the Faculty of Social and Political Sciences, Sebelas Maret University (UNS), Surakarta, Indonesia. She is also affiliated with Gunadarma University, Depok, Indonesia as a lecturer at the Faculty of Communication Science. Her research interest is in big data-based crisis communication networks.

ORCID ID: 0009-0004-8857-4734 | Scopus Author ID: 57320711500

Ismi Dwi Astuti Nurhaeni

is a professor of Public Administration Department, Faculty of Social and Political Sciences, Sebelas Maret University (UNS), Surakarta, Indonesia. Her research interest is in public policy and gender.

ORCHID ID: 0000-0003-4090-4146 | Scopus Author ID: 57190937123

Andre N Rahmanto

is a lecturer at the Communication Department, Faculty of Social and Political Sciences at Universitas Sebelas Maret, Surakarta Indonesia. His research interest is in strategic and organizational communication research.

ORCHID ID: 0000-0001-7331-4973 | Scopus Author ID: 57191827438

Drajat Tri Kartono

is a lecturer at the Sociology Department, Faculty of Social and Political Sciences at Universitas Sebelas Maret, Surakarta Indonesia. Her skills and expertise are in urban development, qualitative analysis, cultural sociology, and cultural diversity.

ORCHID ID: 0009-0003-8455-8633 | Scopus Author ID: 57191474243
