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Public Narrative of Flood Causes and Solutions in Surabaya

Pravidya Salsabiila[1], Mohamad Irfan Nafiyanto[2]
[1]*Universitas Diponegoro, Semarang, Indonesia*
[2]*Universitas Telkom, Bandung, Indonesia*
Email: pravidyasalsabila@gmail.com

Abstract. The rainy season has been observed to result in the river reaching its maximum discharge, thereby causing water to be sent into residential areas and roads at approximately 200 points within the Surabaya city area. This phenomenon is further compounded by the inadequacy of the drainage system, which, despite the construction of box culverts in anticipation of the issue, has not yielded substantial results in terms of flood risk management. In confronting these challenges, it is imperative to recognise the pivotal role that community perceptions play in effectively managing and responding to disasters. This study aims to explore the basis of community perceptions regarding mitigation, evacuation, rehabilitation, and the assessment of the city government's flood management strategies in the Surabaya area. The research will implement ethnography virtual research methods by uncovering public narratives generated through comments on "lovesuroboyo" Instagram posts related to flood and culvert box. The discourse in the public sphere has indicated a pervasive sentiment of dissatisfaction with the government for flood risk management. This has led that the culvert box, a primary conduit for flood mitigation, has been adjudged unsatisfactory. In the context of environmental protection and flood management, it is imperative to underscore the significance of two key elements, namely, effective drainage infrastructure and a shared understanding among stakeholders. The necessity for collaboration between government entities and the community as an instrumental means of addressing and mitigating challenges pertaining to flooding.

Keywords: *Box Culvert; Flood Risk Management; Public Narrative; Urban Flooding.*

A. INTRODUCTION

Flooding in urban areas has become an increasingly frequent disaster due to climate change, with the increasing frequency and intensity of flooding in recent years having had a significant impact on people's lives, including in urban areas.On December 24, 2024, the city of Surabaya experienced four hours of continuous heavy rain, resulting in flooding in various areas.The heavy rainfall caused rivers to reach their maximum discharge, resulting in water entering residential areas and roads. The city government of Surabaya has identified approximately 200 locations that are susceptible to flooding (Unesa, 2024). Flooding in urban areas is attributable to inadequate urban infrastructure to withstand heavy rainfall, a problem that is exacerbated by poor drainage systems that are incapable of handling the volume of water that overflows (Hazrin et al., 2024).

Flooding in urban areas is associated with a variety of natural and man-made causes. Floods in urban areas are typically classified as natural disasters, contingent upon their genesis being triggered by natural phenomena, including heavy rainfall, storms, and hurricanes (Dharmarathne et al., 2024). Conversely, when the absence of a proper waste management system results in individuals disposing of their refuse into water bodies, thereby impeding the flow of these streams, this occurrence may be classified as a man-made disaster (Abubakar et al., 2022). The problem of flooding in urban areas can be influenced by many factors, such as the drainage network within the city, rainfall, and the water discharge of the rivers that cross the city. In principle, there are five primary causes and types of urban flooding (Susetyo, 2008); (Pal & Kolathayar, 2021), Specifically, the following factors were identified: First, the absence of adequate drainage infrastructure. Second, the obstruction of the drainage system. Third,

flooding in low-lying areas. Fourth, a flood of runoff due to rising water levels in downstream areas. Fifth, inundation caused by high river levels.

The risk of flooding in Surabaya is a pressing concern, as the city is vulnerable to increased flows in the nearby rivers. In 2014, the Surabaya City Spatial Planning 2012-2032 was implemented. This comprehensive plan encompasses various spatial planning instruments, including land use allocation, building regulations, drainage systems, and infrastructure investments aimed at mitigating the impact of flooding (Pamungkas & Purwitaningsih, 2021). Strategies to mitigate the impact of flooding include the widening of drainage channels at vulnerable locations (Purwitasari & Wibisono, 2021). The city government is implementing another strategy to anticipate flooding, which involves the construction of culverts in areas susceptible to flooding. The construction of these box culverts is expected to contribute to flood mitigation (Jadhav et al., 2024). However, during the rainy season, the efficacy of these culvert boxes in mitigating flooding from high rain intensity remains to be fully realized. This issue has become a subject of discourse on social media platforms such as Twitter and Instagram. The flooding has had a disruptive effect on daily life and has also resulted in material losses (Liu et al., 2022). Consequently, numerous residents of Surabaya have voiced their discontent regarding the repercussions of this flood event.

In previous research on flood risk perception conducted in China, increased motivation to mitigate flood risk and improved coping behaviors have been identified, providing insight into flood risk management (Liu et al., 2022). Concurrent research on public perceptions of nature-based solutions for flood risk management in Lagos, Nigeria, revealed that Sustainable Urban Drainage Systems as Nature-Based Solutions can mitigate the impact of urbanization on flooding (Ajijola et al., 2021). This study employs quantitative methodologies, leveraging survey data to demonstrate that augmenting green open spaces can mitigate the risk of flooding in urban areas. Concurrently, research by (Ma, 2025) underscores the escalating vulnerability of urban areas to extreme flood events, which pose substantial challenges to the safety and well-being of residents. In this context, it is imperative to understand the relationship between urban landscape patterns and public perceptions of safety to facilitate effective flood disaster management. This research undertakes an exploratory investigation into the relationship between urban landscape patterns and public perceptions of safety during extreme flood events, employing Zhengzhou city as a case study. The objective of this study is to provide strategic insights that inform the management of extreme flood disasters.

Through the literature review, research on flooding has been explored through perceptions of flood risk, urban drainage systems and the relationship between urban landscape patterns and public perceptions of safety in flood-prone areas. This research explores the novelty of flood risk management in urban areas, drawing on public narratives obtained through Instagram social media comments. These comments pertain to heavy rainfall, blocked or failed drainage systems, poor environmental conditions, and inadequate land use planning, which are often cited as major contributors to flood-related problems. In this study, researchers identified the significance of public perception in the context of flood disaster. Public perceptions of disasters not only reflect their understanding of the risks faced, but also influence their behavior in facing and responding to disasters (Cai et al., 2023).

The underlying research question pertains to the public's narrative responses to flooding events in Surabaya. Researchers will examine in detail how the public narratives produces comments based on mitigation, evacuation, rehabilitation, and public assessment of the city government's response to floods in the Surabaya area. This research contributes to the existing literature by offering insights into public sentiment, which can be used to evaluate the government's response to flood disasters in urban areas. The exploration will delve into the

potential of public narratives as a valuable conceptual framework for governments grappling with the challenges posed by climate change-induced flood disasters.

B. METHOD

This study explores public comments by analysing narratives on Instagram regarding posts about flooding and box culvert construction. The research employs a mixed methodology, incorporating a netnographic approach to analyse the flood event in Surabaya. The research data is sourced from two primary sources: 1) Instagram social media data on the 'lovesuroboyo' account, and 2) secondary data in the form of relevant articles and mass media news. The VADER sentiment analysis tool was employed to reveal positive, negative and neutral sentiments. The data analysis process in this study comprises six stages, as outlined by (Loilatu et al., 2021). The data obtained from Instagram posts of the 'lovesuroboyo' account were crawled using coding, then analysed using VADER sentiment analysis to analyse positive, negative and neutral data, validity, and interpretation and presentation of data. The final data set presented here is the sentiment that was generated by the VADER sentiment analysis tool (Elbagir & Yang, 2019).

C. RESULT AND DISCUSSION

The present study examines the utilization of social media comment columns, such as the Instagram platform, as a conduit for public feedback regarding events. The analysis encompasses a data set comprising six Instagram posts from the ‘lovesuroboyo’ account, published between December 10, 2024, and January 9, 2025, with a focus on flooding incidents in Surabaya. The public response in social media can be categorized into three classes of sentiment value positive, negative, and neutral (Kang et al., 2017). Positive sentiment is defined as the response of individuals who concur with all aspects of the subject under discussion. Negative sentiment is defined as the response of individuals who tend to disagree with all issues. Neutral sentiment is defined as an impartial attitude toward both sentiments (Singh et al., 2020).

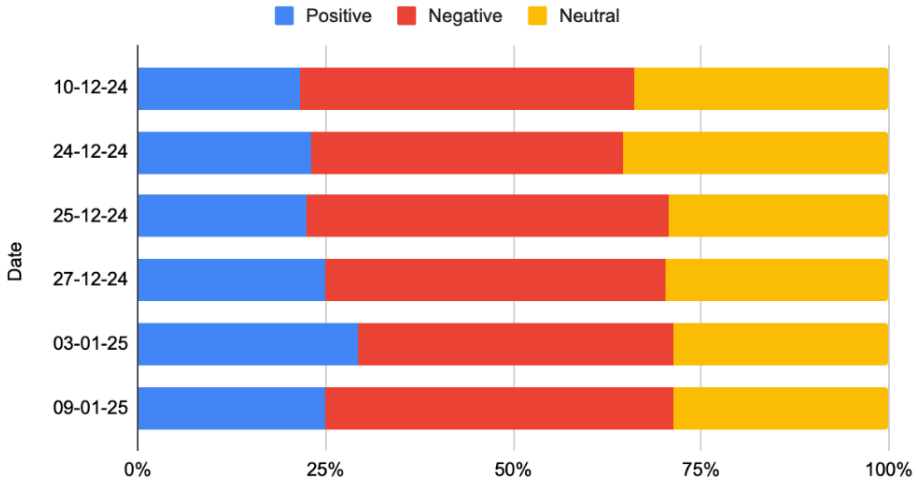

Figure 1. Data Analysis Sentiment
Source: VADER Sentiment Analysis (2025)

According to the results of the sentiment analysis of the six posts shown in graph 1, the public's comments indicate a prevalence of negative sentiment. The flood-related post with the title “Banjir di Mayjend Sungkono Surut, Banyak Kendaraan Mogok!!” on December 10, 2024, which received the highest number of comments with a total of 1,040, exhibited 21.5% positive sentiment, 44.6% negative sentiment, and 33.9% neutral sentiment. The post titled “Hujan

Deras Mengakibatkan Beberapa Wilayah di Surabaya Terendam Banjir (24/12)" on December 24, 2024, where rain occurred for 4 hours, garnered 512 comments, positive sentiment shows 23%, 41.6% negative sentiment, and 35.4% neutral sentiment. The third post, published on December 25, 2024, with the title "Penyebab Banjir Parah saat Malam Natal, Walikota Surabaya Eri Cahyadi: Sungai Meluap, Tak Mampu Tampung Air!!" elicited a response of 358 comments, with 22.3% characterized by positive sentiment, 48.3% negative sentiment, and 29.4% neutral sentiment. The fourth post, published on December 27, 2024, and bearing the title "Drainase Buruk Jadi Biang Kerok Banjir Parah di Gunung Anyar Surabaya, Apa Upaya Pemkot !?" elicited a total of 253 comments, with 24.9% of these comments expressing positive sentiment, 45.5% expressing negative sentiment, and 29.6% expressing neutral sentiment.

The fifth post, published on January 3, 2025, bore the title "Blak-blakan Soal Banjir Surabaya, Walikota Eri Cahyadi: Ketika Kali Jagir dan Kali Surabaya Meluap, Kita tidak Bisa Berbuat Banyak!!" and garnered 386 comments, with 29.2% expressing positive sentiment, 42% expressing negative sentiment, and 28.8% neutral sentiment. The sixth post, published on January 9, 2025, bore the title "Box Culvert Dianggap Kurang Solutif untuk Kurangi Banjir di Surabaya, Ini Saran Pakar Tata Kota!?" elicited a total of 386 comments, with 24.8% of them expressing positive sentiment, 46.4% expressing negative sentiment, and 28.8% expressing neutral sentiment. The positive sentiments identified in the data encompass comments offering advice to the government and expressions of nostalgia for the former Mayor of Surabaya Tri Rismaharini. In contrast, the negative sentiments, as interpreted by the VADER tool, signify publics concerns regarding the ongoing flooding and their disillusionment with the government. Conversely, comments classified as neutral sentiment are regarded as impartial with relation to the flooding event in Surabaya.

According to the information disseminated by the Instagram account "lovesuroboyo", the primary cause of the substantial flooding that affected Surabaya was the inability of the water to enter the major rivers, such as the Jagir River and the Surabaya River. Consequently, the government has been compelled to intervene by employing air suction techniques, utilizing both fire engines and environmental service vehicles. In the comments section of the post, which pertains to flood disaster mitigation, it was observed that the flooding was attributed to the lack of maintenance of the river, culvert, and drainage channels. The public further noted that the high rainfall experienced in each rainy season was consistent with that of the previous year. The public assessed that the former mayor had routinely carried out prevention and cleaning of the drainage system so that overflowing water from the river could be prevented. The community's readiness to confront flooding issues gave rise to a range of sentiments, influenced by the community's level of preparedness to manage flood events (Utsev et al., 2023). The enhancement of community awareness and engagement in flood preparedness and response plans has been demonstrated to foster the development of a more resilient society. According to the comments section of six Instagram posts, no public discussion of the evacuation and rehabilitation carried out in the floods that occurred in Surabaya has been found. However, the evacuation process was implemented in another area, specifically in the Waru district of Sidoarjo. The East Java provincial government spearheaded the evacuation and rehabilitation efforts, which entailed environmental restoration through the continued siphoning of water from flooded areas, the removal of accumulated waste, and the dredging of rivers (Kominfo, 2024).

Regarding public narratives about the Surabaya city government's flood risk management, public dissatisfaction with the handling of flooding in Surabaya was found through the dominant negative sentiment. Despite the government's efforts to construct culverts in flood-prone areas, the public has expressed that these efforts have not had a substantial impact. The government's ongoing reliance on the use of pump systems to remove water from

flooded areas indicates that the efficacy of the culvert infrastructure is yet to be optimized. The public engaged in discourse on the Instagram comment section, contending that the construction of the box culvert, intended to function as a drainage path during inclement weather, was not performing according to its intended design. However, other literature provides contradictory evidence culverts are essential infrastructure in preventing flooding, erosion, and damage to transportation infrastructure by efficiently channelizing water away from roadways and other structures (Dawood & Mawlood, 2024). The effective management of water flow is of the essence for ensuring public safety and preserving infrastructure.

D. CONCLUSION

Analysis of public narratives measured by the VADER tool revealed that negative sentiments predominantly emerged in public comments found regarding the performance of the Surabaya city government in the comments column of the Instagram account "lovesuroboyo" when facing the rainy season. This apparent lack of readiness is evidenced by the malfunction of drainage channels, resulting in river water inundation across nearly the entirety of Surabaya City. The advent of social media as a public sphere has emerged as a new platform for citizens to articulate their concerns. Comments on Instagram have emerged as a novel medium for articulating criticism of the government, serving as a conduit for input and suggestions. Public narratives have emerged as integral components in the formulating new policies, underscoring the significance of social media as a platform for both criticism and the articulation of constructive suggestions.

In the context of flood management, it is imperative to underscore the importance of effective drainage infrastructure and shared understanding among stakeholders, as collaboration between government institutions and communities is important to solving and mitigating flood related challenges. The limitation identified in this study pertains to sentiment analysis research, specifically presence of bias in data collection. The findings of the interpretation analysis conducted by the researcher align with the results of crawling data on Instagram comments, where the research subjects are online communities who follow the 'lovesuroboyo' Instagram account. However, it should be noted that these results may not be representative of all flood affected communities in the city of Surabaya. In future research, it is necessary to conduct in-depth interviews with flood affected communities in the city of Surabaya.

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