

WhatsApp and green activism: a netnography of mobilisation and engagement

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Abstract This study analysed the role of WhatsApp in mobilising environmental activist communities in the Ciputat Subdistrict, South Tangerang. WhatsApp has become the primary communication platform for disseminating information, coordinating activities, and fostering community engagement. This research employs a qualitative approach using netnography. Data were collected through in-depth interviews with 13 informants, comprising community leaders, members, and government representatives, as well as participant observation within the community's WhatsApp group over a three-month period, from May to July 2024. The findings indicate that WhatsApp is effective for the rapid dissemination of critical information, such as environmental clean-up schedules, illegal dumping alerts, policy updates, and educational materials on waste management. WhatsApp also facilitates open discussions by providing a space for members to share opinions, personal experiences, and collaboratively develop action plans through group chats, multimedia sharing, and polls. However, several challenges were identified, including information overload, limited responsiveness from some members, constraints in facilitating in-depth discussions, and technical barriers such as unstable internet connectivity. Despite these obstacles, WhatsApp plays a significant role in strengthening social bonds among community members and fostering collaboration with local government authorities. This study concludes that WhatsApp can serve as an effective tool to support environmental movements at both local and national levels. Its effectiveness could be further enhanced by integrating other communication platforms to meet their existing limitations.

Keywords: community mobilisation; digital communication; environmental activist community; netnography; WhatsApp

INTRODUCTION

Environmental awareness in society develops through a combination of education, community involvement, and the influence of communication technologies. Research indicates that as individuals become more informed about environmental issues, their awareness and concerns increase, leading to more sustainable behaviours (Mat Husain et al., 2024). Communication technology plays a crucial role in this evolution by facilitating the dissemination of information and encouraging public discussions on environmental topics (Aresta & Beça, 2023). For example, social media platforms have been shown to enhance public engagement and mobilise collective action for environmental causes (Tomchuk & Tomchuk, 2022). Additionally, the integration of technology in educational settings has proven effective in raising awareness among younger generations, making them more proactive in environmental management (Aithal & Aithal, 2024). However, challenges remain, such as the digital divide, which can limit access to information for certain populations (Nguyen et al., 2017). Overall, while communication technology significantly supports the evolution of environmental awareness, addressing accessibility issues is crucial to maximising its impact.

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The WhatsApp application significantly enhances collaboration and mobilisation within communities by facilitating real-time communication and information sharing. Research shows that WhatsApp serves as a vital tool for community engagement, allowing users to create groups that promote collective action and support networking (Makoe & Shandu-Phetla, 2019). This enables rapid information dissemination, which is crucial during emergencies or community events, thereby improving response and coordination among members (Gattupalli et al., 2023). Additionally, WhatsApp's multimedia capabilities enable the sharing of diverse content, such as images and videos, which can strengthen community bonds and raise awareness of local issues (Siswantini et al., 2020). However, despite WhatsApp promoting inclusivity, it can also lead to information overload, potentially overwhelming users and diminishing the effectiveness of communication (Lakshmi & Ramakrishnan, 2017). Despite these limitations, the application remains a powerful platform for mobilising community efforts and fostering collaboration, as evidenced by its widespread adoption in various social initiatives (Cronje & Van Zyl, 2022).

The popularity of WhatsApp in Indonesia can be attributed to several interrelated factors. Firstly, its user-friendly interface and features, such as group chats and multimedia sharing, align with Indonesian communication preferences, making it an accessible tool for both personal and professional interactions (Nuraeni & Nurmalia, 2020). Additionally, the platform's ability to facilitate real-time communication aligns with the fast-paced lifestyle of many Indonesians, enhancing its appeal (Motteram et al., 2020). Moreover, WhatsApp's integration with local cultural practices, such as community engagement and family connectivity, further strengthens its position as a preferred communication tool (Caetano et al., 2019). The application's end-to-end encryption also addresses privacy concerns, which are increasingly critical in the digital age where data security is paramount (Alluhaidan & Prabu, 2023). In summary, the combination of user-friendly features, cultural relevance, and security measures significantly contributes to WhatsApp's widespread adoption in Indonesia, making it a crucial communication platform in the region.

The advantages of WhatsApp in Indonesia can be attributed to several key features that resonate with local users. Firstly, its user-friendly interface and accessibility make it appealing, especially among younger demographics who prefer instant messaging over traditional communication methods (Naryoso & Lailiyah, 2020). Additionally, WhatsApp's end-to-end encryption enhances user privacy, a significant concern in a country where data security is increasingly prioritised (Supartini & Solihah, 2022). Moreover, the platform's ability to facilitate group chats and broadcast messages supports community engagement, which is culturally significant in Indonesia (Adrian, 2022). The integration of multimedia sharing, including photos and videos, allows users to express themselves creatively, further enhancing its popularity (Rachmaniar, 2023). Finally, WhatsApp's compatibility with low-bandwidth connections makes it an ideal choice in regions with limited internet access, ensuring that it remains a crucial communication tool across various socioeconomic groups (Ando & N, 2017). Collectively, these features contribute to WhatsApp's unique position in Indonesia's digital landscape.

Understanding the use of WhatsApp by environmental activist communities is crucial for enhancing advocacy and action efforts. Research indicates that WhatsApp serves as a vital communication tool, facilitating real-time information sharing and mobilisation among activists, which can significantly strengthen their reach and impact (Xu & Zhang, 2022). The platform's ability to create group chats fosters collaboration and strengthens community ties, enabling collective action on environmental issues (Yadav et al., 2020). Additionally, research highlights that WhatsApp's user-friendly interface and broad accessibility make it an effective medium for disseminating educational content and raising awareness about environmental challenges (Chamberlain et al., 2014). However, there are limitations, such as the potential for misinformation and the digital divide, which can hinder equitable participation in advocacy efforts (Siswantini et al., 2020). Overall, effectively leveraging WhatsApp can enhance the capacity of environmental advocacy communities for coordinated action and advocacy, making it an important area of study for future environmental initiatives (Hemmi & Crowther, 2013).

Communication theory in social movements focuses on how messages are conveyed and received by the public to drive social change. Communication media play a central role in shaping public opinion and mobilising mass support. Social movements typically utilise media to build solidarity and disseminate messages of change, especially in the digital age, which allows for rapid and widespread information dissemination (Carty, 2018). Information and

Communication Technology (ICT) has enabled social movements to overcome geographic barriers, enhancing coordination and participation on both local and global scales (Slavina & Brym, 2020). In the era of social media, interactions among members of social movements are increasingly reinforced through digital platforms, which facilitate more effective mass mobilisation (Syed & Silva, 2023). Moreover, Bennett & Segerberg (2023) the concept of 'connective action' has emerged, illustrating how social media enables individual participation without the need for formal organisational membership. WhatsApp, as a communication platform, has become a crucial tool in extending the reach of social movements due to its ease of use (Uwalaka & Nwala, 2023).

Social media has demonstrated its role in facilitating environmental movements through rapid and widespread information dissemination. Recent research indicates that platforms such as Facebook, Twitter, and Instagram enable environmental activists to reach a broader audience at low cost and with high effectiveness (Kim et al., 2024). In the context of environmental movements, social media is used to coordinate protest actions, mobilise support, and disseminate crucial information related to both global and local environmental crises (Sorice & Dumitrica, 2023). A study by Knupfer et al. (2023) confirms that participation through social media not only enhances environmental awareness but also drives tangible actions such as donations, participation in protests, and changes in consumer behaviour. On the other hand, research by Avalle et al. (2024) highlights key challenges in the use of social media, including information polarisation and limited space for open discussion, which often narrow solutions to environmental issues. WhatsApp, as a more private and targeted communication application, is able to address some of these limitations by providing a more focused and private space for discussion (Naghdipour & Manca, 2023).

WhatsApp has emerged as a crucial tool for community organisation and social movements, particularly in developing countries where internet access is often limited. A study by Hancock (2024) shows that WhatsApp is used by many grassroots organisations for real-time communication, organising meetings, and mobilising members for various social activities. Another study by Cinque et al. (2023) underscores that WhatsApp facilitates community participation by providing a secure and reliable communication channel for sharing critical information during protests and community activities. WhatsApp also enables faster and more flexible coordination among environmental activists (Agnese et al., 2023). In the context of environmental movements, the use of WhatsApp has helped reduce communication costs and increase organisational efficiency, as reported in the study Bhanye & Maisiri (2023). However, challenges such as the risk of misinformation and privacy concerns remain major issues, as identified by Aïmeur et al. (2023), particularly in the context of digital media.

In the current digital era, social media and instant messaging applications have become integral to both professional and social contexts. Among these, WhatsApp stands out as a highly popular platform with extensive reach, offering effective tools for coordination and communication through features such as group chats, broadcast messages, and media sharing. The Ciputat Subdistrict in South Tangerang faces significant challenges in maintaining environmental cleanliness, necessitating innovative approaches to engage various stakeholders, including government bodies, local communities, NGOs, and individuals. This study aims to investigate how WhatsApp can facilitate stakeholder mobilisation in managing a cleaner environment in Ciputat Subdistrict, South Tangerang. To provide a focused inquiry, the study addresses three core problems: the role of WhatsApp in environmental activist communities, particularly in supporting coordination and mobilisation efforts; the effectiveness of communication via WhatsApp in facilitating information flow, task organization, and collaboration among stakeholders; and the barriers or challenges encountered in its use, including issues such as limited responsiveness, notification overload, and technological constraints. By exploring these aspects, the study seeks to generate insights and practical recommendations for enhancing digital communication strategies and stakeholder engagement toward a cleaner and healthier environment.

METHODOLOGY

This study employs a qualitative approach with an online netnography method to understand the role of WhatsApp in mobilising environmental activist communities in Ciputat Subdistrict.

The research involves 13 informants, including community leaders, environmental activists, and representatives from local government in Ciputat Subdistrict.

Table 1. Informant Background

No	Code	Role / Position	Institution / Group	Gender
1	INF-01	Community Leader	RW Chairperson, Ciputat	Male
2	INF-02	Environmental Activist	TPS3R Facilitator	Male
3	INF-03	Waste Bank Coordinator	Bank Sampah Ciputat	Female
4	INF-04	Local Government Representative	Ciputat Subdistrict Office	Male
5	INF-05	Eco-Enzyme Community Member	Eco-Enzyme Ciputat	Female
6	INF-06	Member of Women's Farming Group	Kelompok Wanita Tani	Female
7	INF-07	Community Organizer	Green Youth Ciputat	Male
8	INF-08	Environmental Volunteer	Independent	Female
9	INF-09	Member of TPS3R	TPS3R Puri Resik	Male
10	INF-10	Educator & Activist	Environmental Education Forum	Female
11	INF-11	Local Government Liaison	Environmental Affairs Division, Subdistrict Office	Male
12	INF-12	Member of Community WhatsApp Group	Ciputat Waste Management Forum	Male
13	INF-13	Eco-Enzyme Campaign Volunteer	Green School Network	Female

Source: Data from interviews (May-July 2024) with environmental activists in Ciputat, South Tangerang.

Data collection techniques include in-depth interviews, participatory online observation, and analysis of WhatsApp conversations within community groups. Online observation is conducted through ethnographic techniques (Masullo & Coppola, 2023). This involves direct observation of interactions within WhatsApp groups of environmental activists to capture communication dynamics, collaboration, and mobilisation occurring within these groups. This technique allows the researcher to understand digital interaction patterns in a social context without disrupting or altering the natural flow of ongoing conversations. Data was collected from May to July 2024, focusing on how WhatsApp is used to coordinate environmental activities, disseminate information, and drive community member participation. Data analysis procedures include content analysis to identify key themes from WhatsApp conversations and discourse analysis to understand the social context and meanings behind the messages shared by online community members (Arazzi et al., 2023). This approach enables the researcher to observe how WhatsApp facilitates effective communication in driving environmental action in Ciputat Subdistrict.

RESULTS AND DISCUSSION

The role of WhatsApp in environmental activist communities

The research findings reveal that WhatsApp plays a central role in mobilising and organising various activities of environmental activist communities in Ciputat Subdistrict. The application is regarded as a primary communication platform that not only facilitates information dissemination but also eases coordination among community members. Activities such as environmental clean-ups, tree planting, and plastic waste reduction campaigns heavily rely on WhatsApp's ability to deliver messages quickly and accurately. A community leader, who is also a key driver of the environmental community, stated, "*WhatsApp helps us coordinate all activities in real-time. With a single message, all members can immediately know what needs to be done, when, and where*" (Interview INF-01, conducted on 10 June 2024). This highlights the importance of WhatsApp as a communication tool that facilitates instant and efficient information dissemination within the community.

In addition to information dissemination, WhatsApp is also utilised to facilitate discussions and activity planning (See Figure 1). Within community WhatsApp groups, members not only receive announcements but also engage in active discussions regarding logistical details, task distribution, and other technical aspects. One community member noted, "*For major events like tree planting, we frequently discuss via WhatsApp to determine who will bring what, who is responsible for specific tasks, and other technical details*" (Interview with a TPS3R facilitator/ INF-02, 12 June 2024). The discussion features provided by WhatsApp enable more

efficient coordination without the need for face-to-face meetings, which is particularly beneficial for members with time or location constraints.

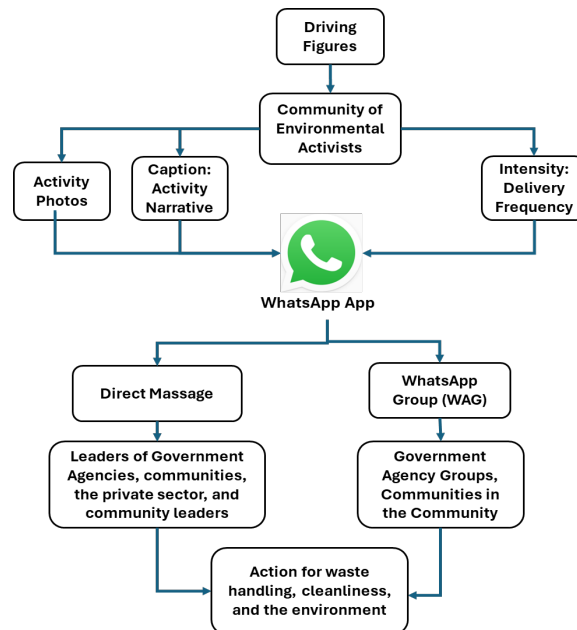


Figure 1. The communication and coordination process of environmental activist communities through WhatsApp
 Source: Online ethnographic observation of the South Tangerang environmental activists' WhatsApp group and in-depth interviews with its members (2024)

WhatsApp also plays a crucial role in enhancing engagement and participation among community members, especially those who cannot always attend physical meetings. One informant stated, *"I can't always make it to meetings due to my busy schedule, but through WhatsApp, I can stay updated on activities and know when to get involved"* (Interview with a waste bank coordinator/ INF-03, May 26, 2024). The application facilitates more inclusive participation, particularly for members with geographic or time constraints. Its ease of access makes WhatsApp an effective tool for maintaining consistent member involvement, even if they cannot be physically present at the activity location.

However, the study also found that the effectiveness of using WhatsApp within environmental activist communities largely depends on the responsiveness and activity level of its members. Some informants noted that important messages sent through WhatsApp groups sometimes do not receive the expected responses, particularly when community members are busy or less emotionally invested in specific activities. A community organiser complained, *"There are times when messages we send do not get prompt responses, perhaps because many members are busy or the messages get lost among other notifications"* (Interview with INF-07, May 17, 2024). This indicates that while WhatsApp offers convenience in communication, there are still limitations in terms of active engagement from all community members, which can affect the effectiveness of organisation.

Another limitation identified in the use of WhatsApp is its inadequacy for facilitating more in-depth and complex discussions. Several informants, particularly those from local government agencies who frequently collaborate with community groups pointed out that WhatsApp is not an ideal platform for addressing matters that require detailed analysis or nuanced decision-making. A government official from Ciputat Subdistrict remarked, *"For more complex matters, such as long-term planning or regulatory discussions, we prefer face-to-face meetings. WhatsApp is too limited for discussions that require extensive detail"* (Interview with a Ciputat Subdistrict government representative/ INF-04, June 23, 2024). This suggests that while WhatsApp is highly effective for daily coordination and quick exchanges, it presents clear limitations for conversations that demand deep reflection and more structured, collaborative deliberation.

Effectiveness of communication via WhatsApp

WhatsApp has proven to be a highly effective communication tool for coordinating activities among environmental activist communities in Ciputat Subdistrict. As an instant and easily accessible communication platform, WhatsApp enables community members to stay updated on activities without needing to be physically present at meetings. One community member remarked, *“Many of us cannot attend physical meetings due to work or other commitments. But through WhatsApp, we can still monitor and participate”* (Interview with a Women's Farming Group Member/ INF-06, 26 May 2024). This indicates that WhatsApp not only facilitates more inclusive communication but also allows members to remain actively engaged even when they are not physically present. The ease of sharing information and communicating through this platform is clearly a critical factor in maintaining community involvement.

In addition to enhancing participation, WhatsApp also streamlines the decision-making process within the community, making it quicker and more efficient. Whenever there are changes in plans or sudden decisions, WhatsApp allows community organisers to promptly convey information to all members. One environmental volunteer noted, *“Sometimes there are last-minute changes regarding the location or time of activities. With WhatsApp, we can immediately inform members, and they can quickly respond”* (Interview with INF-08, May 13, 2024). The speed of information dissemination makes coordination more dynamic, especially when activities require rapid adjustments. In this context, WhatsApp has helped the community maintain a smooth and efficient communication flow, minimising misunderstandings and delays in information.

In the context of environmental activist communities, both communication via WhatsApp groups and direct personal messages have distinct advantages and disadvantages, depending on the communication goals, the type of message, and the group dynamics. Communication through WhatsApp groups allows for rapid and simultaneous dissemination of information to many members, which is highly effective for conveying important announcements such as urgent changes in schedules or locations. However, a common challenge is information overload, where important messages can become buried among other ongoing conversations in the group. As one community member mentioned, *“Sometimes important messages in the group go unread because of the volume of notifications from other discussions”* (Interview with an Eco-Enzyme Community Member/ INF-05, May 06, 2024). In contrast, direct personal messages are more effective in ensuring that information is received and noted by the recipient due to their more personal nature. However, this method is less efficient for mass communication, as it requires more time to send messages individually. Table 2 comparing the effectiveness of communication between WhatsApp groups and direct personal messages.

Table 2. Comparison of communication effectiveness between WhatsApp groups and direct personal messages

Aspect	WhatsApp Group	Direct Personal Messages
Information Dissemination	<ol style="list-style-type: none"> 1. Effective for rapid and simultaneous information dissemination. 2. Challenge: Information overload and important messages can become buried. 	<ol style="list-style-type: none"> 1. Effective for ensuring that messages are received and acknowledged. 2. Not efficient for mass dissemination.
Interaction and Discussion	<ol style="list-style-type: none"> 1. Facilitates open discussions with contributions from multiple members. 2. Challenge: Discussions can become unfocused and diverse topics may arise. 	<ol style="list-style-type: none"> 1. Discussions are more focused and specific. 2. Suitable for resolving individual issues or specific tasks.
Efficiency and Response Time	<ol style="list-style-type: none"> 1. Responses are uneven; some members respond quickly, while others do not. 2. Messages can be overlooked if there are too many notifications. 	<ol style="list-style-type: none"> 1. Faster and more focused response time. 2. Sender can monitor whether the message has been read.
Member Engagement	<ol style="list-style-type: none"> 1. Helps build camaraderie and solidarity. 2. Challenge: Member engagement may be uneven. 	<ol style="list-style-type: none"> 1. More personal communication that enhances individual engagement. 2. Less transparent for group collaboration.
Usage Efficiency	<ol style="list-style-type: none"> 1. Suitable for disseminating information quickly to a large audience. 2. Challenge: Large discussions may require additional moderation. 	<ol style="list-style-type: none"> 1. Suitable for urgent messages requiring immediate attention. 2. Not efficient for mass communication.

Source: Based on in-depth interviews and Focus Group Discussions (June 2024) with members of the South Tangerang environmental activist community

Table 2 summarises the advantages and challenges of each communication method, indicating that WhatsApp groups are more suitable for mass communication and collaboration,

while direct personal messages are more effective for personal and focused communication. In addition, WhatsApp groups facilitate open discussions among community members, enabling collaborative efforts and the exchange of ideas collectively. This is crucial for designing activities or solving problems that require input from multiple parties. However, discussions in groups often lose focus due to the variety of opinions emerging simultaneously, and not all members may be actively contributing. As one community organiser noted, *"It can be difficult to keep discussions on-topic in the group due to the many topics that arise at the same time"* (Interview with an Eco-Enzyme Community Member/INF-05, 18 May 2024). Conversely, direct personal messages are more suited for personal or specific discussions involving only two parties, allowing for more focused and targeted communication. However, this approach is less transparent and reduces opportunities for group collaboration typically found in open group discussions.

Efficiency in response time is also a crucial aspect when comparing these two communication methods. In WhatsApp groups, response times among members tend to be uneven; some members respond quickly, while others may not respond at all due to the volume of incoming messages. As noted by one community member, *"Messages in the group are sometimes not answered immediately, especially if members are busy"* (Interview with an Environmental Activist/INF-02, 7 June 2024). In contrast, direct personal messages typically receive quicker and more focused responses, as recipients often perceive these messages as urgent and requiring immediate attention. However, the process of sending individual messages takes longer compared to the mass dissemination of information within a group.

In terms of member engagement, WhatsApp groups are effective at fostering a sense of camaraderie and solidarity among community members because everyone can participate in discussions and contribute feedback. These groups also allow members who are less active in the field to stay engaged in community discussions and decision-making processes. However, this engagement is not always uniform, and less vocal members may feel marginalised in the conversation. Conversely, direct personal messages facilitate more personalised and targeted communication, often enhancing individual engagement due to the exclusive nature of the message for the recipient. This method is suitable for strengthening individual relationships and ensuring that less frequently involved members receive special attention.

Overall, WhatsApp groups are more effective for mass information dissemination and open discussions, although they often face challenges related to focus and information overload. On the other hand, direct personal messages are more suitable for personalised and responsive communication, with a more targeted focus, but are less efficient for large-scale communication and group collaboration. To maximise communication effectiveness within a community, it is highly recommended to use both methods complementarily. WhatsApp groups can be utilized for mass announcements and open discussions, while direct personal messages can be employed for communication requiring more personal and specific attention.

The effectiveness of WhatsApp is also evident in the collaboration between environmental community groups and external entities such as local government authorities. A representative from the Ciputat Subdistrict government explained how WhatsApp has facilitated coordination with the community, particularly concerning the provision of facilities or activity permits. One government official stated, *"We frequently communicate with the community via WhatsApp, especially for matters related to providing resources or permits. This greatly accelerates the decision-making process"* (Interview with a Local Government Liaison/ INF-11, 7 June 2024). This statement highlights that WhatsApp is not only effective for internal community communication but also for facilitating interactions with external parties, thus streamlining various operational aspects of activities.

In addition to its effectiveness in coordination and collaboration, WhatsApp also offers flexibility for community members in sharing responsibilities and tasks equitably. In an interview, one community member mentioned, *"We often use WhatsApp to delegate tasks before events, such as who should bring what or who is responsible for specific aspects"* (Interview with an Environmental Activist/INF-02, 7 June 2024). The transparent task distribution facilitated by WhatsApp makes each member feel more engaged and provides a clear contribution to community activities. This approach also helps alleviate the burden on community organisers, as responsibilities can be more evenly distributed among members.

However, despite its effectiveness in many aspects, some minor challenges persist. A few community members noted that excessive notifications sometimes cause important messages to be overlooked or buried among other conversations. One community member stated, *"Sometimes important messages are not immediately read due to the high volume of notifications. This can result in some members missing out on crucial information"* (Interview with an Environmental Activist/ INF-02, 7 June 2024). Nonetheless, the community has sought to address this issue by prioritising the use of dedicated groups for critical announcements that require immediate attention, thereby minimising the risk of miscommunication.

Overall, WhatsApp has proven to be a highly efficient and effective communication tool for coordinating activities within environmental advocacy communities. From enhancing member participation to facilitating collaboration with external parties, the app supports rapid, flexible, and inclusive communication. However, it is important to continuously develop strategies to address minor technical challenges, such as notification overload, to ensure that the effectiveness of WhatsApp in mobilising the community remains optimal.

Barriers and challenges

Despite WhatsApp's proven effectiveness in facilitating communication and coordinating environmental community activities in Ciputat, this study identifies several barriers that reduce the application's efficiency. One of the most common challenges encountered is the lack of response from some community members, particularly when urgent announcements are made. A community member noted, *"Sometimes we send important messages about changes in schedules or locations, but only a few respond. It may be because these messages get buried under numerous other notifications on WhatsApp"* (Interview with a Community Organiser/INF-07, 29 June 2024). This situation highlights that, while WhatsApp enables rapid dissemination of information, slow or absent responses from community members can hinder effective coordination. More organised use of WhatsApp, such as creating dedicated groups for important announcements, could be a solution to address this issue.

Additionally, technical barriers have emerged in the use of WhatsApp, particularly related to limited internet signals in some areas. Community members residing in regions with poor network connectivity often struggle to stay connected in real-time. One informant mentioned, *"The signal in my area is often problematic, so I sometimes miss important information sent via WhatsApp"* (Interview with an Environmental Activist/INF-02, 7 June 2024). This challenge underscores that, although WhatsApp is easily accessible on various devices, infrastructural issues such as inadequate internet signal availability in certain regions hinder the ability of all members to participate effectively. The use of alternative communication backup plans or strategies, such as disseminating key information through multiple channels, should be considered to mitigate this issue. In addition to technical barriers, elements of government involved in collaboration with the community also highlight that WhatsApp is not an ideal platform for more in-depth or strategic discussions.

A Local government representative stated, *"We find it difficult to conduct extensive discussions on WhatsApp; sometimes it is more effective to meet in person for complex matters"* (Interview INF-04, 11 June 2024). This statement highlights that while WhatsApp is excellent for quick and practical communication, the application is not always suitable for discussions requiring deeper reflection or complex analysis. Strategic discussions or long-term decision-making are better conducted through face-to-face meetings or platforms that support more intensive collaboration, such as email or online meetings via video conferencing platforms.

Another challenge is related to information overload within community WhatsApp groups. Several informants reported that the constant influx of notifications often causes important messages to be overlooked. One community member explained, *"Sometimes, so many messages come in quickly that important messages get missed. If you don't keep monitoring, you might miss crucial information"* (Interview, Educator & Activist/ INF-10, 17 June 2024). This situation illustrates that while WhatsApp facilitates information dissemination, managing messages in a highly active group can present its challenges. One solution suggested by some community members is to use features like "pinned messages" or "special announcements" to keep important information visible at the top.

Finally, another challenge pertains to privacy and security concerns associated with WhatsApp usage. Despite WhatsApp's end-to-end encryption, some community members

express worries about the inadvertent sharing of personal information within groups. One informant shared, *"We sometimes worry about phone numbers or other personal data being shared in the group without consent, especially when there are new members who are not well-known"* (Interview with an Eco-Enzyme Campaign Volunteer/INF-13, 29 June 2024). This concern highlights that while WhatsApp facilitates communication, there are privacy and data security risks that need to be addressed. Implementing stricter privacy settings or establishing internal community rules regarding data protection can help mitigate these issues, thereby maintaining trust and ensuring a sense of security among community members.

Overall, while WhatsApp has proven to be a highly effective tool for rapid communication and coordination, several challenges must be addressed to enhance its long-term effectiveness. These challenges, ranging from inadequate member responses to privacy and security concerns, underscore the need for additional strategies to ensure that WhatsApp remains a useful and reliable tool in supporting the sustainability of environmental activist communities in Ciputat.

Theoretical Discussion

The findings of this study indicate that WhatsApp plays a central role in mobilising communities, particularly in terms of rapid communication and engaging members in environmental activities. These findings align with the social movement communication theory proposed by Castells (2008), which posits that digital technologies have transformed the operations of communities and social movements by providing direct and real-time access to information and coordination. WhatsApp enables environmental advocacy communities in Ciputat to disseminate information rapidly and effectively, such as changes in schedules or locations of activities, ultimately facilitating more responsive actions from community members. In this context, WhatsApp serves as a digital communication tool that supports social organisation, as also emphasised by Urien et al. (2019), where the application extends access to participation without relying on face-to-face meetings.

In addition to its role in mobilisation, WhatsApp also serves as a platform that helps build and strengthen relationships among community members. The app not only facilitates more practical communication but also enables more personal interactions among members, thereby reinforcing a sense of solidarity and connection within the community. As explained by Della Líbera & Jurberg (2020), Social media, including WhatsApp, can create social interaction spaces where community members share information, experiences, and aspirations, thereby strengthening interpersonal bonds. Within the WhatsApp groups of the environmental community in Ciputat, members frequently share personal stories, environment-related information, and moral support with each other. This supports the theory of connectivity proposed by Bennett et al. (2018), which suggests that digital media enable individual-based social movements to remain connected through flexible communication networks.

This study has significant implications for environmental movements both at the local and national levels. Locally, the use of WhatsApp by environmental activists in Ciputat demonstrates that the application can be an effective tool for mobilising communities to actively engage in environmental conservation efforts. For instance, initiatives such as coordinating clean-up actions and plastic waste reduction campaigns could be scaled up through this platform. At the national level, these findings could serve as a foundation for broader environmental movements to adopt WhatsApp as a primary medium for organizing activities. This is consistent with Secinaro et al. (2022), who argue that digital communication platforms can extend the reach of social movements and enhance public participation in relevant issues. Thus, WhatsApp has the potential to serve as a significant mobilising medium for raising environmental awareness and encouraging collective action at various levels.

Furthermore, this study finds that WhatsApp plays a crucial role in mobilising environmental communities in Ciputat. The application has proven effective in disseminating information, coordinating activities, and enhancing member participation. WhatsApp provides a fast and efficient communication platform, allowing the community to respond to situational changes in real-time, whether in the context of logistical activities or environmental campaigns. Additionally, WhatsApp facilitates more personal interactions among members, strengthening solidarity and cohesion within the community. However, the study also reveals several challenges, such as limited response from some members and technical barriers related to

internet signal issues, which need to be addressed to ensure the full effectiveness of WhatsApp in environmental movements.

Based on these findings, other environmental communities can leverage WhatsApp as a primary communication tool to mobilise their members. Communities should consider using WhatsApp for effective information dissemination and field coordination while implementing strategies to mitigate challenges, such as notification overload or limited active participation from certain members. Utilising dedicated groups for important announcements or scheduling specific times for discussions can help optimise communication.

CONCLUSION

This study shows that WhatsApp plays a key role in mobilising environmental activist communities, especially for quick communication and engaging members in environmental activities. In Ciputat, WhatsApp is effective for rapidly sharing information, such as changes in schedules or locations, and helps the community respond quickly to these updates. The application also facilitates personal interactions among members, strengthening their sense of solidarity and connection. However, there are challenges, such as uneven responses from members and technical issues with internet connectivity, that need to be addressed to improve WhatsApp's effectiveness. To make the most of WhatsApp, communities should use it for efficient information sharing and coordination, while also implementing strategies to manage notification overload and encourage active participation. For more in-depth discussions, combining WhatsApp with other platforms like video conferencing might be beneficial.

The researchers also suggest several actionable strategies that can be implemented to enhance the effectiveness of WhatsApp in community mobilisation. First, it is important to optimise WhatsApp usage by creating dedicated groups for different types of communication such as separating announcement channels from general discussion forums, to better manage notifications and keep important messages visible. In addition, setting clear guidelines for group participation and expected response times can significantly improve engagement and ensure timely attention to key communications. To address the issue of notification overload, users can take advantage of WhatsApp's features, such as the "pin" or "announcement" tools, to highlight crucial messages and prevent them from being buried in ongoing conversations.

Furthermore, scheduling regular updates at specific times can help prevent overwhelming members with excessive messages throughout the day. Recognising the presence of technical challenges, the study also recommends offering alternative communication channels, such as SMS, for members living in areas with weak internet connectivity. It is equally important to ensure that technical support is available to assist members who may encounter difficulties using WhatsApp or other digital tools. Enhancing membership is another key area of focus. This can be achieved by encouraging active participation, fostering a sense of inclusion, and recognising members' contributions.

Additionally, employing tools such as surveys or feedback forms can provide valuable insights into member needs and help fine-tune communication strategies accordingly. To support deeper collaboration, WhatsApp should be complemented with other digital platforms. Video conferencing tools can be integrated to facilitate more complex discussions and long-term planning, while other digital platforms offering advanced features or stronger security may also be explored to support various aspects of community coordination. Finally, future research should investigate the effectiveness of alternative communication platforms such as Telegram or Signal within similar community-based contexts. Expanding the scope of study to include other communities or social movements may also offer comparative insights into how different digital tools influence community mobilisation and engagement across diverse settings.

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