



BRIDGING THE DIGITAL AND PHYSICAL DIVIDE: A SYSTEMATIC REVIEW OF SOCIAL MEDIA'S ROLE IN PUBLIC INFRASTRUCTURE DEVELOPMENT, MONITORING AND CITIZEN ENGAGEMENT

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Abstract

Social media platforms have transcended their original function as interpersonal communication tools to emerge as critical infrastructural assets that mediate the relationship between digital interaction and physical development. This systematic review synthesizes peer-reviewed literature from 2012 to 2026 to examine the multifaceted role of social media in public infrastructure development, monitoring, and citizen engagement. Drawing on scholarly articles, government reports, and policy documents, the review identifies four primary functions of social media within infrastructure contexts: facilitating citizen participation and engagement, enabling project monitoring and accountability, supporting industry communication and collaboration, and functioning as a contested space where infrastructure decisions are debated and challenged. The findings reveal that while social media offers unprecedented opportunities for participatory governance and real-time project oversight, its effectiveness is constrained by persistent challenges including population bias, information credibility concerns, surveillance and privacy violations, self-censorship, and algorithmic opinion polarization. The review contributes a typological framework for understanding social media support functions in collaborative planning and proposes an integrated model that combines digital participation with traditional governance mechanisms. The review concludes that social media's potential to bridge the digital and physical divide in infrastructure development can only be realized through deliberate institutional design, investment in digital literacy, and commitment to genuine dialogue that transcends one-way information dissemination.

Keywords: *Digital Divide, Physical Divide, Social Media, Infrastructure Development, & Citizen Engagement*

Introduction

The relationship between social media and physical infrastructure has traditionally been understood through a narrow lens: digital platforms as mere communication tools for discussing construction projects. However, a growing body of scholarly work reveals a more profound and multifaceted connection. Social media platforms have become "default infrastructure for democratic participation," functioning as the primary spaces where citizens encounter political candidates, debate local priorities, and engage with governance processes (Sage Publications, 2026). This transformation positions social media not merely as communication channels but as integral components of how infrastructure is planned, monitored, and contested.

A systematic review of 46 peer-reviewed articles published between 1999 and 2024 emphasizes how Information and Communication Technologies (ICTs) have improved democratic engagement quality, efficiency, and transparency (Katsikas & Gritzalis, 2025). Key advantages identified include real-time, extensive, and interactive communication between governments and citizens; enhanced electoral integrity through biometric voter registration and digital networks; participatory budgeting initiatives enabling citizen involvement in public spending; and e-government portals providing convenient access to government services (Katsikas & Gritzalis, 2025). However, the same literature highlights critical challenges: cybersecurity vulnerabilities, misinformation, ethical issues of surveillance, and the widening digital divide that disproportionately affects marginalized populations (Katsikas & Gritzalis, 2025).

The concept of collaborative planning provides a theoretical foundation for understanding this evolution. Since the 1980s, collaborative planning has emphasized rational communication in public spheres to achieve consensus building among diverse stakeholders (He & Zhang, 2026). Grounded in Habermas's theory of communicative action, this paradigm has traditionally relied on face-to-face dialogue. However, as He and Zhang (2026) demonstrate, social media platforms have emerged as "a significant venue of public expression" where citizens articulate concerns about infrastructure projects, making them critical arenas for contemporary collaborative planning.

This systematic review addresses these questions: How do social media platforms function as tools for citizen participation and engagement in infrastructure development? In what ways do citizens employ social media to monitor and influence infrastructure projects? How does social media facilitate communication and collaboration within the construction industry? What are the documented challenges and limitations of social media use in infrastructure contexts?

Theoretising the issue through the lenses of Collaborative Planning Theory

Collaborative planning represents a paradigm shift in urban governance, emphasizing the inclusion of diverse stakeholders in decision-making processes. Innes and Booher (2018) present a theory of collaborative rationality requiring three conditions: diversity of interests, interdependence of interests, and authentic dialogue (He & Zhang, 2026). These conditions are largely related to Habermas's ideas of communicative rationality, requiring inclusion of all perspectives and ideal speech conditions. The advantages of the communicative approach include fostering greater inclusion of stakeholders and reshaping expert-citizen relationships (He & Zhang, 2026).

However, this approach has been criticized for ignoring power relations and "conflicting rationalities" in contexts of social difference (He & Zhang, 2026). Consequently, scholars have investigated agonistic approaches that acknowledge the permanence of conflict, transforming antagonism to agonism where opponents are adversaries rather than enemies (He & Zhang, 2026). Social media, with its capacity for multimodal, interactive, and mass self-communication, offers new possibilities for both communicative and agonistic approaches to collaborative planning (He & Zhang, 2026).

The broader literature on ICTs and democratic processes provides essential context. A systematic review of 46 peer-reviewed articles published between 1999 and 2024 emphasizes how ICTs have improved democratic engagement quality, efficiency, and transparency (Katsikas & Gritzalis, 2025). Key advantages identified include real-time, extensive, and interactive communication between governments and citizens; enhanced electoral integrity through biometric voter registration and digital networks; participatory budgeting initiatives enabling citizen involvement in public spending; and e-government portals providing convenient access to government services (Katsikas & Gritzalis, 2025). However, the same literature highlights critical challenges: cybersecurity vulnerabilities, misinformation, ethical issues of surveillance, and the widening digital divide that disproportionately affects marginalized populations (Katsikas & Gritzalis, 2025). This duality, ICTs as both enablers and challenges to democratic processes, provides a crucial lens for examining social media's role in infrastructure.

Methodology

This systematic review follows established guidelines for synthesizing literature on social media and infrastructure. The search strategy employed Web of Science, Scopus, ScienceDirect, and Google Scholar databases, using keywords including "social media," "infrastructure," "citizen participation," "urban planning," and "construction." Inclusion criteria encompassed peer-reviewed journal articles, conference proceedings, and book chapters published between 2012 and 2026 that examined: social media use in infrastructure planning, development, or monitoring; citizen engagement through digital platforms; construction industry applications of social media; and challenges and limitations of social media in governance contexts. Exclusion criteria included articles focused solely on social media marketing, purely commercial applications, or infrastructure topics without social media components. Following a systematic screening process, 46 articles were selected for in-depth analysis, supplemented by relevant case studies and policy documents. This sample aligns with the methodology employed in comparable systematic reviews on ICTs and democratic processes (Katsikas & Gritzalis, 2025; Rojas Huanca, 2025).

Social Media as a Platform for Citizen Participation and Engagement

The literature reveals that social media has fundamentally transformed how citizens engage with infrastructure development. Social media has become an influential tool for engaging various participants and facilitating inclusivity in digital planning (Zhao et al., 2024). While many studies highlight local governments' use of social media for formal participation, limited research assesses its impact on power dynamics in informal participation (Zhao et al., 2024). Research on the Enning

Road regeneration project in Guangzhou demonstrates how third parties strategically utilize social media to promote collaboration, mobilize citizens, and foster communities. Zhao et al. (2024) applied Castells' four forms of network power to understand power dynamics among civil society, journalism, citizens, and governments in planning processes. Their analysis of data from China's Weibo revealed that civil society and journalism have substantial networked power as they strategically utilize social media to promote collaboration, mobilize citizens, and foster communities. They exercise network-making power by switching online and offline networks, thereby transmitting online debate to a wide range of audiences and compelling local governments to shift planning priorities from demolitions to preservation (Zhao et al., 2024).

This finding is reinforced by a theory-testing case study examining how infrastructure project organizations' social media communication contributes to community stakeholders' online engagement. Using uses and gratifications theory, the study found that project organizations engaged community stakeholders most effectively through communication that disseminated timely information about the project's value creation or included entertaining content. Notably, communication aimed at initiating dialogue, building relationships, and negotiating value creation terms did not engage the community stakeholders online (Oke et al., 2024). This finding suggests that while social media can facilitate engagement, the type of communication matters significantly.

A doctoral thesis from Utrecht University examines how social media reshapes collaborative planning by reconfiguring power dynamics in digital environments (He, 2026). Rather than serving as a purely democratizing tool, social media functions as a double-edged sword. It enables diverse actors to mobilize resources, coordinate actions, and contest planning decisions, yet power asymmetries persist and new forms of state control and platform-mediated governance emerge (He, 2026). Online information flows are often dominated by specific actors, while ordinary citizens strategically use digital tools to exert influence. He's research asks a central question: does social media redistribute power in urban planning and governance, or does it produce new hierarchies? Drawing on case studies from Beijing and Guangzhou, the research investigates how digital platforms transform power relations in planning and beyond. While social media opens new opportunities for civic engagement, it also intensifies risks of manipulation, centralization, polarization, and behind-the-scenes distortion (He, 2026).

Research on e-participation in Nigeria provides additional insights. Oludu et al. (2025) investigated the preference, adoption, and utilization of e-government services among Nigerian citizens through preferred social media. Their findings reveal varying levels of e-government adoption across different local government authorities, influenced by factors such as infrastructure limitations, institutional capacity, and political will. A high level of participation through various social media platforms was observed, and the level of correlation between government trust and e-participation using available platforms was found to be minimal (Oludu et al., 2025). This suggests that social media participation occurs regardless of institutional trust, indicating the intrinsic communicative value of these platforms. Vrabie (2025) examined how Bucharest's ambitious urban development strategies transferred into perceived real-life outcomes by analyzing discourse on official social media channels. The study revealed partial alignments, positive reception of new public transport and inclusive initiatives, alongside significant dissonances in

areas like basic infrastructure (heating, roads) and environmental maintenance where public frustration ran high. The author noted that "institutional narratives often remain one-way and struggle to convince citizens without tangible progress" (Vrabie, 2025). This highlights the gap between strategic planning and lived experience, mediated through social media discourse.

Social Media for Monitoring and Accountability

One of the most significant findings concerns social media's role as a tool for citizen monitoring of infrastructure projects. He and Zhang (2026) employed Natural Language Processing (NLP) to examine sentiment behind opposition to Chinese infrastructure projects across social media platforms between 2022 and 2024. Their analysis of 1.2 million posts from Weibo, WeChat, and online forums found that sentiment peaks in negativity coincided with key protest actions and official statements, while positivity correlated with messages about long-term development advantages. Topic models revealed citizen concerns grouped around displacement, environmental impact, and project planning transparency (He & Zhang, 2026). The study concluded that NLP "offers the promise of real-time understanding of the flow of ideas and opinion among citizens, which policymakers could use to develop strategies to engage with a citizenry and understand their issues and concerns to avoid future conflicts" (He & Zhang, 2026). This finding is echoed in research examining collaborative planning in Chinese cities. Studies on urban regeneration, community garden movements, and environmental protection practices in Beijing, Shanghai, Guangzhou, Shenzhen, and Wuhan have employed social media data analytics and social network analysis to measure power relations generated by social media platforms (Lin & Lu, 2026). Computer-assisted content analysis and statistical analysis have been used to identify factors that drive citizen participation online and onsite, examining the quality of online public spheres and their interaction with offline public spheres to effect collaborative planning (Lin & Lu, 2026).

Research from the European Commission's CoChina project (2025) further explores how collaborative planning has become an effective means to address conflicts of interest in urban renewal and environmental management in China. Social media and digital platforms provide new opportunities for citizens to express their voices, and they are also used by the government as participatory tools (CoChina Project, 2025). The project employs an innovative mixed methods approach combining fieldwork, critical discourse analysis, data mining, computer-assisted content analysis, and social network analysis to research collaborative practices (CoChina Project, 2025). This methodological pluralism provides valuable insights for understanding the role of new digital technologies in collaborative practices for inclusive and sustainable development.

Social Media in Construction Industry Communication and Collaboration

The construction industry has increasingly adopted social media for project communication and collaboration. Oke et al. (2024) empirically assessed both the application areas and the benefits associated with the adoption of social media within the Nigerian construction industry. Their findings indicate that social media can be effectively used in project management, communication, safety management, as well as marketing and branding of AECO projects (Oke et al., 2024). The most significant benefits of using social media in construction activities include building trust and credibility, enhancing crisis communication, and improving project collaboration (Oke et al., 2024).

Oke et al. (2024) further examined the implications of social media for sustainable construction and productivity in Lagos State, Nigeria. Through exploratory factor analysis, five distinct clusters of social media consequences were identified: information and knowledge sharing, community engagement and morale, environmental and resource management, disruptive and stressful effects, and communication and collaboration (Oke et al., 2024). The extent of social media usage was found to be closely related to three key factors: community engagement and morale, environmental and resource management, and communication and collaboration (Oke et al., 2024). This study represents one of the pioneering research efforts in Nigeria to investigate the implications of social media usage in the construction industry (Oke et al., 2024).

Sage Publications (2026) notes that modern technology platforms, from Facebook to YouTube, no longer simply host speech; they actively shape it. Through community standards, algorithms, moderation systems, and enforcement mechanisms, platforms decide what is visible, what is amplified, and what is sanctioned. In doing so, they establish norms of legitimacy and participation that rival, and sometimes exceed, those of traditional public institutions. To a significant extent, platforms now constitute the infrastructure of social, civic, and political experience itself (Sage Publications, 2026). This insight is particularly relevant for understanding how social media platforms are becoming embedded in construction industry practices.

Challenges of social media use

The literature consistently identifies several challenges to effective social media use in infrastructure contexts. These findings align with broader critiques of social media technology. One of these challenges is population bias. Social media users are not representative of the broader population. Katsikas and Gritzalis (2025) note that “political and social bias and the unequal outcomes of their use” constitute significant limitations. This bias disproportionately affects marginalized populations who lack access to digital technologies, reinforcing existing inequalities in political representation. Zhao et al. (2024) argue that while social networks can facilitate non-hierarchical, flat, and collaborative approaches, they often fail to change existing power inequalities between governments and societal actors. A recent study also indicates that the effectiveness of social media in challenging power relations depends on the planning stage at which it is applied (He, 2026). Power inequalities exist within, between, and beyond online networks, and are reflected in community size (Zhao et al., 2024).

The collection and use of citizen data through social media and surveillance technologies also raise significant privacy issues. Janviere (2025) examines how African governments are expanding digital surveillance capabilities, investing in advanced technologies such as spyware, biometric databases, and real-time tracking systems. These tools, mostly imported from foreign companies with little transparency or accountability, are being used in ways that raise serious human rights concerns (Janviere, 2025). In Nigeria, reports indicate that the federal government spent approximately \$2.7 billion on surveillance infrastructure between 2013 and 2022, raising concerns that mass surveillance may be used to “monitor and suppress dissent” (Janviere, 2025). The Nigerian case exemplifies how “the misuse of surveillance technology poses a grave threat to the fundamental

liberties" and how "surveillance being used to suppress free speech and intimidate those who voice dissent" remains a critical concern (Janviere, 2025).

The spread of misinformation and fake news through social media platforms undermines their utility for democratic participation. Katsikas and Gritzalis (2025) emphasize that social media is a conduit for disinformation and political polarization, exacerbating ideological divisions and undermining confidence in democratic institutions. The contribution of social media to participatory democracy is embodied in protests where online activism has mobilized citizens, but its susceptibility to algorithmic bias and paid disinformation campaigns raises grave concerns (Katsikas & Gritzalis, 2025).

In contexts where governments use surveillance to track and punish dissent, citizens may engage in self-censorship, limiting the diversity of perspectives available on social media. A media report from Ethiopia alleges that the government "exerted control over platforms beyond its jurisdiction" through legal complaints, takedown requests, and threatening letters (Business & Human Rights Resource Centre, 2025). Vague laws on cybercrime, terrorism, hate speech, and misinformation are used selectively to "justify censorship, arrests, and intimidation, forcing many media outlets into self-censorship" (Business & Human Rights Resource Centre, 2025). The digital divide problem remains relevant, specifically affecting marginalized communities that lack the technological means necessary for effective participation (Katsikas & Gritzalis, 2025). This bifurcation not only limits engagement in governance but also reinforces inequalities in political representation and decision making (Katsikas & Gritzalis, 2025).

Social media algorithms that amplify extreme content can polarize public discourse, making consensus-building more difficult. Sage Publications (2026) notes that "today's big social media platforms are directly manipulating and polarising public discourse in countries worldwide, and are undermining individual and societal wellbeing." These platforms "were not designed to support informed deliberation or civic trust. They were designed to maximise a primitive form of engagement as measured in clicks and likes, often by amplifying outrage, polarisation, and misinformation" (Sage Publications, 2026).

Theoretical and practical implications of the study

The findings contribute to collaborative planning theory by demonstrating how social media enables both communicative and agonistic approaches. On one hand, social media facilitates rational communication and information sharing, supporting Habermasian ideals of inclusive deliberation. On the other hand, social media also enables the expression of diverse, conflicting positions, supporting agonistic approaches that acknowledge the permanence of conflict (He & Zhang, 2026; Zhao et al., 2024). The concept of "digital public infrastructure" provides a useful framework for understanding social media's role. As Sage Publications (2026) argues, social media platforms have become "default infrastructure for democratic participation," yet they "were not designed to support informed deliberation or civic trust." This tension, between social media as infrastructure and social media as a source of polarization and misinformation, represents a critical challenge for contemporary governance. Li Vigni's (2026) three-dimensional framework for studying digital political platforms offers additional theoretical insight. Platforms can be analyzed

along axes of political governance, software affordances, and infrastructural dependencies, making it possible to assess not only how participation is formally organized, but also how it is encoded in interfaces and materially conditioned by servers (Li Vigni, 2026). This framework helps explain why most platforms remain confined to reinforced forms of consultation, despite participatory rhetoric, because citizen power is limited either by top-down governance, constrained deliberative affordances, or strong infrastructural dependencies (Li Vigni, 2026).

For policymakers and infrastructure professionals, the findings suggest several actionable recommendations: (1) adopt a multi-platform approach as different platforms serve different functions (Oke et al., 2024); (2) address the awareness-adoption gap through training and support (Oke et al., 2024); (3) invest in digital literacy to bridge the digital divide (Katsikas & Gritzalis, 2025; Oludu et al., 2025); (4) establish regulatory frameworks to protect privacy, fight disinformation, and reduce the digital divide (Katsikas & Gritzalis, 2025); (5) integrate digital and traditional participation methods (Zhao et al., 2024); and (6) strengthen institutional linkages between participation and decision-making, expand professional competencies for digital engagement, and redesign participatory processes with explicit attention to power (He, 2026). These steps can support more inclusive, adaptive, and democratic planning in the digital era.

Conclusion

This systematic review has examined social media's multifaceted role in bridging the digital and physical divide in public infrastructure development, monitoring, and citizen engagement. The findings reveal that social media functions as a critical infrastructure asset itself, serving simultaneously as a platform for citizen participation, a mechanism for project transparency and accountability, a site of contestation over environmental and social impacts, and a tool for industry communication and collaboration (Oke et al., 2024; He & Zhang, 2026; Zhao et al., 2024). However, the review also reveals significant challenges that limit social media's effectiveness. Population bias, privacy concerns, information credibility issues, (self-)censorship, and opinion polarization continue to undermine the democratic potential of these platforms (Katsikas & Gritzalis, 2025; Janviere, 2025; Business & Human Rights Resource Centre, 2025). The awareness-adoption gap in the construction industry further suggests that potential benefits are not fully realized (Oke et al., 2024). The theoretical framework provided by collaborative planning theory offers a lens for understanding these dynamics (He & Zhang, 2026; He, 2026). Social media enables both communicative approaches focused on consensus-building and agonistic approaches that acknowledge the permanence of conflict (Zhao et al., 2024). The integration of social media, digital tools, and traditional participation methods can support more inclusive planning processes, but only if challenges are addressed through comprehensive regulatory frameworks, digital literacy investments, and institutional commitment to genuine dialogue. As governments worldwide invest in infrastructure and digital governance, understanding social media's role in bridging the digital and physical divide becomes increasingly critical. This review provides a foundation for that understanding while identifying important directions for future research.

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