

COMMUNITY ENGAGEMENT IN SMART CITY – SMARTPHONE APPLICATIONS ASPECTS

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Purpose: The purpose of this publication is to present the usage of smartphone application in Smart Cities in community engagement.

Design/methodology/approach: Critical literature analysis. Analysis of international literature from main databases and polish literature and legal acts connecting with researched topic.

Findings: The integration of smartphone applications in community engagement within smart cities signifies a transformative paradigm shift, offering a myriad of advantages that redefine residents' interactions and contributions to community development. These applications act as dynamic platforms, utilizing technology to amplify communication, collaboration, and participation, fostering a more connected and empowered citizenry. The benefits encompass immediate access to real-time information, heightened civic participation, participatory decision-making, efficient public services, sustainability promotion, community building, emergency response, education, cultural and recreational engagement, and inclusive accessibility. Nevertheless, the implementation of smartphone applications in community engagement encounters challenges, including digital inequality, privacy concerns, technological literacy limitations, language and cultural barriers, security risks, exclusion of vulnerable groups, and issues related to data accuracy and reliability. To ensure inclusivity, effectiveness, and equity, it is imperative to actively address these challenges, emphasizing social equity considerations and balancing technological innovation with the diverse needs of the entire community. Bridging digital divides, providing education and support, addressing privacy issues, and promoting a balanced approach to technology use are vital steps toward creating truly inclusive and effective community engagement strategies in smart cities. Through thoughtful consideration and proactive measures, smart cities can fully harness the potential of smartphone applications to create vibrant, connected, and resilient urban communities.

Originality/value: Detailed analysis of usage smartphone applications in the case of community engagement.

Keywords: Smart City, energy efficiency, energy efficiency management, smartphone applications, community engagement.

Category of the paper: literature review.

1. Introduction

Community engagement in the context of smart cities has become increasingly crucial in fostering sustainable development and enhancing the quality of life for urban residents. One pivotal aspect of community engagement in smart cities revolves around the utilization of smartphone applications. These applications serve as powerful tools that not only connect individuals with the urban environment but also empower them to actively participate in shaping the future of their communities.

Smartphone applications designed for community engagement in smart cities offer a multifaceted approach to address the diverse needs and preferences of urban residents. These applications provide a platform for citizens to access real-time information about various aspects of city life, ranging from public transportation schedules and traffic conditions to local events and community initiatives. By harnessing the capabilities of smartphones, these applications ensure that residents are well-informed and can make timely decisions that contribute to the efficient functioning of the city (Rahman, Dura, 2022).

The purpose of this publication is to present the usage of smartphone application in Smart Cities in the case of community engagement.

2. The usage of smartphone applications in community engagement

Smartphone applications play a pivotal role in promoting civic participation and collaboration among community members. Through features such as forums, discussion boards, and interactive maps, these applications facilitate communication and information-sharing among residents. This fosters a sense of belonging and collective responsibility, as citizens can engage in open dialogue, voice their opinions, and collaborate on projects that positively impact their neighborhoods.

In the realm of urban planning, smartphone applications contribute significantly to participatory decision-making processes. City planners and policymakers can leverage these applications to gather valuable insights from residents regarding their preferences and priorities. By incorporating citizen input into the decision-making process, smart cities can ensure that urban development initiatives align with the actual needs and aspirations of the community, promoting a more inclusive and responsive approach to governance (Jonek-Kowalska, Wolniak, 2021, 2022; Gajdzik et al., 2023). Furthermore, smartphone applications enhance the efficiency of public services by providing a streamlined interface for residents to report issues and request services. From reporting potholes and streetlight outages to submitting requests for waste management services, these applications empower citizens to actively contribute to the

maintenance and improvement of their urban environment. This real-time feedback mechanism not only expedites the resolution of issues but also strengthens the bond between the city administration and its residents (Herdiansayah, 2023; Rose et al., 2021).

In the context of sustainability, smartphone applications can be instrumental in promoting eco-friendly practices and fostering a culture of environmental consciousness. Users can access information about recycling programs, green spaces, and sustainable transportation options, encouraging them to make more environmentally responsible choices in their daily lives. This aligns with the broader goals of smart cities to create a sustainable and resilient urban environment.

Smartphone applications have emerged as powerful tools in transforming the landscape of community engagement, fostering a dynamic and interactive relationship between residents and their urban environments. These applications serve as catalysts for bridging the gap between citizens and local authorities, providing a myriad of functionalities that enhance communication, collaboration, and participation in shaping the future of communities. One primary facet of smartphone applications in community engagement revolves around the delivery of real-time information. Residents can seamlessly access up-to-date details on public transportation schedules, traffic conditions, local events, and ongoing community initiatives. This immediacy empowers citizens to stay informed and make well-informed decisions, contributing to the efficient functioning of the city.

Civic participation and collaboration are also significantly augmented through these applications. Interactive features such as forums, discussion boards, and interactive maps create virtual spaces for residents to engage in open dialogues, express their opinions, and collaborate on projects. This virtual exchange cultivates a sense of belonging and collective responsibility, strengthening the social fabric of communities. Participatory decision-making is another critical aspect facilitated by smartphone applications. City planners and policymakers leverage these platforms to involve citizens in crucial decisions related to urban planning. Through feedback mechanisms and surveys, residents can actively contribute insights, ensuring that development initiatives align with the actual needs and aspirations of the community (Rachmawati et al., 2021; Dutta et al., 2021; Ivanyi, Biro-Szigeti, 2019).

Efficient public services are enhanced by smartphone applications, as residents can easily report issues and request services through streamlined interfaces. This seamless communication between citizens and city administrations expedites issue resolution, creating a responsive and citizen-centric approach to public service delivery. Smartphone applications play a pivotal role in promoting sustainability by providing information on recycling programs, green spaces, and sustainable transportation options. These applications contribute to building a culture of environmental consciousness, encouraging residents to make eco-friendly choices in their daily lives.

Beyond functionality, these applications act as virtual hubs for community building. By connecting residents and facilitating social interactions, they contribute to the organization of local events, meet-ups, and community initiatives. This virtual engagement strengthens the bonds among community members, fostering a vibrant and closely-knit social fabric. In times of emergencies, smartphone applications contribute to community safety by offering features such as emergency alerts, real-time incident reporting, and location-based services. This aids in effective emergency response coordination and ensures the well-being of residents (Simonofski et al., 2023; Chmielarz et al., 2021).

Smartphone applications also serve as educational tools, promoting awareness about local issues, civic responsibilities, and opportunities for community involvement. By providing valuable information, these applications contribute to an informed and engaged citizenry, fostering a sense of civic duty and responsibility within the community. In showcasing cultural and recreational opportunities, smartphone applications enrich residents' awareness of local offerings, from museums and parks to cultural events. This contributes to a vibrant and culturally enriched community life, enhancing the overall quality of life for residents (Dutta et al., 2019).

Crucially, smartphone applications prioritize inclusive design to ensure accessibility for diverse populations. Features such as voice commands and intuitive interfaces enable broad community engagement, ensuring that everyone, regardless of ability, can actively participate in the benefits of smart city initiatives (Chmielarz et al., 2021).

Table 1 contains descriptions of how smartphone applications are used in community engagement.

Table 1.

How smartphone applications are used in community engagement

Aspect of Environmental Monitoring	Use of Smartphone Applications
Real-time Information Access	Smartphone applications serve as dynamic platforms for delivering real-time information to residents. Users can access up-to-date details on public transportation schedules, current traffic conditions, local events, and ongoing community initiatives. This ensures that citizens stay informed and can make timely decisions based on the latest data.
Civic Participation and Collaboration	These applications feature interactive components such as forums, discussion boards, and interactive maps to facilitate communication and collaboration among community members. Residents can actively engage in open dialogues, express their opinions, and collaborate on various projects that contribute to the betterment of their neighborhoods. This promotes a sense of belonging and collective responsibility within the community.
Participatory Decision-Making	City planners and policymakers leverage smartphone applications to engage citizens in the decision-making processes related to urban planning. These applications often include features that allow residents to provide feedback, share insights, and participate in surveys, ensuring that the development initiatives align with the actual needs and aspirations of the community.
Efficient Public Services	Residents can use smartphone applications to report issues, such as potholes or streetlight outages, and request services like waste management. The streamlined interface provided by these applications enhances communication between citizens and city administrations, leading to faster issue resolution and improved public service delivery.

Cont. table 1.

Sustainability Promotion	Smartphone applications play a crucial role in promoting sustainable practices. They provide information about recycling programs, green spaces, and sustainable transportation options. By raising awareness and encouraging eco-friendly choices, these applications contribute to building a culture of environmental consciousness among users, fostering a more sustainable urban environment.
Community Building and Engagement	These applications act as virtual hubs for community building by connecting residents and fostering social interactions. They often include features that facilitate the organization of local events, meet-ups, and community initiatives. By providing a space for residents to connect and engage, these applications contribute to the creation of vibrant and closely-knit communities.
Emergency Response and Safety	Smartphone applications enhance community safety by incorporating features for emergency alerts, real-time incident reporting, and location-based services. In times of crisis, these applications play a critical role in disseminating information, coordinating emergency responses, and ensuring the safety of residents.
Education and Awareness	Residents can access educational content through these applications, promoting awareness about local issues, civic responsibilities, and opportunities for community involvement. By providing valuable information, these applications contribute to an informed and engaged citizenry, fostering a sense of civic duty and responsibility within the community.
Cultural and Recreational Engagement	Smartphone applications showcase cultural and recreational opportunities within the community, such as museums, parks, and cultural events. By highlighting these aspects, the applications contribute to residents' awareness and participation in the local cultural scene, fostering a vibrant and culturally enriched community life.
Inclusive Accessibility	Smartphone applications prioritize inclusive design to ensure accessibility for diverse populations, including people with disabilities. By incorporating features such as voice commands, screen readers, and intuitive interfaces, these applications enable broad community engagement and participation, ensuring that everyone has equal access to the benefits of smart city initiatives.

Source: (Kalasova et al., 2021; Chmielarz et al., 2021; Rose et al., 2021; Dutta et al., 2019; Ivani, Biro-Szigeti, 2019; Leal et al., 2023; Chowdhury et al., 2023; Sanchez et al., 2018; Aguilera, Boutueil, 2018).

The integration of smartphone applications in community engagement has ushered in a transformative era, offering a multitude of advantages that redefine how residents interact with and contribute to the development of their communities. These applications serve as dynamic platforms that leverage technology to enhance communication, collaboration, and participation, thereby fostering a more connected and empowered citizenry. One notable advantage is the immediate access to real-time information. Smartphone applications provide residents with instant updates on public transportation schedules, traffic conditions, local events, and community initiatives. This ensures that individuals stay well-informed, enabling timely decision-making and contributing to a more efficient and responsive urban environment.

Enhanced civic participation is another significant benefit. These applications create interactive spaces, such as forums and discussion boards, where residents can actively engage in open dialogues, express their opinions, and collaborate on community projects. The result is a strengthened sense of belonging and shared responsibility, as citizens become more involved in shaping the future of their neighborhoods. Participatory decision-making is facilitated through smartphone applications, allowing city planners and policymakers to involve citizens in crucial processes related to urban planning. Through feedback mechanisms, surveys, and interactive features, residents can contribute valuable insights, ensuring that development initiatives align with the actual needs and aspirations of the community (Boichuk, 2020).

Efficient public services are achieved as residents can easily report issues and request services through streamlined interfaces. This seamless communication between citizens and city administrations expedites issue resolution, creating a more responsive and citizen-centric approach to public service delivery. Smartphone applications also play a pivotal role in promoting sustainability. By providing information on recycling programs, green spaces, and sustainable transportation options, these applications encourage residents to make eco-friendly choices in their daily lives, contributing to a culture of environmental consciousness within the community (Kalasova et al., 2021).

Community building and engagement are significantly enriched through smartphone applications, acting as virtual hubs that connect residents and facilitate social interactions. Features promoting local events and initiatives contribute to the creation of vibrant and closely-knit communities, fostering a sense of unity among residents. In times of emergencies, these applications contribute to community safety. With features for emergency alerts, real-time incident reporting, and location-based services, they play a crucial role in disseminating information and coordinating effective emergency responses, ensuring the well-being of residents.

Educationally, residents can access valuable content through these applications, promoting awareness about local issues, civic responsibilities, and opportunities for community involvement. This contributes to an informed and engaged citizenry, fostering a sense of civic duty and responsibility within the community. Moreover, smartphone applications showcase cultural and recreational opportunities within the community, enhancing residents' awareness of local offerings such as museums and events. This contributes to a more vibrant and culturally enriched community life, enhancing the overall quality of life for residents.

Crucially, these applications prioritize inclusive design, ensuring accessibility for diverse populations. Features such as voice commands and intuitive interfaces enable broad community engagement, allowing everyone, regardless of ability, to actively participate in the benefits of smart city initiatives.

Table 2 highlighting the advantages of using smartphone applications in community engagement within smart cities. Using smartphone applications in community engagement provides a multifaceted array of advantages, ranging from immediate access to information and enhanced civic participation to inclusive accessibility and the promotion of sustainable practices. These applications play a pivotal role in shaping modern urban living by fostering connectivity, collaboration, and informed decision-making within communities.

Table 2.*Advantages of using smartphone applications in community engagement*

Advantage	Description
Real-time Information Access	Smartphone applications provide residents with instant access to real-time information, including public transportation schedules, traffic conditions, local events, and community initiatives, ensuring timely decision-making and enhanced urban navigation.
Enhanced Civic Participation	These applications create interactive spaces such as forums and discussion boards, fostering increased civic participation. Residents can engage in open dialogues, express opinions, and collaborate on community projects, promoting a sense of belonging and shared responsibility.
Participatory Decision-Making	Smartphone applications facilitate citizen involvement in decision-making processes related to urban planning. City planners and policymakers can gather insights through feedback mechanisms, surveys, and interactive features, ensuring development aligns with community needs.
Efficient Public Services	Residents can report issues and request services through streamlined interfaces, improving communication between citizens and city administrations. This expedites issue resolution and enhances the overall efficiency of public service delivery.
Promotion of Sustainability	These applications contribute to the promotion of sustainable practices by providing information on recycling programs, green spaces, and sustainable transportation options. Residents are encouraged to make eco-friendly choices, fostering a culture of environmental consciousness.
Community Building and Engagement	Smartphone applications serve as virtual hubs for community building, connecting residents and facilitating social interactions. Through features promoting local events and initiatives, these applications contribute to the creation of vibrant and closely-knit communities.
Emergency Response and Safety	Applications with features for emergency alerts, real-time incident reporting, and location-based services enhance community safety. In times of crisis, these tools play a crucial role in disseminating information and coordinating effective emergency responses.
Education and Awareness	Residents can access educational content, promoting awareness about local issues, civic responsibilities, and opportunities for community involvement. These applications contribute to an informed and engaged citizenry, fostering civic duty within the community.
Cultural and Recreational Engagement	Smartphone applications showcase cultural and recreational opportunities, such as museums and events, enhancing residents' awareness and participation in the local cultural scene. This contributes to a more vibrant and culturally enriched community life.
Inclusive Accessibility	Applications prioritize inclusive design, ensuring accessibility for diverse populations. Features such as voice commands and intuitive interfaces enable broad community engagement, allowing everyone, regardless of ability, to participate in smart city initiatives.

Source: (Kalasova et al., 2021; Chmielarz et al., 2021; Rose et al., 2021; Dutta et al., 2019; Ivani, Biro-Szigeti, 2019; Leal et al., 2023; Chowdhury et al., 2023; Sanchez et al., 2018; Aguilera, Boutueil, 2018).

While smartphone applications have become integral to community engagement strategies in smart cities, their implementation is not without challenges. These problems, if not effectively addressed, can hinder the effectiveness and inclusivity of community initiatives, potentially leaving certain segments of the population marginalized. The prevalence of smartphone applications assumes universal access to smartphones and reliable internet connectivity. However, digital inequality persists, leaving some residents without the necessary tools to participate in community engagement efforts. This divide can disproportionately affect marginalized communities, contributing to disparities in civic participation.

The collection and utilization of personal data through community engagement applications raise significant privacy concerns. Residents may be wary of sharing personal information, fearing potential misuse or unauthorized access. Balancing the need for data-driven insights with robust privacy measures is crucial to foster trust. Not all residents possess the same level of technological literacy, and some individuals, particularly older demographics, may face challenges in navigating and utilizing smartphone applications effectively. Designing interfaces with user-friendly features and providing educational support can help address this issue.

Language diversity and cultural differences can pose barriers to effective communication through smartphone applications. If these applications do not cater to multiple languages and cultural nuances, certain groups may feel excluded, hindering the goal of inclusive community engagement. Language diversity and cultural differences can pose barriers to effective communication through smartphone applications. If these applications do not cater to multiple languages and cultural nuances, certain groups may feel excluded, hindering the goal of inclusive community engagement.

Vulnerable populations, such as those experiencing homelessness or individuals with limited access to technology, may find themselves excluded from community engagement efforts that rely heavily on smartphone applications. Ensuring alternative methods of participation is essential for inclusivity. The accuracy and reliability of data presented through smartphone applications are critical for informed decision-making. Inaccurate or outdated information may lead to misguided community initiatives, emphasizing the need for continuous monitoring and verification of data sources.

An overreliance on smartphone applications may inadvertently exclude residents who prefer traditional communication methods or are not comfortable with extensive technology use. Striking a balance between digital and analog engagement methods is essential to reach diverse segments of the population. Inadequate accessibility features within smartphone applications can create barriers for individuals with disabilities. Ensuring that these applications adhere to accessibility standards is crucial to accommodate users with varying abilities (Benevolo et al., 2016; Kalasova et al., 2021).

Socioeconomic disparities, including disparities in access to smartphones and internet services, can perpetuate inequalities in community engagement. Bridging these gaps requires targeted efforts to provide access and support to underserved communities. Some residents may resist the transition to digital community engagement, preferring traditional methods. Overcoming resistance involves effective communication about the benefits of smartphone applications and addressing concerns regarding the shift towards technology-driven engagement (Boichuk, 2020).

Recognizing and actively mitigating these challenges is essential for creating truly inclusive and effective community engagement strategies within the context of smart cities. Balancing technological innovation with social equity considerations ensures that the benefits of smartphone applications are accessible to all residents (Dutta et al., 2019).

Table 3 highlighting some of the common problems and challenges associated with the usage of smartphone applications in community engagement within smart cities. While smartphone applications offer numerous benefits for community engagement in smart cities, it's crucial to acknowledge and address these challenges to ensure that such initiatives are inclusive, secure, and effectively cater to the diverse needs of the entire community.

Table 3.

Problems of using smartphone applications in community engagement within smart cities

Problem	Description
Digital Inequality	Not all residents may have access to smartphones or the internet, leading to digital inequality. This can exclude certain demographics from participating in community engagement activities through smartphone applications.
Privacy Concerns	The collection of personal data by smartphone applications raises privacy concerns among users. Residents may be hesitant to engage with these applications due to uncertainties about the handling and security of their information.
Limited Technological Literacy	Some residents, particularly older or less tech-savvy individuals, may face challenges in using smartphone applications effectively. Limited technological literacy can hinder widespread adoption and engagement with these tools.
Language and Cultural Barriers	Language and cultural differences can pose barriers to effective community engagement through smartphone applications. Applications may not cater to diverse linguistic or cultural needs, limiting accessibility for certain segments of the population.
Security Risks and Cyber Threats	Smartphone applications can be vulnerable to security risks and cyber threats, potentially exposing users' personal information. Concerns about data breaches or malicious activities may discourage residents from actively participating in community engagement through these platforms.
Exclusion of Vulnerable Groups	Vulnerable or marginalized groups, such as those experiencing homelessness or individuals with limited access to technology, may be excluded from community engagement initiatives reliant on smartphone applications. Ensuring inclusivity becomes a significant challenge.
Data Accuracy and Reliability	The accuracy and reliability of data presented through smartphone applications can be a concern. Inaccurate information may lead to misinformed decision-making and erode trust in the effectiveness of these applications for community engagement.
Overreliance on Technology	A heavy reliance on smartphone applications for community engagement may exclude residents who prefer traditional methods of communication or lack the inclination to use technology extensively. Striking a balance between digital and non-digital engagement is crucial.
Limited Accessibility Features	Insufficient accessibility features can hinder the use of smartphone applications by individuals with disabilities. Inadequate accommodations for varying abilities may limit the inclusivity of community engagement efforts through these platforms.
Socioeconomic Disparities	Socioeconomic disparities may impact the availability and quality of smartphones and internet access within certain communities. This can exacerbate existing inequalities, hindering equitable participation in community engagement initiatives relying on smartphone applications.
Resistance to Change	Some residents may resist the shift towards digital community engagement, preferring traditional methods. Resistance to change poses a challenge in encouraging widespread adoption of smartphone applications as primary tools for community interaction and participation.

Source: (Kalasova et al., 2021; Chmielarz et al., 2021; Rose et al., 2021; Dutta et al., 2019; Ivani, Biro-Szigeti, 2019; Leal et al., 2023; Chowdhury et al., 2023; Sanchez et al., 2018; Aguilera, Boutueil, 2018).

3. Conclusion

The integration of smartphone applications in community engagement within smart cities represents a transformative shift, offering a multitude of advantages that redefine how residents interact with and contribute to the development of their communities. These applications serve as dynamic platforms, leveraging technology to enhance communication, collaboration, and participation, thereby fostering a more connected and empowered citizenry. Immediate access to real-time information, enhanced civic participation, participatory decision-making, efficient public services, sustainability promotion, community building, emergency response and safety, education and awareness, cultural and recreational engagement, and inclusive accessibility are among the key benefits highlighted in this discourse. However, the implementation of smartphone applications in community engagement is not without challenges. Digital inequality, privacy concerns, limited technological literacy, language and cultural barriers, security risks, exclusion of vulnerable groups, data accuracy and reliability, overreliance on technology, limited accessibility features, socioeconomic disparities, and resistance to change are significant hurdles that, if not effectively addressed, can hinder the inclusivity, effectiveness, and equity of community initiatives. It is crucial to recognize and actively mitigate these challenges to ensure that the advantages of smartphone applications are accessible to all residents.

The evolution of community engagement strategies within smart cities must prioritize social equity considerations, balancing technological innovation with the diverse needs of the entire community. Bridging digital divides, addressing privacy issues, providing technological education and support, catering to linguistic and cultural diversity, enhancing security measures, ensuring inclusivity for vulnerable populations, verifying data accuracy, promoting a balanced approach to technology use, prioritizing accessibility features, addressing socioeconomic disparities, and effectively communicating the benefits of digital engagement are key steps toward creating truly inclusive and effective community engagement strategies within the context of smart cities. Through thoughtful consideration and proactive measures, smart cities can harness the full potential of smartphone applications to create vibrant, connected, and resilient urban communities.

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