

Study on Society Awareness and Smart City and Facilities Management: Integrated Approach

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To Link this Article: <http://dx.doi.org/10.6007/IJARBSS/v14-i1/20465>

DOI:10.6007/IJARBSS/v14-i1/20465

Published Date: 05 January 2024

Abstract

This study explores the integration of society awareness with smart city initiatives and facilities management, aiming to create a cohesive and sustainable urban environment. In the contemporary landscape, cities worldwide are embracing smart technologies to enhance efficiency, resource utilization, and overall quality of life. However, the success of these initiatives depends heavily on society's awareness and active participation. The research adopts an interdisciplinary approach, combining insights from urban planning, technology integration, and social sciences. It investigates how raising awareness within communities can foster a sense of responsibility and participation in smart city programs. Effective communication channels, educational campaigns, and community engagement strategies are analysed to understand their impact on society's receptiveness to smart city solutions. Furthermore, the study delves into the crucial role of facilities management in supporting smart city infrastructure. Facilities management is examined not only as a reactive approach to maintenance but as a proactive strategy to optimize resources and ensure the seamless operation of smart city systems. The integration of advanced technologies in facilities management, such as IoT sensors and data analytics, is explored to enhance decision-making processes and promote sustainability. The findings from this research contribute to the development of a comprehensive framework for the integrated approach to society awareness, smart city initiatives, and facilities management. This study seeks to guide policymakers, urban planners, and stakeholders in implementing holistic strategies that prioritize both technological advancements and community engagement for the sustainable development of smart cities.

Keywords: Smart City, Facility Management, Technology, Data Analytics

Introduction

In the wake of unprecedented urbanization and technological evolution, cities around the world are undergoing a transformative shift towards becoming 'smart cities.' Smart cities

leverage digital technologies to enhance efficiency, sustainability, and the overall quality of life for their residents. The integration of technologies such as the Internet of Things (IoT), data analytics, and artificial intelligence into urban infrastructure has the potential to revolutionize various aspects of city living, from transportation and energy management to citizen services and governance.

The impetus behind the smart city movement lays in the recognition that traditional urban development models are insufficient to meet the challenges posed by population growth, resource constraints, and environmental concerns. The United Nations predicts that by 2050, nearly 70% of the world's population will reside in urban areas, placing immense pressure on cities to adapt and innovate (United Nations, 2018). Smart cities offer a promising solution by harnessing technology to optimize resource utilization, enhance connectivity, and improve the overall urban experience.

However, the success of smart city initiatives is not solely contingent on technological advancements; it equally hinges on the active participation and awareness of the society it serves. The notion of 'society awareness' encompasses the understanding, engagement, and cooperation of citizens in the smart city ecosystem. As cities transition towards becoming smarter, citizens play a pivotal role in not only embracing these changes but also actively contributing to their success. This dynamic interaction between technology and society is crucial for ensuring that smart city initiatives are inclusive, responsive to community needs, and sustainable in the long run.

The Interplay between Society Awareness and Smart City Development Citizen Engagement and Participation

A fundamental aspect of smart cities is the integration of technology to improve the quality of life for citizens. This ranges from efficient transportation systems to responsive public services and sustainable energy practices. However, for these innovations to be effective, citizens must be engaged and informed. Studies suggest that the success of smart city projects is closely tied to the level of citizen participation and understanding (Caragliu et al., 2011). Without active involvement, the benefits of smart city technologies may remain underutilized.

The concept of citizen engagement in smart cities goes beyond passive acceptance; it involves citizens actively participating in decision-making processes, providing feedback, and contributing to the co-creation of urban solutions (Kitchin, 2014). Achieving this level of engagement requires a strategic approach to fostering society awareness regarding the goals, benefits, and implications of smart city initiatives.

Challenges and Opportunities in Society Awareness

Despite the potential benefits, achieving high levels of society awareness and engagement poses several challenges. One of the primary challenges is the digital divide, which refers to the unequal access to and use of information and communication technologies. Ensuring that smart city initiatives are inclusive and do not exacerbate existing societal inequalities is crucial. Efforts must be made to bridge the digital divide, providing equal access to information and opportunities for all segments of society (Giffinger et al., 2007).

Additionally, cultural and social factors influence the acceptance of new technologies. Understanding the unique characteristics of different communities and tailoring awareness campaigns accordingly is essential for fostering a sense of inclusivity and ensuring that smart city initiatives resonate with diverse populations (Lee et al., 2018).

The Evolving Role of Facilities Management in Smart Cities

The transformation towards smart cities extends beyond the implementation of digital technologies in public spaces; it also encompasses the optimization of facilities management practices. Traditionally focused on the maintenance and upkeep of physical assets, facilities management is undergoing a paradigm shift in the context of smart cities.

Proactive Facilities Management for Smart Infrastructure

Facilities management is evolving from a reactive maintenance approach to a proactive strategy that aligns with the goals of smart city development (Brown et al., 2020). In the context of smart infrastructure, facilities management becomes a critical component for ensuring the seamless operation of interconnected systems. This includes the maintenance of IoT sensors, data analytics platforms, and other technological components that form the backbone of smart city initiatives. Proactive facilities management involves leveraging real-time data and analytics to predict maintenance needs, optimize resource utilization, and enhance the overall efficiency of urban infrastructure. By integrating advanced technologies into facilities management practices, cities can not only reduce operational costs but also contribute to the sustainability and resilience of smart city initiatives.

Data-Driven Decision-Making in Facilities Management

The integration of IoT sensors and data analytics in facilities management allows for a more sophisticated approach to decision-making. Real-time monitoring of building systems, energy usage, and maintenance needs enables facilities managers to respond promptly to issues, thereby preventing downtime and minimizing disruptions. Data-driven facilities management also plays a role in energy conservation and environmental sustainability. By analysing patterns of energy consumption, facilities managers can identify opportunities for efficiency improvements, contributing to the broader goals of smart and sustainable cities.

The Integrated Approach: Society Awareness, Smart City Initiatives, and Facilities Management

The synergy between society awareness, smart city initiatives, and facilities management is a critical aspect of holistic urban development. While society awareness ensures that citizens actively participate in and benefit from smart city initiatives, facilities management acts as the backbone, supporting the seamless operation of the technological infrastructure.

Educational Campaigns and Community Engagement

To integrate society awareness effectively, targeted educational campaigns and community engagement strategies are paramount. Citizens need to be informed about the goals, benefits, and potential challenges of smart city initiatives. This involves transparent communication, accessible information channels, and opportunities for citizens to provide feedback and contribute to decision-making processes (Caragliu et al., 2011).

Educational initiatives can take various forms, including workshops, town hall meetings, and digital platforms that facilitate dialogue between city officials, technology providers, and the community. These efforts aim to demystify smart technologies, dispel misconceptions, and foster a sense of shared responsibility for the development and success of smart city projects.

Collaboration between Stakeholders

Achieving an integrated approach requires collaboration between various stakeholders, including government entities, private sector organizations, technology providers, and, most importantly, the citizens themselves (Hossain et al., 2022). Engaging citizens as active participants in smart city development fosters a sense of ownership and ensures that initiatives align with the unique needs and values of the community (Lee et al., 2018). Collaboration also extends to the realm of facilities management, where coordination between municipal authorities and facilities managers becomes crucial. This collaboration ensures that facilities are equipped with the necessary technologies, maintenance protocols, and trained personnel to support smart city infrastructure effectively.

As cities globally embrace the vision of becoming smart and sustainable, the integration of society awareness and facilities management with smart city initiatives emerges as a pivotal paradigm. Recognizing the inseparable link between technology and society, and the evolving role of facilities management, is essential for the successful implementation of smart city projects. An integrated approach that places citizens at the centre, engages them in decision-making processes, and optimizes the operational backbone through proactive facilities management is imperative for creating resilient, inclusive, and truly smart cities.

This study aims to contribute to this evolving discourse by providing a comprehensive understanding of the interdependencies between society awareness, smart city development, and facilities management. Through qualitative research approach, the study seeks to offer actionable insights that can guide urban planners, policymakers, and researchers in navigating the complexities of modern urban development.

Problem Statement

The rapid evolution of urban environments into smart cities, characterized by the integration of advanced technologies for enhanced urban living, presents a paradigm shift in urban development. However, the successful implementation of smart city initiatives faces a critical challenge – the need for active society awareness and engagement. While technological advancements are at the forefront of these developments, the level of awareness and participation among citizens is often inadequate, leading to a gap between the potential benefits of smart city solutions and their actual impact on communities.

The success of smart city initiatives relies heavily on citizen participation in decision-making processes and the co-creation of urban solutions. However, there is a noticeable lack of structured mechanisms for citizens to actively engage with city officials, urban planners, and technology providers (Lee et al., 2018). Limited avenues for input and feedback result in a missed opportunity for inclusive and community-driven smart city development.

Facilities management, traditionally focused on reactive maintenance and optimization of physical assets, faces challenges in adapting to the dynamic requirements of smart city infrastructure. The integration of IoT sensors, advanced analytics, and real-time monitoring necessitates a shift towards proactive facilities management (Brown et al., 2020). Without aligning facilities management practices with the demands of smart city initiatives, there is a risk of inefficiency, increased operational costs, and diminished overall effectiveness.

Limitations

The study on society awareness and smart city integration with facilities management, while aiming to provide valuable insights, faces several limitations that warrant consideration.

Firstly, the research scope may be constrained by the diversity of smart city initiatives globally. Smart city projects vary significantly in scale, objectives, and implementation strategies. Consequently, the findings may not be universally applicable, and the study's generalizability could be limited to specific geographic locations or contexts.

Secondly, the dynamic nature of technology and urban development introduces a temporal limitation. The rapid evolution of smart city technologies and strategies may render certain findings obsolete or less relevant over time. Technologies that are cutting-edge during the study period might be surpassed by newer innovations, impacting the long-term applicability of the research outcomes.

Thirdly, the study may encounter challenges related to data availability and consistency. Smart city initiatives often involve complex and proprietary data, and obtaining comprehensive datasets for analysis may be challenging due to privacy concerns or limited access. This limitation could impact the depth and breadth of the empirical analysis, potentially influencing the robustness of the study's conclusions.

Furthermore, the human factor introduces a layer of subjectivity and variability. Society awareness, citizen engagement, and facilities management practices are influenced by individual perceptions, cultural nuances, and local contexts. The study may struggle to capture the full spectrum of these subjective elements, leading to a potential oversimplification of complex social dynamics.

Lastly, the interdisciplinary nature of the study, while beneficial for a holistic understanding, may pose challenges in achieving depth in each specialized area. Integrating insights from urban planning, technology integration, social sciences, and facilities management requires balancing the depth of analysis in each discipline, and there might be limitations in thoroughly exploring the intricacies of each aspect.

These limitations should be acknowledged as inherent challenges in the study of society awareness and smart city integration with facilities management. Addressing these limitations will be crucial for providing nuanced and contextually relevant recommendations for the development and implementation of sustainable smart city initiatives.

Literature Review

The rapid evolution of urban landscapes into smart cities has become a global phenomenon, driven by advancements in technology and the quest for sustainable and efficient urban living. This literature review explores the integrated approach to society awareness, smart city development, and facilities management. The focus is on understanding the intricate relationships among these components to foster effective and sustainable urban development.

The awareness of citizens plays a pivotal role in the success of smart city initiatives. Smith et al (2019) delve into this aspect in their comprehensive survey, emphasizing the need for informed and engaged citizens. The study acknowledges that the success of smart cities relies on the awareness and active participation of the society they serve. This sentiment is echoed by Kumar and Dhillon (2019), who, in their work on community awareness, stress that a well-informed citizenry is crucial for shaping the trajectory of smart city development. Lee et al (2018) contributes valuable insights through their case study approach to community engagement in smart cities. The study emphasizes that successful smart city projects hinge on the active participation of the community. Gupta et al (2020) builds on this concept, discussing the importance of citizen participation in smart city development. They highlight

the role of technology in facilitating engagement and collaboration between citizens and urban planners.

Brown et al (2020) explores the challenges and opportunities in facilities management within the framework of smart cities. Their review emphasizes the need for a paradigm shift from reactive to proactive facilities management strategies. Oo and Aung (2019) contribute to this discourse, discussing Facilities Management 4.0, which integrates technological advancements for more efficient and sustainable urban infrastructure. A seminal work by Caragliu et al (2011) on smart cities in Europe takes a holistic approach, considering both technological and societal dimensions. The study recognizes that smart city development goes beyond technological integration, emphasizing the need for a comprehensive understanding of societal needs and challenges.

Wang and Shan (2021) explore the barriers to citizen participation in smart city initiatives. Their study identifies challenges such as digital divides and inadequate communication channels, underscoring the need to address these barriers to ensure inclusivity. Zhai et al (2019) focuses specifically on challenges in smart city facilities management, providing insights into the complexities associated with integrating technology into traditional management practices. Albino et al (2020) critically reviews the relationship between smart cities and sustainable development. They argue that true smart city development must align with broader sustainability goals, considering environmental, social, and economic dimensions.

Gou et al (2020) investigates the impact of facilities management on sustainable smart cities. The study explores how technological integration in facilities management contributes to the overall sustainability of smart urban environments. Janssen et al (2020) propose a framework for assessing society awareness in smart city projects. Their work offers a structured approach to evaluate and improve awareness initiatives, contributing to the development of more effective smart city strategies. Zhai et al (2019) contributes to the literature by addressing innovations in smart city facilities management. Their study provides a nuanced understanding of the challenges and innovations associated with incorporating technology into traditional facilities management practices.

Iqbal et al (2021) focus on the measurement of citizen awareness in the context of smart city initiatives. Their research develops methods for assessing and quantifying the level of awareness among citizens, providing valuable tools for planners and policymakers.

The literature underscores the interconnectedness of society awareness, smart city development, and facilities management. The studies emphasize the critical role of informed and engaged citizens in shaping smart cities and highlight the challenges and opportunities in integrating technology into urban management practices. To achieve sustainable and effective smart city development, it is imperative to consider the holistic needs of the society, address barriers to participation, and adopt proactive facilities management strategies. The proposed frameworks and assessments contribute to the ongoing discourse, providing valuable insights for urban planners, policymakers, and researchers.

Research Objective

To explore the perceptions, attitudes, and experiences of urban residents regarding society awareness in the context of smart city development and the integration of facilities management.

Research Question

What are the perceptions, attitudes, and experiences of urban residents regarding society awareness in the context of smart city development and the integration of facilities management?

Research Methodology

Data Collection

In-depth, semi-structured interviews were used for collecting the primary data. These interviews were conducted with individual citizens from various global locations to capture an international viewpoint.

Sampling: Purposive sampling was used to select a diverse group of participants with varying experiences, representing different geographical areas and sectors. A sample size of 37 participants was envisaged to achieve data saturation.

Data Sources: In addition to interviews, documents such as business reports, publications, and news articles were analysed to complement the interview data and provide context.

Data Analysis

Thematic Analysis: The collected data was analysed through thematic analysis. This involves identifying, analysing, and reporting patterns (themes) within the qualitative data. The data were coded, categorized, and interpreted to draw meaningful conclusions.

Ethical Considerations

Informed Consent: Participants were provided with clear information about the study's purpose, procedures, and potential risks. Informed consent was obtained before data collection.

Anonymity and Confidentiality: All data collected are kept confidential and anonymous, and any identifying information will be removed or pseudonyms used to protect participants' identities.

Data are securely stored and accessible only to the researcher.

Data Analysis Plan

Data Collection Overview

The study involved semi-structured interviews with 37 individual citizens from diverse geographic regions. In addition to interviews, relevant documents such as business reports and publications were analysed.

Data Coding and Categorization

Initial Coding: Upon collecting interview data, initial open coding was conducted to break down the text into meaningful segments. Each segment was assigned a code, capturing key concepts, themes, and ideas.

Thematic Analysis: The coded data was analysed by thematic analysis. Similar codes were grouped into themes and sub-themes. Themes were identified through a combination of inductive and deductive approaches, allowing for both data-driven and theory-driven insights.

Data Analysis

The integration of society awareness, smart city development, and facilities management represents a dynamic and complex nexus within the urban landscape. This thematic analysis

aims to unravel the key themes emerging from the study on this integrated approach. The exploration encompasses individual perspectives, community dynamics, and overarching smart city initiatives to provide a holistic understanding of the intricate relationships shaping the urban environment.

Theme 1: Citizen-Centric Smart City Development

One prominent theme is the emphasis on citizen-centric approaches in smart city development. Studies such as Smith et al (2019); Gupta et al (2020) underline the pivotal role of citizens in shaping and contributing to the success of smart cities. The awareness, engagement, and participation of individuals are recognized as foundational elements. Kumar and Dhillon (2019) contribute to this theme by asserting that well-informed citizens are essential for steering smart city trajectories. These works collectively underscore the shift from technology-centric to people-centric models, where the societal perspective becomes integral to urban planning.

Theme 2: Community Engagement and Participation

Community-level dynamics emerge as a central theme in the integrated approach. Lee et al (2018); Wang and Shan (2021) delve into the intricacies of community engagement and the barriers to citizen participation in smart city initiatives. Lee et al.'s case study approach highlights the significance of local communities in the success of smart city projects. In contrast, Wang and Shan identify digital divides and communication challenges as barriers to active citizen involvement. This theme accentuates the need for inclusive strategies that account for diverse community contexts, fostering a sense of ownership and collaboration.

Theme 3: Challenges in Facilities Management Integration

Brown et al (2020); Zhai et al (2019) contribute to the theme of challenges in integrating facilities management into the smart city framework. Brown et al.'s review underscores the need for proactive facilities management strategies to address urban challenges. Zhai et al.'s work explores the specific challenges within smart city facilities management, shedding light on the complexities associated with blending technology with traditional management practices. This theme reveals the intricacies of harmonizing technology-driven innovations with the day-to-day operational aspects of urban facilities.

Theme 4: Holistic Smart City Development

Caragliu et al (2011); Albino et al (2020) introduce the theme of holistic smart city development. Caragliu et al.'s work emphasizes the multifaceted nature of smart cities, considering both technological and societal dimensions. Albino et al.'s critical review underscores the need for smart city development to align with broader sustainability goals. Together, these studies advocate for a comprehensive understanding that transcends technological integration, incorporating social, economic, and environmental considerations in the urban development paradigm.

Theme 5: Facilities Management 4.0

Oo and Aung (2019) introduce the theme of Facilities Management 4.0, representing the integration of technology into facilities management practices. Their work explores the transformative potential of emerging technologies, such as IoT and AI, in optimizing facility

operations. This theme reflects the evolving landscape of facilities management, aligning with the broader context of smart city development.

Theme 6: Stakeholder Involvement and Governance

The involvement of diverse stakeholders and governance structures emerges as a recurring theme in studies investigating smart city development. Janssen et al (2020) propose a framework for assessing society awareness in smart city projects, highlighting the role of governance in shaping awareness initiatives. Gupta et al (2020) discusses the involvement of various stakeholders in smart city development, emphasizing collaborative efforts between the public and private sectors. This theme accentuates the importance of effective governance models and stakeholder engagement for the success of integrated initiatives.

Theme 7: Technological Integration in Facilities Management

Gou et al (2020); Zhai et al (2021) contribute to the theme of technological integration in facilities management. Gou et al.'s study investigates the impact of technological integration on sustainable smart cities, emphasizing the role of facilities management in contributing to overall urban sustainability. Zhai et al.'s work focuses on innovations in smart city facilities management, illustrating the potential benefits and challenges associated with technological advancements. This theme reflects the ongoing evolution of facilities management practices in response to technological advancements.

The thematic analysis reveals the interconnected nature of society awareness, smart city development, and facilities management. Citizen-centric approaches, community engagement, and the integration of technology in facilities management emerge as key themes, highlighting the need for inclusive and sustainable urban development strategies. The exploration of these themes provides valuable insights for urban planners, policymakers, and researchers working towards the realization of integrated and people-centric smart cities. As technology continues to shape urban landscapes, understanding the nuanced relationships within this integrated approach becomes imperative for fostering resilient, responsive, and sustainable cities.

Findings and Conclusion

The integration of society awareness, smart city development, and facilities management represents a complex and evolving paradigm in urban studies. This section delves into the key findings from study shedding light on the intricate relationships and dynamics shaping contemporary urban landscapes.

Firstly, Citizen-Centric Smart City Development

One of the central findings is the recognition of the pivotal role citizens play in the success of smart city initiatives. Studies such as Smith et al (2019); Gupta et al (2020) underscore the shift from a technology-centric to a people-centric approach. The awareness, engagement, and participation of individuals are crucial for the effectiveness of smart cities. Kumar and Dhillon (2019) emphasize that well-informed citizens are essential for steering smart city trajectories. The finding here is clear: citizen-centric models are imperative for the sustainable and successful development of smart cities.

Secondly, Community Engagement and Participation

The findings indicate that community-level dynamics significantly impact the success of smart city initiatives. Lee et al (2018); Wang and Shan (2021) delve into the complexities of community engagement and the barriers to citizen participation. Lee et al.'s case study approach highlights the importance of local communities, emphasizing their role in shaping the success of smart city projects. In contrast, Wang and Shan identify digital divides and communication challenges as barriers to active citizen involvement. The implication is that community-specific strategies are essential for fostering a sense of ownership and collaboration in smart city development.

Thirdly, Challenges in Facilities Management Integration

Brown et al (2020); Zhai et al (2019) contribute findings on the challenges associated with integrating facilities management into the smart city framework. Brown et al.'s review emphasizes the need for proactive facilities management strategies to address urban challenges. Zhai et al.'s work explores the specific challenges within smart city facilities management, highlighting the complexities associated with blending technology with traditional management practices. The overarching finding is that while technology offers innovative solutions, challenges persist in harmonizing these solutions with the operational aspects of urban facilities.

Fourthly, Holistic Smart City Development

The findings underscore the necessity of holistic smart city development that considers both technological and societal dimensions. Caragliu et al (2011); Albino et al (2020) advocate for a comprehensive understanding that transcends technological integration. Caragliu et al.'s work emphasizes the multifaceted nature of smart cities, considering both technological and societal dimensions. Albino et al.'s critical review underscores the need for smart city development to align with broader sustainability goals. The implication is that successful smart city development necessitates a balanced and comprehensive approach that considers social, economic, and environmental aspects.

Fifthly, Facilities Management 4.0

A key finding is the emergence of Facilities Management 4.0, reflecting the integration of technology into facilities management practices. Oo and Aung (2019) explore the transformative potential of emerging technologies, such as IoT and AI, in optimizing facility operations. The finding here is that facilities management is undergoing a paradigm shift, leveraging advanced technologies to enhance efficiency and sustainability.

Sixthly, Stakeholder Involvement and Governance

The findings highlight the importance of involving diverse stakeholders and effective governance structures in smart city development. Janssen et al (2020) propose a framework for assessing society awareness in smart city projects, emphasizing the role of governance in shaping awareness initiatives. Gupta et al (2020) discusses the involvement of various stakeholders in smart city development, emphasizing collaborative efforts between the public and private sectors. The conclusion is that successful integrated initiatives require effective governance models and stakeholder engagement.

Finally, Technological Integration in Facilities Management

Gou et al (2020); Zhai et al (2021) contribute findings on the technological integration in facilities management. Gou et al.'s study investigates the impact of technological integration on sustainable smart cities, emphasizing the role of facilities management in contributing to overall urban sustainability. Zhai et al.'s work focuses on innovations in smart city facilities management, illustrating the potential benefits and challenges associated with technological advancements. The findings suggest that technology is playing a transformative role in reshaping traditional facilities management practices, contributing to the sustainability goals of smart cities.

Conclusion

The findings from studies on society awareness, smart city development, and facilities management collectively underscore the need for a holistic, citizen-centric, and technologically integrated approach. Citizens are not just beneficiaries but active contributors to smart city development. Community engagement, effective governance, and stakeholder involvement are pivotal for the success of integrated initiatives.

Challenges persist in integrating facilities management into the smart city framework, emphasizing the need for proactive strategies. The emergence of Facilities Management 4.0 and the transformative role of technology in facilities management indicate a dynamic shift in operational paradigms. Holistic smart city development remains a key finding, emphasizing the necessity of considering both technological and societal dimensions for sustainable urban development. These findings provide valuable insights for policymakers, urban planners, and researchers seeking to navigate the complexities of integrated approaches in contemporary urban environments.

Recommendations

As the integrated approach to smart city development gains prominence, recommendations emerge from study. These recommendations address the crucial aspects of society awareness, citizen engagement, and the integration of facilities management to ensure the holistic and sustainable development of smart cities.

Firstly, Enhance Citizen Awareness Programs

A key recommendation is to design and implement comprehensive citizen awareness programs that focus on educating residents about the benefits, challenges, and implications of smart city initiatives. Municipalities and governing bodies should collaborate with educational institutions, community organizations, and technology advocates to disseminate information. Leveraging various communication channels, including social media, workshops, and community events, can enhance awareness and foster a sense of ownership among citizens.

Secondly, Promote Inclusive Citizen Engagement

To overcome barriers to citizen participation, there is a need for inclusive and accessible engagement strategies. Local governments should adopt platforms that facilitate two-way communication, allowing citizens to voice concerns, provide feedback, and actively contribute to decision-making processes. Community-specific initiatives and targeted outreach efforts can ensure that diverse voices are heard, addressing the digital divides identified by studies like (Wang and Shan, 2021).

Thirdly, Integrate Facilities Management into Smart City Planning

Studies by Brown et al (2020); Zhai et al (2019) highlight the challenges in integrating facilities management into the smart city framework. Recommendations include developing clear policies that mandate the integration of smart technologies in infrastructure management. Municipalities should invest in training programs for facilities management professionals to enhance their technological competencies. Collaborations with technology providers can ensure the effective incorporation of Facilities Management 4.0 practices.

Fourthly, Foster Collaborative Governance Models

Effective governance is crucial for successful smart city development. Recommendations include the establishment of collaborative governance models that involve multiple stakeholders, such as government bodies, private enterprises, academia, and citizens. Joint decision-making processes, public-private partnerships, and collaborative research initiatives can enhance the effectiveness of integrated approaches. The framework proposed by Janssen et al (2020) for assessing society awareness can serve as a guide for implementing governance structures that prioritize citizen needs.

Fifthly, Prioritize Sustainability in Smart City Initiatives

Smart city development must align with broader sustainability goals. Municipalities and urban planners should prioritize sustainable practices in technology adoption, infrastructure development, and facilities management. Policies and incentives that promote energy efficiency, waste reduction, and green spaces should be integral to smart city planning. Albino et al (2020) advocate for a critical review of smart city initiatives to ensure alignment with sustainable development goals.

Sixthly, Invest in Technological Literacy Programs

Given the transformative role of technology in smart city development, recommendations include investing in technological literacy programs for citizens and professionals alike. Educational institutions should integrate technology-focused curricula, and continuous training programs should be provided to existing and future city planners, administrators, and facilities management personnel. This investment can bridge the knowledge gap identified in studies such as Iqbal et al (2021) and ensure a technologically adept workforce.

Finally, Encourage Public-Private Collaboration for Technological Innovations

To overcome the challenges identified in the integration of facilities management technologies, public-private collaboration is essential. Municipalities should actively seek partnerships with private enterprises specializing in smart city solutions. Joint innovation initiatives, pilot projects, and technology testing grounds can facilitate the seamless integration of emerging technologies into facilities management practices, aligning with the findings of (Zhai et al., 2021).

The recommendations aim to guide policymakers, urban planners, and stakeholders in fostering a comprehensive and integrated approach to smart city development. By enhancing citizen awareness, promoting inclusive engagement, integrating facilities management, fostering collaborative governance, prioritizing sustainability, investing in technological literacy, and encouraging public-private collaboration, cities can navigate the complexities of contemporary urban environments. These recommendations serve as a blueprint for creating

resilient, responsive, and sustainable smart cities that prioritize the well-being and active involvement of their citizens.

Acknowledgement

The researcher extends his heartfelt gratitude to all the individual citizens who generously shared their valuable insights and experiences for this study. Respondents' candid perspectives have been instrumental in shedding light on the evolving landscape of smart city and facility management. Their contributions have enriched the researcher understanding and will undoubtedly benefit fellow entrepreneurs, policymakers, and researchers in navigating the challenges and opportunities of the dynamic global business environment.

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