

MIXED METHOD ANALYSIS ON DREAM OF SMART URBANISM

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Abstract

The rapid pace of global urbanization has intensified the need for innovative solutions that enhance the livability, sustainability, and governance of cities. This study investigates the evolving landscape of smart urbanism by exploring how digital technologies—such as IoT, AI, and big data—are integrated into urban systems to address growing challenges. Adopting a mixed-method research design, the study combines quantitative surveys and qualitative interviews across global smart cities to capture citizen perceptions, technological impacts, and governance implications. NVivo software is employed for thematic analysis of qualitative data, revealing dominant themes such as convenience, digital access, mobility, and trust in technology. Findings highlight both the opportunities and challenges of smart urbanism, including issues of digital inclusion, data security, and institutional readiness. The study offers practical insights for policymakers, urban planners, and technologists aiming to implement citizen-centric, inclusive, and sustainable smart city strategies.

Keywords: Smart Urbanism, Digital Technologies, Urban Governance, IoT, Citizen Participation, Digital Inclusion

I. INTRODUCTION

The rapid growth of urban populations worldwide has intensified the demand for more convenient, efficient, and technology-driven living environments. This phenomenon has given rise to the concept of smart urbanism, where digital innovations are integrated into urban infrastructure to enhance sustainability, governance, mobility, and quality of life. Smart urbanism encompasses various technological interventions, including the Internet of Things (IoT), artificial intelligence (AI), big data analytics, and smart governance systems. However, despite its potential, the implementation and effectiveness of smart urbanism remain complex and require further empirical investigation.

A. Problem Statement

The increasing global population has resulted in urban expansion, straining existing infrastructure and resources. As cities become more densely populated, the need for convenience in daily living—such as efficient transportation, energy management, and digital governance—has become a priority. Technology plays a crucial role in addressing these urban challenges, yet the extent to which smart urban solutions contribute to sustainable and livable cities remains insufficiently explored. Moreover, the perspectives of urban residents, policymakers, and stakeholders on smart urbanism initiatives require deeper examination to understand their adoption, challenges, and effectiveness.

B. Research Approach

To address this issue, this study adopts a mixed-method research approach, combining qualita-

tive and quantitative data to provide a comprehensive analysis of smart urbanism. A survey will be conducted to gather statistical insights into public perception, needs, and challenges associated with smart urban solutions. Simultaneously, qualitative data will be collected through interviews and open-ended responses to capture deeper insights into lived experiences, policy effectiveness, and technological integration. NVivo software will be utilized for qualitative data analysis, enabling pattern recognition and thematic categorization. The mixed-method approach ensures a holistic understanding of smart urbanism's impact, facilitating informed decision-making for urban planners and policymakers.

II. LITERATURE REVIEW

A. Smart Urbanism: Concept and Evolution

Smart urbanism refers to the integration of technology, data analytics, and digital innovations to improve urban living, sustainability, and governance [1]. The concept is rooted in the application of smart technologies, such as the Internet of Things (IoT), big data, and artificial intelligence (AI), to enhance city operations, including energy management, transportation, and public services [2]. Smart urbanism is often aligned with the broader goals of sustainable urban development, aiming to optimize resource usage while ensuring economic growth and social inclusivity [3].

B. The Role of Technology in Urban Development

Technological advancements play a crucial role in addressing the challenges posed by rapid urbanization. Digital governance, smart transportation systems, and IoT-enabled infrastructure contribute to the efficiency of urban environments. For instance, AI-driven traffic management systems have significantly reduced congestion in major smart cities, such as Singapore and Barcelona [4]. Additionally, digital platforms and citizen engagement tools have improved participatory governance, allowing residents to contribute to urban planning and decision-making processes [5].

C. Challenges in Smart Urbanism

Despite its potential benefits, the implementation of smart urbanism faces several challenges, including technological limitations, governance issues, and social acceptance [6]. Privacy concerns related to data

collection and surveillance remain a major issue, with citizens often expressing skepticism about data security in smart cities [7]. Moreover, the digital divide—where certain populations lack access to smart technologies—can exacerbate social inequalities, making smart urban solutions less inclusive [8]. Effective governance and policy interventions are necessary to ensure that smart urban initiatives benefit all socio-economic groups.

D. Mixed-Method Research in Urban Studies

A mixed-method approach, combining both qualitative and quantitative research, has been increasingly utilized to study urban development and smart technologies [9]. While quantitative surveys help analyze large-scale trends in urban technology adoption, qualitative insights provide deeper understandings of user experiences and policy implications [10]. NVivo software has been widely used in urban studies to conduct thematic analysis and organize qualitative data efficiently [11]. Applying this mixed-method framework allows for a comprehensive assessment of smart urbanism and its impact on modern cities.

III. MATERIAL AND METHOD

A. Research Design

This study employs a mixed-methods research design [12], combining both quantitative and qualitative approaches to provide a comprehensive analysis of smart urbanism. The mixed-method approach allows for statistical insights through surveys while also capturing in-depth perspectives via qualitative data collection. Quantitative data will be gathered through structured surveys, while qualitative data will be collected using semi-structured interviews and open-ended survey responses.

B. Research Location

The study focuses on major cities worldwide, where smart urbanism initiatives have been implemented or are under consideration. These cities include, but are not limited to, New York, London, Singapore, Tokyo, Dubai, Amsterdam, Shanghai, and Barcelona. These locations were selected based on their level of urbanization, adoption of smart technologies, and diverse governance models. This global scope ensures a comprehensive understanding of smart urbanism in different socio-economic and technological contexts.

C. Research Participants

The study targets experts from academia, industry, and government sectors who are actively involved in urban planning, smart city initiatives, and technology development [13]. The participant categories include:

- **Academics and Researchers:** Experts in urban planning, smart city technologies, data analytics, and policy research.
- **Industry Professionals:** Engineers, IT specialists, smart city consultants, and urban infrastructure developers.
- **Government Officials and Policymakers:** City planners, municipal authorities, and government representatives responsible for urban development policies.

Participants will be selected based on purposive sampling, ensuring that individuals with relevant expertise contribute to the study.

D. Data Collection Methods

1. Quantitative Data Collection

A structured online survey will be distributed to collect large-scale data on perspectives [14], adoption rates, challenges, and expectations of smart urbanism. The survey will include Likert-scale questions, multiple-choice questions, and ranking-based assessments to analyze trends and general opinions quantitatively.

2. Qualitative Data Collection

For in-depth insights, semi-structured interviews will be conducted with a subset of experts. Open-ended survey responses will also be analyzed to capture expert opinions, experiences, and policy recommendations. Interviews will be conducted via video conferencing or email-based questionnaires to ensure global participation.

E. Data Analysis

- **Quantitative Analysis:** The survey data will be analyzed using statistical tools, including descriptive statistics, correlation analysis, and regression modeling, to identify trends and relationships between smart urbanism adoption and influencing factors.
- **Qualitative Analysis:** Thematic analysis will be performed using NVivo software, which will help categorize and identify patterns in expert opinions. This approach ensures that both nu-

merical trends and qualitative insights are systematically analyzed for a holistic understanding of smart urbanism.

E. Ethical Considerations

The study will ensure ethical research practices, including:

- **Informed consent** from all participants before data collection.
- **Anonymity and confidentiality** of responses to protect participant identities.
- **Compliance** with research ethics guidelines from relevant institutions and organizations.

III. RESULT AND DISCUSSION

A. Preparing Data for Analysis

Qualitative data can be obtained from structured questionnaires that the value presented with numbers. The data can be processed using Microsoft Excel, SPSS, and other quantitative data software. Qualitative data like a transcription of data and importing data files into Nvivo are the first steps for the review's method with Nvivo [15]. Transcription can range from using a primary audio player and word processing software to more specialized transcription software,

Respondent:

- **Name:** James Wu
- **Profession:** Industry
- **City:** Hong Kong
- **Country:** China

Question 1: What aspects of urban living that many people find appealing include?

- **Convenience:** Easy access to amenities and services.
- **Career Opportunities:** Availability of diverse job markets and professional growth.
- **Social Life:** Vibrant social settings with opportunities for community engagement.

Question 2: What ways do you currently use digital technologies to navigate or enhance your urban living experience?

- **Public Transportation Apps:** For efficient and timely travel.
- **Food Delivery Apps:** Convenient access to a variety of cuisines.
- **Smart Home Devices:** Enhancing comfort and energy efficiency at home.

Question 3: What do you understand by the term "smart city"?

- **Quality of Life:** Enhancing urban living standards through technology.
- **Sustainability:** Balancing development with environmental care.
- **Infrastructure Management:** Efficient use of resources to improve city functionality.

Question 4: What are your hopes or expectations for the future of urban living?

- **Equitable Access to Resources:** Ensuring fairness in resource distribution.
- **Green Spaces:** Preserving nature within urban areas.
- **Healthy and Active Lifestyles:** Promoting well-being through urban design and initiatives.

Figure 1. Questionnaire form

It becomes a faster process for more experienced transcribers, and transcription software often helps speed up the process. Still, it may take two to three hours to transcribe one hour of the interview with transcription software. While open-ended survey questions should be formatted for use in NVivo easily. No default format exists, but every researcher has a comfortable style, as shown in Figure 1.

Google Forms is a popular tool for creating online surveys. Researchers can design their survey questionnaire using various question types, such as multiple-choice, Likert scale, open-ended text, and more. Participants respond to the survey questions online, providing both quantitative (numerical) and qualitative (text-based) responses. The questionnaires are designed as follows:

1. How would you describe your overall satisfaction with your current urban environment? (Scale from 1 - Very low to 5 - Very high)
2. How big challenges you face in your current urban environment? (Scale from 1 - Very low to 5 - Very high)

3. How often do you utilize digital technologies (smartphones, IoT devices, etc.) in your daily life? (Scale from 1 - Low to 5 - Very high)
4. How do you believe that digital technologies shaping the future of urban living? (Scale from 1 - Low to 5 - Very high)

5. How are you familiar with the concept of “smart cities”? (Scale from 1 - Low to 5 - Very high)
6. How do you believe smart city initiatives can address the challenges faced by urban environments effectively? (Scale from 1 - Low to 5 - Very high)

7. How do you think digital technologies will transform urban environments in the next decade? (Scale from 1 - Low to 5 - Very high)
8. How do you believe citizens should play in shaping the future of smart cities? (Scale from 1 - Low to 5 - Very high)

9. How would you be interested in participating in future discussions or events related to digital urbanism and smart cities? (Scale from 1 - Low to 5 - Very high)

Thematic analysis is a method for analyzing qualitative data that entails searching across a data set to identify, analyze, and report repeated patterns (Braun & Clarke, 2006). It is a method for describing data but also involves interpretation in selecting codes and constructing themes. A distinguishing feature of thematic analysis is its flexibility to be used within a wide range of theoretical and frameworks and applied to a wide range of study questions, designs, and sample sizes.

The word cloud generated from the survey, processed using NVivo, highlights the dominant words reflecting dominant concepts and priorities discussed by participants. Here's an exploration of the meaning behind these dominant words:

This study centers on the experiences of urban living, focusing on the intricacies of daily life, the challenges faced, and the aspirations shaped by urban environments. It highlights how participants perceive cities as dynamic ecosystems that significantly impact



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their quality of life, social connections, and daily routines, illustrating the complex interplay between individuals and the ever-evolving urban landscapes they inhabit.

2. Smart

This concept refers to “smart cities,” where advanced technology is seamlessly integrated into urban systems to improve efficiency, sustainability, and the overall quality of life. It suggests that participants are not only aware of but also interested in how cities are evolving to become more intelligent and responsive, driven by innovation that enhances both daily living and the management of urban spaces.

3. Technology

This highlights the transformative role of digital tools and systems in reshaping urban spaces and lifestyles. It suggests that participants recognize technologies such as apps, the Internet of Things (IoT), and Artificial Intelligence (AI) as key enablers of modern urban convenience and efficiency, driving improvements in how people interact with their environment, access services, and navigate daily life in increasingly connected cities.

4. Digital

This represents the pervasive influence of digitalization in urban living, impacting everything from communication to transportation and beyond. It indicates a shift toward virtual and online solutions that facilitate navigating city life, accessing essential services, and engaging with urban culture. As technology continues to shape how residents experience and interact with their cities, digital platforms and tools are becoming integral to everyday activities, creating a more connected and efficient urban environment.

5. Access

This represents the pervasive influence of digitalization in urban living, impacting everything from communication to transportation and beyond. It indicates a shift toward virtual and online solutions that facilitate navigating city life, accessing essential services, and engaging with urban culture. As technology continues to shape how residents experience and interact with their cities, digital platforms and tools are becoming integral to everyday activities, creating a more connected and efficient urban environment.

6. Convenience

This emphasizes the value participants place on the ease of living, whether achieved through digital tools, thoughtful urban design, or proximity to essential services. It suggests that convenience is a key factor in defining the attractiveness of urban environments, as residents seek efficient, accessible solutions that enhance their daily lives. From seamless digital interactions to well-planned spaces, convenience plays a crucial role in shaping how individuals experience and evaluate the quality of life in cities.

7. Transportation

This highlights the critical role of mobility in shaping urban experiences, with participants increasingly relying on apps and digital tools to navigate their cities efficiently. It reflects the growing need for smart transportation systems that not only reduce congestion but also improve accessibility and enhance sustainability. As urban populations grow, these technologies become essential in creating more efficient, connected, and environmentally friendly cities, ensuring that residents can move freely while minimizing the impact on the environment.

IV. CONCLUSION

The word cloud generated from the survey, processed using NVivo, highlights the dominant themes and priorities that shape contemporary urban living. These key terms—Living, Smart, Technology, Digital, Access, Convenience, and Transportation—reflect participants’ perspectives on the evolving nature of cities and the role of technology in enhancing urban experiences.

The concept of Living underscores how cities function as dynamic ecosystems that shape daily life, social interactions, and overall well-being. The prominence of Smart reflects growing awareness and interest in the transformation of urban spaces through advanced technologies that improve efficiency and sustainability. The emphasis on Technology and Digital highlights the increasing reliance on digital tools, IoT, and AI in reshaping how people navigate and engage with urban environments.

The terms Access and Convenience illustrate the importance of seamless urban experiences, where digitalization and urban design converge to enhance daily life. Participants express a clear preference for efficient, accessible solutions that improve

mobility, service delivery, and overall quality of life. Finally, Transportation emerges as a crucial theme, emphasizing the role of smart mobility solutions in addressing congestion, sustainability, and urban accessibility.

Overall, the findings indicate that smart urbanism is driven by the integration of technology to improve quality of life, efficiency, and accessibility. As cities continue to evolve, urban planners, policymakers, and technology developers must consider these priorities to create inclusive, innovative, and sustainable urban environments. The insights from this study contribute to the broader discourse on smart urbanism, offering valuable perspectives that can inform future city planning and digital transformation strategies worldwide.

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