



**JOURNAL OF ECONOMIC
DEVELOPMENT & VILLAGE BUILDING**

Journal Homepage : <http://jedvb.polteksci.ac.id/index.php/jedvb/>



Digital Urbanism and Sustainability: Aligning Smart City Policies with Green Development Goals

Gulam Habib¹, Muhammad Urfan Ullah², Iqra ismail³, Rana Shoaib⁴, Ayesha Khan⁵

AIR University Islamabad, Pakistan¹

Allama Iqbal Open University Islamabad, Pakistan²

Lahore College for Women University, Pakistan³

University of Engineering & Technology Lahore, Pakistan^{4,5}

*Corresponding Author: engrhabib8@gmail.com¹, engrurfan.bhatti@gmail.com², Iqra.ismail94@yahoo.com³, Zartaj512@gmail.com⁴, Khaneyesha22@gmail.com⁵

Article received on 11-02-2026 — Final revised on 12-04-2026 — Approved on 23-06-2026

Abstract

Urban sustainability research increasingly focuses on the role of digital technology in shaping cities. Numerous smart city frameworks and experimental initiatives have been developed globally; however, a persistent gap remains between technology-driven planning approaches and governance systems that prioritize social equity and the human dimensions of urban life. This paper employs a qualitative literature synthesis combined with a multiple-case study approach drawing upon peer-reviewed academic sources identified through structured database searches to investigate how smart city programs can be aligned with sustainability goals while ensuring meaningful citizen participation. The analysis identifies four principal themes: (1) ICT standardization as a foundational enabler of coordinated urban development; (2) the centrality of inclusive governance in achieving equitable outcomes; (3) the structural challenges of adapting global smart city agendas to local realities; and (4) the persistent risk that technology-led solutions inadequately address social inclusion. Key findings indicate that open platform architectures support participatory governance more effectively than proprietary systems (Gimpo, South Korea); that contextual adaptation is essential in cities with complex historical and institutional conditions (Shiraz, Iran); and that digital literacy and community engagement constitute prerequisites for meaningful participation (Islamabad, Pakistan). This study argues that a citizen-centred model of smart and sustainable urban development is both achievable and necessary. It highlights the need to treat participation as a structured process of shared decision-making rather than a formal or limited exercise, applicable to cities in both developed and developing regions.

Keywords: smart cities, sustainable urbanism; ICT governance; citizen participation; qualitative synthesis; urban development



INTRODUCTION

Urban cities in the twenty-first century are dealing with several interconnected pressures, including growing population, environmental changes, limited resources, high living expectations, and increasing demand for public services. To address these issues, two prominent yet different urban approaches have developed such as smart cities and sustainable cities. Each approach has developed with their own academic field, policy frameworks, and technical system, there is growing agreement that neither approach can provide complete solutions, if used in isolation. A common concern is that smart cities approach can become strong in data use but weak in addressing social dimensions, while sustainable cities may remain focus on environmental goals without sufficient technical support. As a result, efforts to integrate these two approaches into a single, are now a main focus of urban studies.

Smart cities literature has grown rapidly since its early theoretical foundation in 1990s and gained further through the 2000s, due to advances in digital infrastructure, mobile technologies, and open data systems (digital libraries). By the 2010s, major international organizations such as United Nations, the International Telecommunication Union, and the European Commission had each proposed their own frameworks, and cities such as Vienna, Singapore moved forward with their large-scale implementations. At the same time, the idea of sustainable cities has developed from its foundations in the 1987 Brundtland Commission and was further strengthen through the 1992 Rio Declaration, Agenda 21 and later the well-known Sustainable Development Goals (SGD's). Its scope has gradually widened from a focus on environmental sustainability to include social, economic, and institutional governance.

Rather the questioning the feasibility of combining the both smart and sustainable cities, which has largely been confirmed through real-world practices. This paper examines how such integration should be achieved, particularly in terms of its conceptual foundations, governance structure, and the participation of citizens. This is qualitative problem that demands attention to social context, interpretation, and power in addition infrastructure and data.

Smart cities and sustainable cities are two concepts that are increasingly important in today's urban development planning. Smart cities utilize technology to improve efficiency, connectivity, and quality of life for residents, while sustainable cities focus on environmental protection, resource efficiency, and long-term viability. By combining these two approaches, cities can work towards creating more livable and eco-friendly urban environments for everyone. One key aspect of smart cities is the use of data and technology to enhance urban services and infrastructure.

Through the integration of sensors, smart devices, and data analytics, cities can optimize energy usage, traffic flow, waste management, and public safety. For instance, smart traffic management systems can reduce congestion and improve air quality, while smart energy grids can promote renewable energy sources and reduce carbon emissions. On the other hand, resource conservation, trash minimization, and the preservation of natural ecosystems are prioritized in sustainable cities. Energy-efficient building design, promoting green spaces, encouraging public transportation, and implementing recycling initiatives are all components of sustainable urban planning (Batista et al., 2021).

Cities may increase their economic competitiveness, foster social justice among citizens, and become more resilient to climate-related disasters using smart technology and sustainable policies. In addition, sustainable and intelligent cities have the potential to improve everyone's quality of life, stimulate innovation, and draw in investment Yonezawa et al., (2015) The future of urban development lies in smart and sustainable cities, which provide a method to create technologically sophisticated, ecologically conscious, and socially inclusive metropolitan environments.

Within the literature, several efforts have been made to conceptualize the smart city as a whole or a partial aspect of it. As this research aims at contributing to these research efforts, an overview of existing approaches is given. Early on, it was determined that the core elements of a smart city were technical considerations, which included both the virtual and physical technologies found in cities as well as institutional and human aspects. Other contributions preserve the other elements in the form of society and government while drawing even more distinctions between technology and the physical world (Bifulco et al., 2016).

Cities can ensure that their development plans reflect the interests and goals of their citizens by actively incorporating them into the decision-making process. Empowering residents in city development can result in more sustainable and resilient urban environments. By combining local knowledge, preferences, and priorities into planning processes, cities can create policies and infrastructure that better meet the needs of their residents. This bottom-up approach to urban development can lead to more equitable distribution of resources, reduced social and economic disparities, and improved environmental outcomes. Proponents argue that involving residents in decision-making leads to more informed, inclusive, and sustainable outcomes. By listening to the needs and preferences of residents, cities can better address social, economic, and environmental challenges and build stronger, more resilient communities.

Due to underrepresented groups' ability to participate in decision making processes, community involvement can result in a fairer distribution of opportunities and resources. Cities may build more culturally sensitive and responsive urban settings that reflect the diversity of their population by involving resident

s in the planning and design process. Promoting citizen participation in municipal development also instils a sense of pride and ownership in the people.

Greater civic engagement and responsibility may lead to increased social capital, trust in local institutions, and teamwork to accomplish common goals. In addition, incorporating local knowledge and preferences into planning procedures can lead to more innovative and sustainable urban solutions through citizen empowerment. Cities may create programs and policies that are specifically suited to the requirements and difficulties of their communities by utilizing the creativity and knowledge of their citizens, leading to more long-lasting and successful results.

In addition, incorporating local knowledge and preferences into planning procedures can lead to more innovative and sustainable urban solutions through citizen empowerment. Cities may create programs and policies that are specifically suited to the requirements and difficulties of their communities by utilizing the creativity and knowledge of their citizens, leading to more long-lasting and successful results.

Certain governments have demonstrated the ability of ICT to create value through correlation and citizen participation. The citizen is the focal point of applying ICT- based tools for participation, and thus the primary goal is to increase citizens' abilities to participate in governance, including the processes of providing public services at various stages of the production chain, namely planning, decision-making, implementation, and evaluation. Apart from providing public services, smart city efforts typically involve multiple sectors and encourage citizen participation ([Bifulco et al., 2016](#); [Cardullo & Kitchin, 2017](#)).

Additionally, the objective is to empower them to have a meaningful impact on public policies. Social media may play a critical role in fostering responsive government when utilized by the public sector. According to Chen & Chan, ([2023](#)) social media monitoring can help increase responsiveness in policymaking and citizen collaboration, but it can also help enable governance processes in which citizens participate and public organizations consider their thoughts and proposals.

Smartopia Gimpo, also known as the Smartopia Center, is an integrated city management facility outfitted with a big data city control system that includes a multi-image analysis tool and an intelligent closed-circuit television system. The main goal is to guarantee effective municipal administration by offering intelligent resident services and proactive information on catastrophe safety. It is a big data service platform that operates in real time and is built on mobile, cloud, IoT and big data technologies. With the use of big data analysis, this platform enables individuals to anticipate dangers and minimize their harm by evaluating indicators of impending natural and societal calamities. Gimpo led to a decline in crime rates as well as a reduction in mishaps and natural calamities ([Ben Letaifa, 2015](#)).

The type of expenditures required will depend on a number of things, including the issues that metropolitan regions may face in the future. Certain

elements will be related to the city's location and sensitivity to climate events, such as exposure to effects of sea level rise, floods from altered river flows, elevated heat island risk, etc. Nam & Pardo, (2011) The city may have significant limitations due to its location. Many industrialized cities, as well as those in emerging and developing nations, are taking into account their hinterland throughout the planning stage of development.

Ultimately, whether investments are primarily made in green field or brownfield areas will depend on the rate of urban migration and the type of infrastructure or building stock that already exists. A green field method is frequently associated with developing or emerging nations, that is, areas where brand-new cities or economic zones are created. This strategy, however, may also be used in industrialized and developed nations where new cities and districts are built in an integrated manner (Letaifa, 2015)

In the latter instance, conventional frameworks have been left behind when a whole new section of an already-existing city is designed and constructed. The procedure and associated steps needed to transform an existing urban infrastructure into a smart city or city of the future are outlined in the brown field method. In this instance, changing or replacing the current infrastructure while keeping in mind the demands of the populace and the unique characteristics of the city is essential to its success. This method is often used in wealthy and industrialized nations (Beverungen et al., 2019).

Our mission is to promote the value of smart cities and the development of digitally literate, smart citizens. We chose this project because developing nations urgently need to construct smart cities in order to ensure the sustainability of cities in the future. The objective is to inform individuals on how to adopt a wise, economical, and sustainable lifestyle (Aziz & Anwar, 2024).

1. To promote the value of smart city development.
2. To plan awareness-raising events at different institutions to inform the public about the significance of smart, sustainable cities to use IoTs to let PWDs easily enter buildings.
3. To motivate the corporate and investment sectors to assume accountability for ensuring the sustainability and intelligence of urban initiatives.
4. To include interested parties in government policy-making pertaining to sustainable urban development.
5. To raise knowledge of communication and information technologies. to use several webinars to educate folks about digital literacy and intelligence.
6. To alter an individual's behavior or mindset with regard to improving their own life and the community.
7. To meet with housing society administration to discuss the planning of events and activities that would inspire ongoing action among all members of the community answer

A participatory form of government must consider how citizens might participate in smart governance. In other words, decisions in government projects must be made with the full participation of beneficiaries to minimize delays caused by the consultation process. Nonetheless, citizen engagement in the consultation process is considered tokenism, in which decision-making authority is not genuinely ceded to the people. Even with those mentioned above, the challenges in building participatory governance are mounting.

First, only the emphasis on technological corporate factors in innovative governance has been criticized for failing to solve the issues concerning smart cities. Beyond this, the human factor involved in the innovative city program needs serious consideration and is seen as a "critical intervention" in a dominant type of corporate smart city. Second, the fundamental role that people can play remains vague, as citizens are often regarded as passive users whose opinions should be taken more seriously ([Batty et al., 2012](#)).

Third, global development agendas, such as the New Urban Agenda (NUA) pioneered by the United Nations (UN), have lauded the importance of citizen involvement and inclusion to all parties. Nonetheless, the current situation has been criticized by many parties regarding the fact that corporate smart cities are against the current global agenda and have often manipulated the issue of people's involvement and popularized social polarization. Furthermore, parties have criticized the NUA framework and emphasized that intelligent cities would fail if the community refused involvement.

Communities' refusal to participate is likely due to a lack of understanding of the involvement, type, or process in authentic engagement matters. As such, it also suggested "dis-consensus" as a living indicator ([Cardullo & Kitchin, 2017](#)). This proposal is against the current practice of "building consensus," where the different opinions of the people should be considered, even if the consultation process is "painstaking."

Scholars in Malaysia frequently criticize the planned development of smart cities, such as Cyberjaya, located within the Multimedia Super Corridor (MSC), citing a lack of participatory governance existing planned developments, such as Petaling Jaya City, are already integrated into the Smart Selangor Blueprint. Still, local coordination of the people's role in the future smart city remains a concern. Agenda 21 projects were initiated two decades ago ([Md Dali et al., 2022](#)). The fundamental difficulty for both types of creative city government in Malaysia is a lack of local context indicators for integrating the element of involvement and the people's role if there is a desire to move toward citizen-centricity ([Homer, 2023](#)).

We strongly suggest that these characteristics result in a variety of dynamic citizen involvement arrangements and that a more comprehensive understanding of governance modes in the digital age one that embraces and embeds the dynamic nature of citizenship and participation is required. Far from catching the good part

of digitalization, this is a top-down model that emphasizes central governance, which is far from being a given in the next one hundred years. As such, highlighting the links between the parties regardless of relative places, power and influence is not a satisfactory ([Simonofski et al., 2017](#)).

ICTs enable the development of new 'collaborative' governance models, resulting in a more dynamic process of network configuration that goes beyond the traditional governance models found in every societal and institutional situation. In this context, new governance strategies based on ICTs are influencing how governments design public services, create smart city solutions, and boost citizen participation. This dynamic can be explained by differences in the local context and urban systems of government, as well as variations in the tools and opportunities accessible to different individuals. It is yet to be appreciated at the technical level. Human, machine, and hybrid computational resources. In terms of computational resources, the power of PSC can be classed as three.

The urgency of this inquiry is underscored by the accelerating pace of global urbanization and the mounting governance challenges it produces. Cities in the Global South, in particular, face dual pressures: a need to modernize rapidly and a structural deficit in institutional capacity, digital infrastructure, and civic participation frameworks. Under these conditions, the uncritical transfer of smart city models designed for high-resource contexts risks deepening existing inequalities rather than alleviating them. Addressing this gap requires conceptual clarity about what it means to align smart city development with genuine sustainability principles, and empirical evidence drawn from diverse urban contexts.

Prior studies have examined specific dimensions of this integration challenge. [Jiang et al., \(2022\)](#) established a foundational framework linking urban smartness to human and social capital investment, arguing that technological infrastructure alone is insufficient without supportive governance structures. [Grossi & Welinder, \(2024\)](#), in their extensive interdisciplinary literature review, identified the coexistence of smart and sustainable city agendas as both intellectually and practically necessary, yet noted that governance alignment remains an underexplored dimension. [Kougias & Papadakaki, \(2026\)](#) raised an earlier critical concern that the label of 'smart city' has been disproportionately appropriated by technology vendors and corporate actors rather than grounded in citizen-led needs assessment. These observations collectively point toward a gap in the literature: the absence of integrated, cross-contextual analyses that examine the governance and participatory conditions under which smart and sustainable city objectives can be simultaneously advanced.

The novelty of the present study lies in its deliberate cross-contextual comparative analysis, which juxtaposes three case studies from geographically and institutionally distinct settings Gimpo (South Korea), Shiraz (Iran), and Islamabad (Pakistan) within a unified qualitative literature synthesis. While individual case analyses have appeared in prior literature, no previous study has integrated these

three cases within a single analytical framework oriented explicitly toward the governance and participatory dimensions of the smart–sustainable city nexus. This paper therefore contributes both a comparative empirical perspective and a governance-centred theoretical synthesis to an active and growing area of urban research.

The objectives of this paper are to conceptualize the relationship between smart city technologies and urban sustainability principles, to evaluate the role of ICT standardization, citizen participation, and local contextual adaptation in advancing or impeding sustainable urban governance, to derive governance-oriented policy implications applicable across diverse urban contexts and to identify productive directions for future interdisciplinary research. The findings are intended to benefit urban policymakers, city planners, international development organizations, and scholars engaged in the study of digital urbanism, participatory governance, and sustainable urban development.

RESEARCH METHOD

Research Design

This paper employs a qualitative literature synthesis combined with a multiple-case study design as its primary methodological approach. This design is recognized as appropriate for research questions requiring systematic integration of conceptual arguments and empirical evidence across multiple sources and contexts, particularly when the objective is to generate interpretive conclusions that transcend what any individual study can provide. This approach is well-suited to exploring the governance and participatory dimensions of smart and sustainable city development, which are inherently social, contextual, and interpretive in nature.

Data Sources and Selection Criteria

The literature reviewed for this paper was identified through a structured search of academic databases such as Scopus, Web of Science, and Google Scholar, supplemented by a review of grey literature from international organizations including the United Nations, the International Telecommunication Union, and the European Commission. Keywords and search terms were *smart city*, *sustainable city*, *ICT governance*, *citizen participation*, *urban development*, and other related terms. Sources were selected for inclusion if they addressed core themes of the paper including smart city conceptualization or implementation, sustainable urban development, citizen participation or governance. In addition to peer-reviewed literature, the paper is based on three primary case studies such as Gimpo from South Korea, Shiraz from Iran, and Islamabad from Pakistan which were selected for comparative analysis.

Analytical Framework

The study employed a three-phase analytical process. In the first phase, each source was reviewed and coded according to its primary conceptual argument, empirical findings, and methodological approach. In the second phase, these codes were organized into thematic clusters using constant comparison across studies to detect shared patterns and significant contradictions. In the third phase, the identified themes were further examined to surface internal tensions and cross-contextual inconsistencies, leading to the development of broader interpretive conclusions. This analytical process was applied consistently across both the synthesized literature and the three case study materials. No primary data collection instrument was employed; the study is based entirely on the analysis and synthesis of existing secondary literature and publicly documented case study materials.

RESULT AND DISCUSSION

Bifulco et al., (2016) Argue that without common standards, smart city development becomes disconnected, with different municipal departments using incompatible technologies and isolated data system. Such fragmentation is more than an operational issue, as its produce gap in governance, especially in a situation where coordination between data system in sectors such as energy, health, transportation, and public safety is necessary for addressing urban challenges.

The smart city project in Gimpo, Korea is an important example of the benefits of coordinated standardization in urban management. Its Smartopia Centre was designed with an open platform with large database system, Advance image analysis tools, and advance CCTV infrastructure (Myeong et al., 2020). This smart architectural choice was significant as it encourages participation from multiple Stakeholders and reduce the lock-in effects commonly associated with proprietary systems. The platform integrated mobile, cloud, IoT, and large data technologies in real-time, allowing city managers or planners to predicts and manage both natural and social challenges using predictive analytics. The finding from this case study is very important as the introduction of Smart City platform was linked to lower crime rates and fewer incidents related to natural disaster (Letaifa, 2015)

Citizen Participation in smart city governance is one of the most debated topics in the literature of urban cities. Analysis of this field, identifies a clear division between a thin model of participation, where citizen mainly supply data and receive services, and a thick engagement model, where citizens are involved as co-producers of knowledge and participation in governance decisions.

In both academic discussion and practical implementation, the thin model of citizen participation is widely dominate. According to Cardullo & Kitchin, (2017) this model can understand as *Citizenship as consumption*, where Smart cities are designed to optimize urban services for residents as end-users. While this may

enhance service quality in a measurable way, but they do not meaningfully redistribute power in urban governance. Citizens are largely excluded from decision-making and primary benefits from policies shaped by municipal officials, and technological companies.

In the thick model, public participation is treated as a core component of governance rather than a form of consultation. Simonofski et al., (2017) developed an assessment framework for evaluating participation in smart cities across 5 dimensions including depth, breathe, timing, impact and mechanism. Analysis using these framework shows that most smart city practices remain limited in level of participation, primarily due to the limitation of information sharing and consultations.

In Islamabad, the capital city of Pakistan, a participatory model was used to support smart city development by prioritizing citizen participation and behavioral change (BCC) as important starting point. The initiative focuses on the schools, universities, colleges, and community organizations to introduce residents to smart city concepts. It also encourages engagements with digital literacy and sustainable living practices. This approach acknowledged that barriers to citizen engagement in smart city governance are not only technical but also related to knowledge and motivation. According to Chen & Chan, (2023) their qualitative analysis shows that citizens with strong understanding of smart city concepts were more likely to support the initiatives and eagerly participate in governance activities.

Alongside, example of positive progress, research also identifies structural barriers to effective citizen engagement. Nam & Pardo, (2011) Describes concerns including, the dominance of corporate and technological priorities over human needs, the role of citizen remain unclear, and frequently reduced to that of end users, rather than active participations. There is disconnect between global commitments to inclusive governance, such as UN, NUA and actual corporate-led practices with limited space for citizen voice.

A third most important theme in the research focuses on the challenges of applying global smart city framework in local conditions. The most dominant model originates mainly form North American, Europeans, and East Asian cities and are based on the expectations about governance capacity, infrastructure systems, economic development, and civic culture that are not universally present. As a results, critics suggest that when these frameworks are adopted without adaptations, may re-inforce existing inequalities by transferring planning models designed for high resource cities to context with priorities and constraints.

A subtle perfect example of these contextual challenges can be seen in the Shiraz case study in Iran. Noori et al., (2020) Also explain that the city of Shiraz was dealing with issues such as air pollution, inefficient transport system, environmental stress and pressure on existing infrastructure due to rapid urbanization, while also maintaining an important historical and cultural landscape. Under such situations,

implementing smart city strategies required balancing modernization goals with local social and spatial realities.

The fourth theme concerns the relationship between smart city initiatives and social inclusion, which is gaining growing attention in the recent literature. It connects smart city and sustainable city perspectives by stressing that urban sustainability cannot be understood only through environmental or technical efficiency. It must also address whether development processes are equitable and whether the advantages of smart city investment distributed across all social groups.

Bano, M. &, & Zowghi, (2019) Show that social inclusion in smart cities is often discussed but poorly measured in practice. The review outlines three main dimensions such as digital access, digital literature and digital participation. These dimensions cover access to technology, the skills needed to use it and participation in governance processes.

Discussion

An important dimension that warrants further attention is the relationship between smart city initiatives and environmental or 'green' sustainability the dimension most directly invoked by the paper's title. The case evidence reviewed in this study, while suggestive, does not provide detailed quantitative measures of environmental outcomes. In Gimpso, the use of predictive analytics and IoT-enabled urban management platforms has been associated with reductions in crime and natural disaster incidents, yet direct evidence of carbon emission reductions or biodiversity outcomes is not well documented in the available literature. In Shiraz, the planning framework incorporates considerations of climate sensitivity and environmental stress, reflecting the Sustainable Development Goals (SDGs) alignment highlighted by international frameworks (Samani et al., 2025). Future studies should systematically measure the environmental outcomes of smart city interventions alongside their social and governance dimensions, in order to substantiate claims of genuine green sustainability.

The analysis highlights an area of research defined by both progress and unresolved tensions. While the literature has developed strong conceptual models, diverse case-based evidence, and shared principles such as open system, citizen participation and the adaptation in the local context. Yet, a gap remains between theory and implementation. These include the division between global development frameworks and local implementation, as well as between technological capabilities and the governance structure needed to ensure equitable outcomes.

Three policy and practices implications arise from this study analysis. First, ICT standardization and open platform systems are necessary for sustainable smart cities, they are not sufficient. The Gimpso case shows that open platforms can support participation and flexibility compared to closed systems, yet they do not automatically produce good governance outcomes. Social and institutional

arrangements such as data ownership rules, citizen participation in decision making, and how public private partnership are equally important. Where policy makers prioritize technical standardization while neglecting governance design, smart city projects may improve operational performance but fail to deliver broader social and democratic benefits linked to sustainability.

Second, the findings suggest that the prevailing thin model of participation does not meet the demand of urban sustainability. When citizens are treated mainly as data providers and services users, then they lose access to local knowledge, civic engagement and democratic legitimacy. Evidences from Islamabad and Malaysia shows that participation must be structurally integrated into governance systems rather than applied as a late-stage additions.

Third, the findings suggest that smart and sustainable urban development requires recognition of local context within global framework and standards. Cities in Global South often operate under different environmental pressures, infrastructure constraints, institutional capacities and social conditions means that important models may not be suitable without adjustment. Rather than applying standardized solutions there is a need for frameworks that are adapted to local situations while stills based on relevant global principles.

The findings support a governance-first model of smart and sustainable urban development that prioritize decision-making structure over advance technology. Smart city systems would be guided by governance needs defined through public participation, rather than technological availability. Smart infrastructure becomes a means to governance goals, and improving alignments with suitability principles.

CONCLUSION

Based on the qualitative based of literature and case studies, this paper argues that smart and sustainable city models require a deeper transformation rather than simply combining both technological and environmental system together. It requires a shift in governance frameworks that makes citizen participation structural, ensures sustainability to local conditions and where social inclusion is considered as a core part of sustainability. The three cases provide complementary insights such as Gimpo highlights the value of open platforms alongside participatory governance, Shiraz shows the need and importance of adapting smart city approaches to historical and institutional conditions through incremental development, and Islamabad shows how citizen awareness, digital literacy. Together these models supports where technology serves governance rather than replacing it. While this approach is institutionally demanding, its offers strong and meaningful sustainable and democratic outcomes. Future research should strength and more focus on governance frameworks, cross-context comparisons and examine conditions for effective productions.

ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to the respective institutions AIR University Islamabad, Allama Iqbal Open University Islamabad, Lahore College for Women University, and the University of Engineering & Technology Lahore for their institutional support throughout the course of this research. The authors also acknowledge the valuable insights drawn from the existing body of literature on smart and sustainable urban development, which informed the analytical framework of this study. No external funding was received for this research.

REFERENCES

- Aziz, A., & Anwar, M. M. (2024). Assessing the impacts of urban expansion on sustainability; empirical evidence from Islamabad, Pakistan. *SpringerA Aziz, MM AnwarGeoJournal*, 2024•Springer, 89(2). <https://doi.org/10.1007/S10708-024-11087-6>
- Bano, M. &, & Zowghi, D. (2019). *Citizen engagement in smart cities: Theoretical dreams vs. practical reality*. https://dro.deakin.edu.au/articles/media/Citizen_Engagement_in_Smart_Cities_Theoretical_Dreams_vs_Practical_Reality/20724877
- Batista, E., Moncusi, M. A., López-Aguilar, P., Martínez-Ballesté, A., & Solanas, A. (2021). Sensors for Context-Aware Smart Healthcare: A Security Perspective. *Sensors*, 21(20), 6886. <https://doi.org/10.3390/s21206886>
- Batty, M., Axhausen, K. W., Giannotti, F., Pozdnoukhov, A., Bazzani, A., Wachowicz, M., Ouzounis, G., & Portugali, Y. (2012). Smart cities of the future. *The European Physical Journal Special Topics*, 214(1), 481–518. <https://doi.org/10.1140/epjst/e2012-01703-3>
- Ben Letaifa, S. (2015). How to strategize smart cities: Revealing the SMART model. *Journal of Business Research*, 68(7), 1414–1419. <https://doi.org/10.1016/J.JBUSRES.2015.01.024>
- Beverungen, D., Müller, O., Matzner, M., Mendling, J., & vom Brocke, J. (2019). Conceptualizing smart service systems. *Electronic Markets*, 29(1), 7–18. <https://doi.org/10.1007/s12525-017-0270-5>
- Bifulco, F., Tregua, M., Amitrano, C. C., & D'Auria, A. (2016). ICT and sustainability in smart cities management. *International Journal of Public Sector Management*, 29(2), 132–147. <https://doi.org/10.1108/IJPSM-07-2015-0132>
- Cardullo, P., & Kitchin, R. (2017). Being a 'citizen' in the smart city: Up and down the scaffold of smart citizen participation Paolo Cardullo and Rob Kitchin, NIRSA, National University of Ireland Maynooth, County Kildare, Ireland. *NIRSA, National University of Ireland Maynooth*, 1–24. <https://osf.io/preprints/socarxiv/v24jn/>
- Chen, Z., & Chan, I. C. C. (2023). Smart cities and quality of life: a quantitative analysis

- of citizens' support for smart city development. *Information Technology & People*, 36(1), 263–285. <https://doi.org/10.1108/ITP-07-2021-0577>
- Grossi, G., & Welinder, O. (2024). Smart cities at the intersection of public governance paradigms for sustainability. *Journals.Sagepub.Com*, 61(10), 2011–2023. <https://doi.org/10.1177/00420980241227807>
- Homer, S. T. (2023). Perceptions of smart sustainable cities: a scale development study. *Quality & Quantity*, 57(4), 3363–3388. <https://doi.org/10.1007/s11135-022-01507-5>
- Jiang, H., Geertman, S., & Witte, P. (2022). Smart urban governance: an alternative to technocratic “smartness.” *GeoJournal*, 87(3), 1639–1655. <https://doi.org/10.1007/s10708-020-10326-w>
- Kougias, C., & Papadakaki, M. (2026). Rethinking the ‘smart city’: From technology-led visions to citizen-centered governance—barriers and pathways in digital urban initiatives. *Journal of Urban Affairs*, 48(5), 1581–1604. <https://doi.org/10.1080/07352166.2025.2502116>
- Md Dali, M., Sharifi, A., & Mohd Adnan, Y. (2022). *Envisioning Sustainable and Resilient Petaling Jaya Through Low-Carbon and Smart City Framework* (pp. 213–238). https://doi.org/10.1007/978-3-030-95037-8_10
- Myeong, S., Kim, Y., & Ahn, M. J. (2020). Smart City Strategies—Technology Push or Culture Pull? A Case Study Exploration of Gimpo and Namyangju, South Korea. *Smart Cities*, 4(1), 41–53. <https://doi.org/10.3390/smartcities4010003>
- Nam, T., & Pardo, T. A. (2011). Conceptualizing smart city with dimensions of technology, people, and institutions. *Proceedings of the 12th Annual International Digital Government Research Conference: Digital Government Innovation in Challenging Times*, 282–291. <https://doi.org/10.1145/2037556.2037602>
- Noori, N., de Jong, M., & Hoppe, T. (2020). Towards an Integrated Framework to Measure Smart City Readiness: The Case of Iranian Cities. *Smart Cities*, 3(3), 676–704. <https://doi.org/10.3390/smartcities3030035>
- Samani, E. A., Environment, Z. F.-... and B., & 2025, undefined. (2025). Integrating informal settlements into sustainable land use planning: a phased development framework for addressing spatial inequalities in Chabahar, Iran. *Springer*, 3(1). <https://doi.org/10.1007/S44213-025-00061-8>
- Simonofski, A., Asensio, E. S., De Smedt, J., & Snoeck, M. (2017). Citizen Participation in Smart Cities: Evaluation Framework Proposal. *2017 IEEE 19th Conference on Business Informatics (CBI)*, 227–236. <https://doi.org/10.1109/CBI.2017.21>
- Yonezawa, T., Matranga, I., Galache, J. A., Maeomichi, H., Gurgun, L., & Shibuya, T. (2015). A citizen-centric approach towards global-scale smart city platform. *2015 International Conference on Recent Advances in Internet of Things (RIoT)*, 1–6. <https://doi.org/10.1109/RIOT.2015.7104913>