Reframing smart governance for smart cities: learning from global practices

Abstract

With the rapid advancement of digital technologies, the concept of “digital cities” was used in the late 1990s and has since been replaced by “smart cities". The term "smart cities" integrates the principle of smart people with digital inclusion, reflecting a broader and multidimensional approach to urban development. Smart cities have emerged as an effective solution to urban challenges. However, the success of smart city development depends on smart governance, ensuring that policies, decisions, and actions are socially, environmentally, and economically viable. Smart governance is characterized by data driven decision making, transparency, and the institutional accountability. This special issue explores the role of digitalization in enabling smart governance within a contemporary urban context, with a specific focus on urban management. The COVID-19 pandemic brought a significant change in governance practices, the public’s opinion transferred from paper to bright screens. People started giving more emphasis on real-time data capturing. E-Governance has emerged as crucial component of smart governance, facilitating efficient service delivery and enhanced public participation. The study highlights how digital technologies support decision making, improve administrative efficiency, and citizen engagement promoting city development. The findings suggest that smart governance is essential to ensure that smart cities are developed in a way that it meets the needs of their citizens while ensuring to their long-term viability.

Keywords: Smart cities, smart governance, open data, digital technologies, ICT, decision-making

1. Introduction

The rapid urbanization across nations is creating a new opportunity to use innovative technologies to address urban management challenges. Developing smart governance over traditional governance models which is essential to economic growth and society, i.e. achieved by smart digital technologies (Rosol & Blue, 2022; Park & Yoo, 2023). Traditional governance models, having fragmented decision making and minimal public engagement are not much adequate in addressing the complex urban challenges faced by smart cities (Beckers & Mora, 2025). Technological innovations and smart digital interventions have emerged as an important tool for reframing smart governance (Zhang et al., 2025). Smart digital technologies consisting digital platforms, data- driven analytics, open source program, real-time data capturing, GIS platform, and ICT technologies are being widely adopted across cities enhancing governance efficiency (Kitchin, 2014). Governance practices becoming more participatory and adaptive to urban transformation. Smart cities support and provide valuable evidence on how smart governance approach benefits in the urban management (Desouza et al., 2020). A smart city can be defined in a variety of ways. But, a broad definition includes implementing digital driven infrastructures to drive social and urban progress by boosting the economy, public participation, and governmental efficiency (Albino et al., 2015; Sanchez-Gallegos et al., 2025). A smart city offers a connection between the public, the government, and the varied stakeholders. The public would be able to communicate and interact with the govt. and its key aspects, while the government would be capable of monitoring and regulating the city via remote access (Solanki et al., 2019a). The City infrastructure can be defined as the

interconnected networks of the following components: City governance, transportation, education, healthcare, public safety, and utility infrastructure. All of these contribute with high quality and effective urban development enhancing economic and social well-being (Hansman et al., 2006; Meijer & Bolívar, 2016a).

These cities also serve as new hubs for large corporations and communities. A Smart city analysis can be done by studying the elements and functions of a city. Table 1 summarizes the fundamental understanding of various smart city pillars, including smart environment, smart economy, and smart government, etc., given by various researchers. However, there are some studies related to this dimension based on Europe and Asian countries (Attaran et al., 2022),which have been incorporated to understand and applicability in the global discourse.

Table 1 Six pillars of a smart city.

Dimension	Description	Reference
Smart Environment	Enhancing safe and healthy living environment aims to improve the QoL for its inhabitants.	(Sripath Roy et al., 2018)
Smart Economic	Improving the business environment and making it more interesting for talent and investors to utilize digital technologies is a practical approach to bring up city's economy.	(Vinod Kumar & Dahiya, 2017)
Smart Living	It’s all about improving the quality of life through safe and healthy living conditions.	(Vinod Kumar, 2020)
Smart Government	It involves integrating actions and services, which contributes to improving relationships with its citizens.	(Masik et al., 2021)
Smart Transportation	Smart transportation involves the integration of ICT infrastructure, unified transportation, and intelligent smart urban and road transportation.	(Soomro et al., 2018)
Smart People	With skill sets, people in a technological society can receive intelligent education and their potential to improve initiative and creativity.	(Loo & Tang, 2019)

This special issue focuses on the role of digital technologies in enabling smart governance, how it can effectively reframe smart governance. Through examining global cases, the study seeks to identify principles, methods, tools, and strategies that contribute to transparent and citizen cantered approach reflected in governance. Additionally, governance through digital inclusion offers pathway towards efficient urban governance.

2. Smart Governance

With the advancement of technology, people rely on real-time access to data. After COVID-19, the public's opinion transferred from paper to bright screens (Simon et al., 2021). People started giving more emphasis on data sharing. E-Governance plays a vital role in smart governance (Tomor et al., 2019). Smart Governance includes network infrastructure, ICT technologies, and participatory decision-making, enabling people to engage, collaborate, and access to information about their city management (Attaran et al., 2022; Cezar et al., 2024). Table 2 depicts the various elements of Smart governance as shown in below.

Table 2 Elements of Smart Governance.

Elements	Description	Reference
Smart Municipality	E-municipality- easy, fast, accessible, safe.	(Albino et al., 2015; Meijer & Bolívar, 2016; Sanchez-Gallegos et al., 2025)
Smart Rules	Rules and codes	
Technology Infrastructure	ICT, IOT	
Smart Feedback	Feedback about Government performance towards services	
Smart governmental services	e-government, web tools, e-Dhara, e-Gram	
Smart Management	Framework for setting clear goals in administrative management	

Smart governance is essential because it helps governments to be more efficient, effective, and ability to respond to the citizens' needs. The reasons are summarized below.

i. **Improves Service Delivery**: Smart governance enables governments to serve their citizens more effectively and efficiently. This is accomplished by utilizing technology and data analytics to quickly detect and respond to citizen demands (Yun & Lee, 2019; B. Zhang et al., 2024).
ii. **Increases Transparency**: Smart governance encourages openness by giving citizens access to information about governmental policies and decision-making processes. As a result, there is increased accountability and trust between the public and their government (Meijer & Bolívar, 2016b; Pereira et al., 2018).
iii. **Reduced Operational Costs**: By improving efficiency and removing unnecessary tasks, smart governance can help lower the government's expenses. This might free up resources in other necessary fields, like infrastructure development, healthcare, and education (Bolívar & Meijer, 2016a; Ruijer et al., 2023a).
iv. **Enhances Decision-Making**: Governments are given access to real-time data and analytics through smart governance, which enables them to make more informed decisions. This can aid in their identification (Meijer & Bolívar, 2016a).

v. **Enhance Innovation**: Smart governance promotes innovation by encouraging innovation and risk-taking (Beckers & Mora, 2025).

Figure 1 Clouds of Tag. Terminology related to smart governance, Source: Author

3. Global Discourse

In recent years, smart cities have given a broad scope for governments in their innovative implementations and development projects globally. Cities have become more resource-savvy with the use of digital technology (Albino et al., 2015; Yun & Lee, 2019). Cities with new technological applications create new commercial opportunities and a centre for research attracting businesses, businesspeople, and research institutions etc. (Zhang et al., 2024a).

"Smart Governance is commonly refers to the implementation of ICT infrastructures to support social and urban progress while boosting the economy, public engagement, and effective administration (Bakıcı et al., 2013; Pereira et al., 2018). Smart Cities are more open to experimenting with and modifying various economic and governance models for ease. They have the skills and abilities to create an atmosphere that lends itself to learning due to their expertise, agility, and proximity (Angelidou, 2014).

The study of smart governance is still evolving, and it is becoming increasingly essential to comprehend the challenges of designing and implementing successful innovative governance processes. An effective way to tackle the challenges associated with smart governance is by understanding the issues comprising various governance aspects (Bolívar & Meijer, 2016a; Ruijer et al., 2023a). Various concepts, approaches, and principles help reduce the communication gap between citizens and government. The concept of “city 5.0” provides a strategy for creating smart cities that are more people-centric and citizen-led. City 5.0 strives to balance the economic growth with social problem-solving through a system that connects online and physical world (Becker et al., 2023; Svítek et al., 2020). The approach pioneered by Japan is based on advanced technologies developed from "monozukuri" getting utilized for the public good to identify society's particular problems, i.e., ageing communities, a decline in the productive-age population, and issues about environmental and energy problems on the other (Nastjuk et al., 2022). Design thinking can be the best way to generate an innovative

strategy for smart governance. Design thinking principles like radical association, exploration, and innovation can help smart cities strengthen their cohesive structures and address common problems linked to data access, processing etc. (Schliwa, 2019; Tapias et al., 2024). Adaptation behavior of citizens to certain governance apps. This kind of app provides real-time data capturing of multiple government services, providing services to people. But due to a lack of awareness illiterate, we often see a growing gap between the lower strata of people. There is a need for innovative development and strategies to point out and bridge this gap (Bingqian Zhang, 2022).

In Indian context, the Planning Commission of India emphasized smart urban centers, further implementing smart cities. JnNURM is the key program for India in which E-governance implementation proved to be the best city-level reform introduced. Nowadays, most urban cities have municipal websites. Currently, not a single city incorporated the IoT for real-time data capturing. Urban local bodies had targeted only the few subjects' i.e. an online platform for certificates, property tax, water charge, and other utility bills, online building approval etc. Among all JnNURM cities, only 38 cities have achieved the respective targets. This indicates that the local urban bodies need improvement in capacity and resources, which must be improved first. With the announcement of Smart City Mission (SCM), India has been building 100 smart cities with inclusion of Make in India, Digital India Initiatives, and various central funded schemes and program. This centralised dynamic proving to be catalyst in the multilevel governance, enabling people to engage, cooperate, and participate in the urban management (Mullick & Patnaik, 2022; Reardon et al., 2024).

4. Discussion

Based on the various governance approach and methods used by various smart cities, as summarized in table 3, to enhance smartness in governance, ICT and IoT are the best elements to incorporate with the current government system resulting in transparency, data clarity, fair public participation, accountability, etc (Ruijer et al., 2023b; B. Zhang et al., 2024). Here, the potential outcome is indicated at the government policy level, such as public value and government organization, which further contribute to economic growth with the collaboration with the top stakeholders, i.e. although modern technologies can overcome outdated policies, cities can adopt SCD as a guide to enhance overall governance (Bolívar & Meijer, 2016b; Sanchez-Gallegos et al., 2025). The smart city analysis has various indicator typologies; the input-process-output-impact Model is best for studying the different global smart cities (Yigitcanlar, 2018).

Figure 2 Flow diagram depicting Input-Process-Output-Impact Model

Some of the critical observation has been noted from the literature cases as shown in Table 3, such as The Open Cities125, eVanti, 22@Barcelona project, ITU-T and Commons4EU projects including Amsterdam, Zurich, Dubai, Singapore, Barcelona, and global cases.

Table 3 Comparative analysis & Learnings from various global smart cities.

Smart City	Input	Process	Outcome	Impact	Reference
Bristol, UK	Bristol Open Programmable city	Data collection and Open Data portal, Capturing real-time data	In addition to gathering data for informed decision-making, this governance addresses data privacy and digital inclusion issues.	Participatory Decision Making, Data Clarity, neighbourhood engagement	(Brown et al., 2023)
Manchester, UK	Service Reform, n iBase - an IBM (i2), ICT investment, Corridor Partnership	Real-time data capturing, Risk sensing and analytics, governance risk map	Analysing modest size of the city and finding the duplicative state, local, and federal bureaucracy.	Integration, E-commerce, smart Business model, Smart Management	(Capra, 2016)
Zurich, Switzerland	eVanti project, GEVER, Cross-border services	Open Govt Data (OGD), Digital Single Market Strategy	Bottom-up initiatives supported local people, prioritization of digitalization.	Citizen-centric, Inclusiveness, E-business	(Mettler, 2019)
Barcelona, Spain	Open data, OVAC (cloud platform), e-administration, 22@Barcelona project	Sensors platform, Web application	The service gathers and analyses Big Data from local bodies and public sources.	Data Clarity, Transparency	(Bakıcı et al., 2013; Fernandez-Monge et al., 2024)
Copenhagen, Denmark	Copenhagen Cleantech Cluster, Copenhagen Solution Lab (CSL)	GIS platform, sensor network	We are developing an open data market in partnership with the private sector organization.	Transparency, intelligent handling of Services	(Oyadeyi & Oyadeyi, 2025)

To be continued.

Smart City	Input	Process	Outcome	Impact	Reference
Florence, Italy	Open Data, Firenze Up, Firenze Card App, GeoWash	Fibre optic network, Digital Signage	The application enables citizens to access progress reports.	Data Clarity, Transparency, accessibility	(Capra, 2016)
Venice, Italy	Open Data, IRIS (Internet Reporting Information System), Cockpit	Real-time data capturing	Platform helps citizens to report online and geo-locate the need for city repair through a e-channel between themselves.	A participatory approach, Data-driven	(Capra, 2016)
Dubai, UAE	Blockchain technology (AI & Big Data), IoT, Web 2.0	Virtual Assistant (RASHID), Digital Interface (Happiness Meter)	DubaiNow & Dubai Pulse portal, stakeholders can create their own dashboard.	Efficient Service delivery, Data-driven, Transparency	(Almheiri et al., 2026; Cyrill & Pasha, 2019)
Taipei, Taiwan	Open data, information systems, online distorter prevention, Taipei Free (Wi-Fi access), camera CCTV real-time capturing	Open Data portal, Capturing real-time data	In addition to gathering data (Taipei easy call) for informed decision-making, this governance addresses digital inclusion issues.	Transparency, Participatory Approach	(Alamsyah et al., 2016; Chang et al., 2021)
Singapore	Deloitte's Smart Governance 3.0 model, an Online 3D city platform	IDA, TR38& TR40 sensor network, Risk sensing, governance risk map	It has benefited chiefly from its urban network, without a poor governance structure.	Integration, Data Clarity.	(Cavada et al., 2019)

To be continued.

Smart City	Input	Process	Outcome	Impact	Reference
Porto, Portugal	Open and Agile Smart Cities (OSAC), Intranet: City information	FIWARE (an open source program), Intelligence Urban Solution (RENER)	The development of a smart ecosystem around open source.	Data clarity, Transparency.	(Solanki et al., 2019)
Malta	Smart Island Strategy (a national ICT strategy)	Adoption of a 360-degree approach	Public, private, and non-governmental entities join to work & decide on potential solutions.	Smart governmental Services	(Angelidou , 2014)
Berkane, Morocco	Urban Digital Twin (UDT), Mobile Mapping System (MMS)	Virtual Reality (VR & MR), GIS Platform, AI	Digital twin technology enabled more efficient and informed decision-making.	Municipal efficiency, Revenue enhancement	(Ben Hichou, 2024)
Chengdu, China	SETS resilience framework, ITU-T (International Telecommunication Union)	Risk governance, Data-platform architecture	Dual effects of urban digital transformation on governance; Smart urban collaboration capacity	Smart decision making, citizen-centred	(Li et al., 2026)
Kocaeli, Turkey	Kocaeli Bicycle Sharing System (KOBIS), Eco-Mobile	Address information system, Smart Parking System	An App developed to strengthen the communication between the various stakeholders.	Transparency, Data-driven, Smart Service	(Demirel & Mülazımoğlu, 2022)
Amsterdam Smart City, Netherlands	Living lab, Amsterdam Smart City Platform (ASCP), AIM (Amsterdam Innovation Motor)	The energy network operator	Without regard to hierarchy, public, private, and non-governmental entities join to discuss issues and decide on potential solutions.	Safety, Integration, smart governmental services	(Riva Sanseverino et al., 2018)

Analysing the various methods and technologies used by smart European cities, there is clear communication among the public about their motives and initiation. Open data Information is next to the people that can be observed and change their attitude towards the government (Choenni et al., 2022). It has been observed from the above literature case that these project foundations emphasize transparency through partnerships between cities. These innovative project has developed and continues to create web-based apps that connects cities with their citizens, strengthening public engagement with efficient administration (Capra, 2016; De Falco, 2019; Correia et al., 2022). Singapore ONE is a kind of broadband network with the agenda of One Network for everyone that delivers interactive and multimedia applications and services (Cavada et al., 2019; Mahizhnan, 1999). Manchester pulled the "Corridor Partnership", a ready-made structure for providing the city's smart city program, by bringing world-class organizations together to collaborate (Carter, 2013). To preserve and strengthen the Amsterdam Metropolitan Area, AIM is a foundational establishment that helps the government know the economy. The Amsterdam Innovation Motor project has been created with the four priority areas creative businesses; virtual worlds; information and communication technology (ICT); life sciences; and environmental responsibility (Riva Sanseverino et al., 2018). The city of Porto, an essential region of Portugal, had worked on the website Porto. Pt, which smoothens the interaction between the city and citizens and is easily accessible to the knowledge of government policies and data (Solanki et al., 2019). These strategic models address the social and economic implications of raising smartness in the administrative structure.

5. Conclusion

This special issue addressed the evolving role of digital technologies and its inclusion in urban governance. The discussion highlights how digital inclusion helps in smooth and efficient governance with long term success. Municipal governments at the very lowest level have minimal resources, which results in discoordination among their hierarchy. Key findings suggest that people must have a shared platform to facilitate the exchange of information and data. The government must streamline actions by creating an open data platform with smart systems like ICT IoT, user-friendly to every stakeholder. So Smart governance is the leading dimension that helps accelerate the move in all directions and create a safe, secure, and smart environment for living. The importance of this study was to understand and explore the future potential of smart technology in the governance of cities, where ICT and real-time data capturing are accessible to every stakeholder, including academics, policymakers, and professionals, to achieve smart city motives, further helping in the economic growth of the city. The urban development strategies should focus on strengthening governance capacities; being a key dimension in smart city initiatives.

Disclosure Statement

No conflicts of interest/competing interest.

Data availability statement

Data is available upon reasonable request.

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