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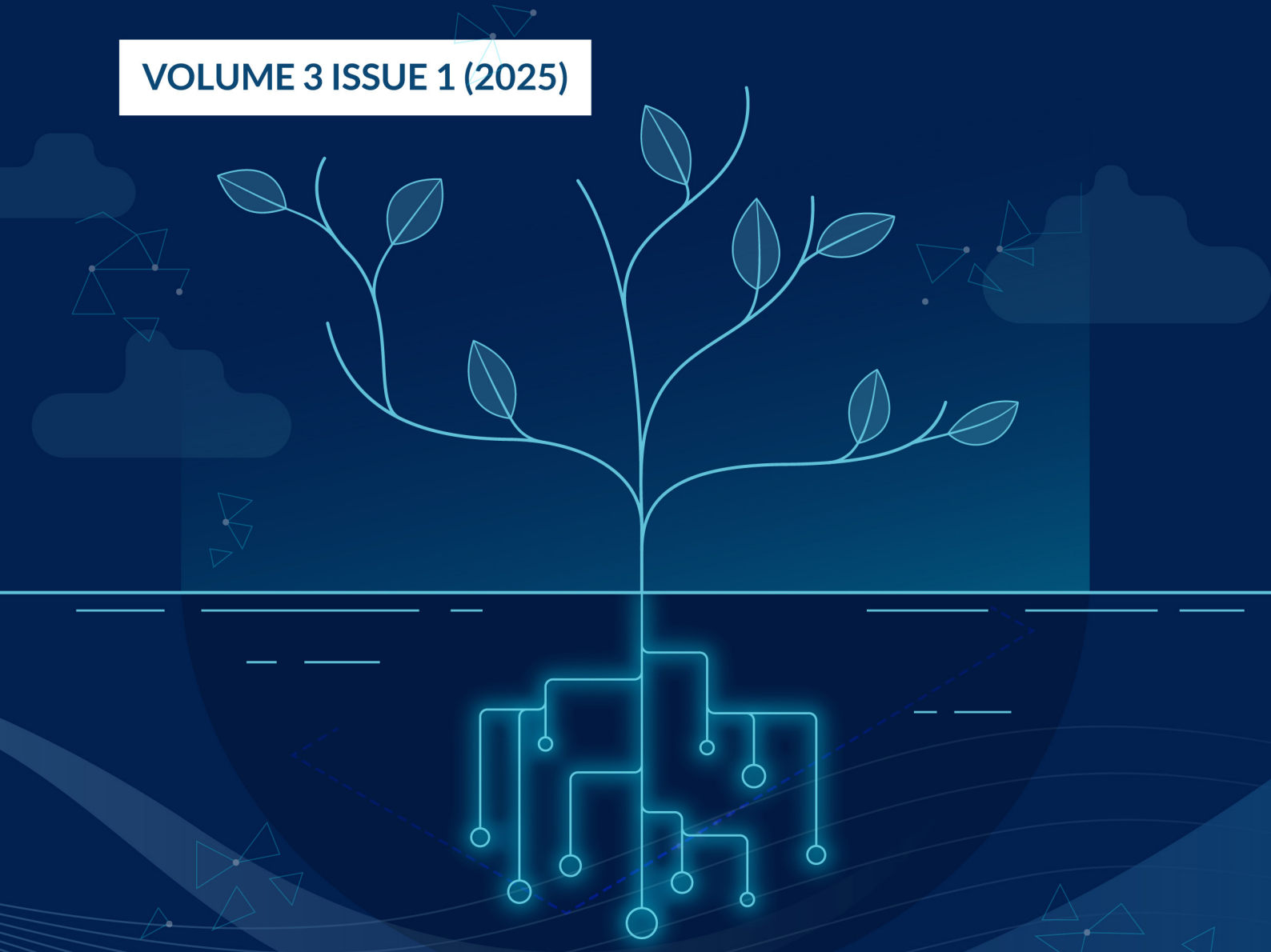

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Smart Cities for Sustainable Urban Development: A Framework for Emerging Economies

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ABSTRACT

As the two key issues of rapid urbanization and increasing population pressure give rise to deteriorating services and infrastructure in emerging economies, smart cities based on digital technologies emerge as a possible solution. Yet the financial burden of infrastructure maintenance, informal economies, and governance-related problems often results in these smart cities' dreams going unfulfilled in the global south. This article examines the status of innovative city development in these countries, focusing on the frameworks, motivations, and drivers for innovative city initiatives and the blocking factors that prevent their success. We conducted a systematic literature review of 56 studies from an initial total of 3928 articles in social sciences databases, providing insights into the current scenario. Through thematic synthesis and analysis, we argue that achieving technology-driven smart cities in developing nations rests on parallel changes in socioeconomic, legal, and regulatory infrastructure. Governments must ensure they can respond to citizens' basic infrastructure needs, establish sustainable revenue sources, and create clear regulatory frameworks to mitigate technological risks and enhance human capital. Additionally, they should promote digital inclusion policies and environmental sustainability. For a smart city to become a reality, an ecosystem that supports citizen participation, start-ups, as well as public–private partnerships is needed.

INTRODUCTION

Smart cities have attracted considerable interest as a comprehensive political dream and growth method, particularly in developing nations (Zhang *et al.*, 2025). Smart cities are not a new idea, but the rising interest over the past few decades has been attributed, in part, to recent advances in technology and the pressing need for modernized infrastructure solutions to meet urban inefficiencies and sustainability head-on. The developers of smart cities can be considered from a couple of perspectives (Marchesani *et al.*, 2025). Technological progress and the increasing demand for efficient and sustainable solutions in cities have led to the proliferation of smart cities from an urban policy perspective (Anthony Jnr, 2025). Economically speaking, the development of smart cities in countries with vast urban areas largely hinges on the attraction effect cities have through their human capital (Sheldon *et al.*, 2025). This draws students from various parts of these countries to pursue university education and indexed careers. While definitions and conceptualizations of smart cities differ, the central idea often revolves around incorporating technology into urban systems to increase their efficiency (Noori *et al.*, 2025). Major platforms, such as the Internet of Things (IoT) and big data analytics, are likewise expected to transform urban administrations, thus boosting their attractiveness to businesses and subsequently driving economic development (Zhang *et al.*, 2025). The development of information and communication technology (ICT) has introduced new technologies, such as quantum computing and machine learning, to the general public (Rishiwal *et al.*, 2025). Combined with universal mobile access, this has made it easier for citizens to express themselves and participate in policy-making, particularly in some governments (Hamilton, 2025). Smart cities are lauded as proof-of-concepts of solutions to the socioeconomic and environmental problems confronting urban areas. Although technology has an important part to play, engaging citizens as co-creators in governance and decision-making is inherently influential. A community-wide effort is necessary, involving an ecosystem of stakeholders that engages citizens as partners in delivering innovative solutions shaped by the needs and values of the population (Gooding *et al.*, 2025). Although these concepts and the theoretical frameworks behind them can be lost in translation, most of the research on smart city deployment has centered around developed markets examining implementation strategies, policy mechanisms, and sustainability (Mondal *et al.*, 2024). Yet, there remain significant gaps in the way smart cities are conceptualized, developed, and governed in developing countries (Colding *et al.*, 2024). Nowhere is that gap more noticeable than in the distinct drivers and obstacles each country deals with as it moves forward with innovative city initiatives (Colding *et al.*, 2024). Smart cities governance is usually even more complicated in developing countries, where governments still have problems providing their citizens with basic needs. These regions face unique challenges and require a robust understanding of how the governance of smart cities can be operationalized amidst different development priorities (Mehmood *et al.,* 2024). In addition, the urban areas in

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developing countries are under pressure due to a growing rural-to-urban migration. The largest global cities are also concentrated in megaregions, and by 2030, the number of them will increase and continue to pose challenges to infrastructure, social equity, and sustainability. A key challenge in realizing a smart city is the sheer expense of maintaining infrastructure and operating services, which is further complicated by unaccounted-for practices having persisted in the informal economy. A smart city that prioritizes technology over our values and basic needs may ultimately fail, becoming a costly and inefficient project (Salih *et al.,* 2025). Thus, it is crucial to realize that the balance between technology advancement and social need is essential for innovative city development in emerging economies (Zhou *et al.*, 2025). The goal of this review is to synthesize existing literature on the smart city progress in developing countries, and then provide elucidation on a) how innovative city governance has been structured, particularly in megacities, b) brainstorming the emergence factors responsible for adoption (motivators), and c) hindrances (challenges). Our review provides valuable policy insights on how smart cities are theorized, why governments aim at innovative city initiatives, and what factors help or hinder the development of smart cities. Results underscore the necessity of implementing a multi-faceted approach to socioeconomic, legal-regulatory, and human capital reform to realize smart cities (Lee Ludvigsen & Byrne, 2025). They must cater to the primary infrastructure requirements of their citizens, cultivate long-term revenue streams, lay down well-defined regulatory parameters, create an enabled ecosystem that ensures digital inclusion, and maintain a sustainable environment. The vision of smart cities in these emerging economies can only be realized through a supportive ecosystem for citizen participation, fostering innovation and public-private partnerships.

LITERATURE REVIEW

This literature review examines the status of development of smart cities in emerging economies while considering the brilliant city initiative's conceptualization, motivation, drivers, and challenges (Almarri & Boussabaine, 2025). The smart city idea in the developing world is dedicated to infusing digital technologies in urban systems. Large data technology, such as IoT and big data analysis technology, is an essential urban management and service support technology that can help make cities more efficient and sustainable. Definitions of smart cities are numerous, but the point of convergence is the application of technology for operational efficiency, resource distribution, and service delivery. In most studies, the concept deals with technology, sustainability, and low-carbon cities and eco-cities (Duan & Zhu, 2025). This blend of technology and sustainability has the objectives of minimizing the impact on the environment, improving public services and resulting in a livable and affordable urban environment.

One of the key drivers of the construction of smart cities in these economies is to increase government efficiency in delivering public services. Smart cities seek to optimize services, lower transaction costs, and enhance service efficiency through IoT platforms and big data analysis (Lukić *et al.*, 2025). Another primary motivator is improving urban life for its residents while solving problems such as traffic jams, pollution, lax infrastructure, etc. In nations like Ghana, for instance, innovative city projects are primarily aimed at enhancing mobility and reducing emissions. Moreover, innovative city development greatly emphasizes inclusive governance and citizen participation in the collaboration between governments, citizens and private companies (Hosseini & Tayebi, 2025). Smart cities also aspire to support disadvantaged groups to ease inequality and see that every citizen shares in the progress of urban development. There are several drivers of innovative city development in developing countries. These include the ability of governments to fund measures, the readiness and capacity of technology, and the participation of citizens (Karnsomdee, 2025). Governments, bound to rules of budgetary constraints, must consider alternative financing options such as public-private partnerships and crowdfunding. Technology and infrastructure, whilst important, cities need to invest in the development of ICT systems, data centers and smart infrastructure. Human capital development is of utmost importance as it is required to manage and operate innovative city technologies (He *et al.*, 2025). The private sector plays a significant part in this role, offering resources, knowledge, innovation, etc. Economic stability also promotes investments in these cities, which are crucial for the continued success of smart cities in the long run (Almarri & Boussabaine, 2025). However, a few obstacles exist to developing smart cities in emerging economies. The lack of restrictive standards, inconsistent governance policies, regional financial constraints, and inadequate supply chain legislation for the governance and cost of technology risk are fundamentally challenging (Abid *et al.*, 2025). Also, some levels of government, particularly in the developing world, lack the infrastructure or people with the expertise to maintain and operate innovative city systems. Prominent social and cultural barriers, like low digital literacy, hinder the successful diffusion of innovative city projects (Djatmiko *et al.*, 2025). The study's findings provide policy implications for developing country governments to invest in basic infrastructure before entering into mega innovative city projects. Moreover, diversification of financing and funding sources, elaboration of a coherent regulatory environment, investment in human capital, and citizen participation play a key role in the success of innovative city projects. Finally, a smart city strategy should include technologies and renewable energy solutions to help drive a sustainable environment.

MATERIALS AND METHODS

Search Strategy

To examine the implementations and experiences of smart

city development in emerging economies, we conducted a systematic literature review. We focused on gathering evidence from two prominent academic databases Scopus and Web of Science which are widely recognized for their comprehensive social sciences literature collections. The search process was structured around two detailed search strings. The first search string included relevant keywords associated with smart cities and their related concepts, while the second-string targeted keywords and conceptual equivalents related to developing countries. These two sets of search terms were combined using the logical operator to ensure the retrieval of studies that addressed both smart city development and its application within emerging economies.

Table 1: Keywords included in the search strings

Smart Cities and Analogous Concepts	Developing Countries and Conceptual Equivalents
"Smart cities" OR "smart city" OR "smart-city" OR "smart-cities"	"Developing countries" OR "developing country" OR "developing society" OR "developing societies"
"Sustainable city" OR "Sustainable cities" OR "Sustainable urban development" OR "Sustainable urban developments"	"Middle income countries" OR "middle income country" OR "low-income countries" OR "low-income country"
"Digital city" OR "Digital cities" OR "Eco City" OR "Eco cities"	"Lower middle-income countries" OR "lower middle-income country" OR "higher middle-income country"
"Green city" OR "Green Cities" OR "Low Carbon City" OR "Low carbon cities"	"Low and middle-income country" OR "low- and middle-income countries"
"Knowledge City" OR "Knowledge cities" OR "Resilient city" OR "Resilient cities"	"Less developed country" OR "less developed countries" OR "less economically developed country"
"Intelligent city" OR "Intelligent cities" OR "Livable City" OR "Livable cities"	"Underdeveloped country" OR "underdeveloped countries" OR "emerging market" OR "emerging markets"
"Information city" OR "Information cities"	"Emerging economy" OR "emerging economies" OR "less industrialized" OR "less industrialized" OR "none industrialized" OR "none industrialized"

Inclusion and Exclusion Criteria

The authors developed five inclusion criteria to guide the selection of relevant studies for this review. Only studies published between 2009 and 2019 were included, reflecting the recent development of smart city agendas in developing countries. For example, India launched the 100 Smart Cities Mission in 2015, and China introduced the National Pilot Smart Cities policy in 2012. The review included various types of studies, such as quantitative and qualitative case studies, policy analysis, conceptual studies, book chapters, and conference proceedings, acknowledging the nascent nature of smart city development in these regions. Studies that explicitly addressed the implementation, development, applications, dimensions, goals, drivers, and barriers of smart cities in developing countries were included. Additionally, studies discussing analogous concepts of smart cities, such as digitalization, green solutions, and sustainability, within the broader context of smart city development in developing countries were also considered relevant (Silva *et al.*, 2025). Lastly, studies focusing on public policy processes for smart cities and the specific instruments used to advance the smart city agenda were included. Three exclusion criteria were established to strengthen the evidence search process. Studies solely discussing smart city development in developed countries were excluded. Also excluded were studies discussing analogous concepts of smart cities without explicitly relating them to smart city development in developing countries (Sepehr & Felt, 2025). Lastly, empirical studies focusing solely on the impact of specific technologies or policies on environmental outcomes, without situating the discussion within the broader context of smart city development, were excluded.

Data Collection, Data Extraction, and Data Analysis

A record of all studies identified from the primary search method of the search strings was kept on a spreadsheet. First, duplicates were discarded, and then the titles and abstracts of the studies were screened according to inclusion and exclusion criteria to find relevant studies. Following this preliminary evaluation, full-texts of studies that fulfilled the requirements were downloaded for further review. These texts were evaluated to find out if they covered the scope of this review. An extraction template was created for collecting pertinent information from each study, such as the title, authors, methodology, study objectives, smart city definitions, dimensions of innovative city concepts, aims of the smart city, and drivers and barriers to innovative city development. This allowed for a wide range and focused approach to collecting the required data. Data was analyzed thematically, synthesizing inductive and deductive methods. Deductive templates, generated from existing literature in conjunction with inductive procedures, were employed to capture emergent themes from the included studies. Based on three research questions elaborated in the literature analysis, relevant text was extracted from every paper describing definitions,

objectives, purposes, drivers, facilitators, barriers and challenges associated with smart cities. On close line-by-line coding of the material with thematic analysis, we explored the themes in greater depth and teased out the conceptual nuances. It assisted in detecting patterns and relations, which resulted in extracting the key themes and sub-themes. A thematic analysis was vital to identifying specific instances to demonstrate these themes and sub-themes visibly and vividly.

RESULTS AND DISCUSSION

The search resulted in 3928 hits when searching for two kinds of keywords. After applying the inclusion and exclusion criteria, 56 studies were considered applicable to this review. These were a range of comparative policy articles and case studies that examined policy processes and development experiences in innovative city initiatives in 12 countries in Asia, Africa, and Eastern Europe. The nature of the 56 studies that were included can be classified broadly into three categories: studies which describe the innovative city development or policy construction process in one specific region/country related to smart cities; surveys of views held by the public and experts on smart cities; and conceptual and theoretical studies that explore the developmental trend of smart cities in developing countries. Most studies deal with a macro-policy level of implementation in smart (Mahadi *et al.*, 2025). Still, some inquiries concern bright things, like the application of platforms or ICT in public service, the introduction of innovative transportation systems or empirical usage of smart cities with IoT in agglomerations for public services. Additional details on the 56 studies – including the countries/initiatives studied, methods, and aims – can be found in Table 2.

Table 2: Analyzed studies

Study	Country (City)/ Smart City Initiative	Methods/Study Design	Aims/Objectives of the Studies
1. A trivial approach for achieving smart city: a way forward towards a sustainable society	Malaysia	Case study	Discusses achieving smart city and sustainable society
2. Smart city for development: towards a conceptual framework	Indonesia	Case study	Investigates the resources needed for smart city development
3. The specificities and practical applications of Chinese eco-cities	China	Case study	Examines the eco-city development in China
4. Sustainable smart city development framework for developing countries	India (3 city-level cases)	Case study	Investigates the four different dimensions of smart city
5. The operationalizing aspects of smart cities: the case of Turkey's smart strategies	Turkey	Case study	Examines instruments for intelligent transport systems in Turkey
6. National initiatives and local contestations	China	Case study	Reviews the eco-city developments and challenges in China
7. Smart cities in developing economies: a literature review and policy insights	India	Review	Discusses smart city development challenges in India
8. Effects of successful adoption of information technology enabled services in proposed smart cities of India	India	Survey research (exploratory factor analysis)	Describes goals and drivers of smart city adoption in India
9. Citizens of proposed smart cities in India: system security and privacy perspective	India	Survey research (regression analysis)	Discusses security and privacy in smart city adoption in India
10. Planning for sustainability in China's urban development: Status and challenges for Dongtan eco-city project	China	Case study	Investigates the Dongtan eco-city challenges
11. Smart city initiatives and the policy context: the case of rapid business opening office in Mexico City	Mexico	Case study	Depicts key factors for smart city adoption in Mexico

12. Smart cities: the main drivers for increasing the intelligence of cities	Brazil	Literature review and expert opinion survey	Identifies seven major drivers for smart city intelligence in Brazil
13. Low-carbon urban development strategy in Malaysia: the case of Iskandar Malaysia development corridor	Malaysia	Case study	Illustrates instruments applied in low-carbon city development in Malaysia
14. Smart city implementation framework for developing countries: the case of Egypt	Egypt	Case study	Discusses challenges and domains in Egypt's smart city development
15. The evolution of the smart cities' agenda in India	India	Case study	Depicts challenges in smart city development in India
16. Prospect of Faridabad as a smart city: a review	India	Case study	Investigates drivers and barriers to smart city development in India
17. Smart city for development: a conceptual model for developing countries	Developing countries	Review	Reviews conceptualization, drivers, and goals of smart cities
18. Theory: what can it teach us about overcoming barriers in implementation	Developing countries	Review	Explores overcoming barriers in smart city development
19. Smart city and quality of life: citizens' perception in a Brazilian case study	Brazil (Curitiba City)	Questionnaire survey	Investigates citizens' perception of smart city quality of life
20. Platform ecosystems for Indonesia smart cities	Indonesia	Case study	Discusses dimensions and challenges of smart city adoption in Indonesia
21. Adoption of Internet of Things in India: a test of competing models	India	Survey research (structural equation modelling)	Examines IoT adoption and challenges in India
22. Increasing collaboration and participation in smart city governance	India	Case studies	Analyzes smart city adoption in India, Ghana, and Brazil
23. A system view of smart mobility and its implications for Ghanaian cities	Ghana	Case study	Examines smart mobility issues in Ghana
24. Innovative civic engagement and digital urban infrastructure: lessons from 100 Smart Cities Mission in India	India	Case study	Describes goals, barriers, and instruments of smart city adoption
25. Urban innovation through policy integration: critical perspectives from 100 smart cities mission in India	India (Bhubaneswar)	Case study	Investigates challenges and drivers of smart city implementation
26. Smart city governance in India	India	Case study	Discusses smart city governance issues in India
27. Cutting through the clutter of smart city definitions: a reading into the smart city perceptions in India	India (Lavas a, GIFT, New Town Kolkata)	Case studies	Examines barriers/ challenges in smart city development in India
28. The promise and performance of the world's first two zero-carbon eco-cities	China	Case study	Investigates lessons from zero-carbon eco-cities in China
29. Barriers to the development of smart cities in the Indian context	India	Survey research	Identifies barriers to smart city development in India
30. Developing smart cities: an integrated framework	Developing countries	Review	Proposes an integrated framework for smart city development

31. Lessons from financing smart cities in developing countries	India	Case study	Proposes strategies for financing smart cities in India
32. Smart solutions shape for sustainable low-carbon future: a review on smart cities and industrial parks in China	China	Review	Reviews smart city and industrial parks developments in China
33. Smart city with Chinese characteristics against the background of big data	China	Country-level case study	Discusses Chinese smart city characteristics and challenges
34. Developing a sustainable smart city framework for developing economies: an Indian context	India	Empirical study	Proposes a sustainable smart city framework for India
35. Towards a service-dominant platform for public value co-creation in a smart city: evidence from two metropolitan cities in China	China (Shanghai, Guangzhou)	Case study	Compares two service-dominant platforms in China
36. Financing eco-cities and low-carbon cities: the case of Shenzhen International Low-Carbon City	China (Shenzhen)	Case study	Reviews financing for low-carbon city development in China
37. Relevance of smart economy in smart cities in Africa	Africa	Case study	Examines the relevance of the smart economy in African cities
38. Towards smart cities development: a study of public transport system and traffic-related air pollutants in Malaysia	Malaysia	Case study	Investigates smart mobility and air pollutants in Malaysia
39. Conceptualization to amendment: Kakinada as a smart city	India (Kakinada)	Case study	Describes smart city development in Kakinada, India
40. Smart city Nusantara Development through the application of Penta Helix Model	Indonesia	Case study	Illustrates the application of Penta Helix model in Indonesia
41. The making of knowledge cities in Romania	Romania	Case study	Discusses knowledge city development in Romania
42. Smart sustainable city application: dimensions and developments	China (Yogyakarta)	Case study	Examines smart city application in Yogyakarta, Indonesia
43. Experimenting towards a low-carbon city: policy evolution and nested structure of innovation	China (Suzhou)	Case study	Discusses lessons from low-carbon city development in Suzhou, China
44. Improving municipal solid waste collection services in developing countries: a case of Bharatpur Metropolitan City, Nepal	Nepal (Bharatpur)	Case study	Investigates waste management in smart city development in Nepal
45. Transportation planning aspects of a smart city: case study of GIFT City, Gujarat	India (GIFT, Gujarat)	Case study	Discusses smart transport in Gujarat International Finance Tec-City
46. Design of IoT systems and analytics in the context of smart city initiatives in India	India	Case study	Discusses IoT systems in smart city development in India
47. Enabling technology for smart city transportation in developing countries	Vietnam (Ho Chi Minh City)	Case study	Examines smart transportation systems in Vietnam

48. Achieving energy savings by intelligent transportation systems investments in the context of smart cities	Vietnam	Review	Reviews smart mobility investments in developing countries
49. Smart social development key for smart African cities	Africa	Case study	Discusses smart social development for African cities
50. Transition to a low-carbon city: lessons learned from Suzhou in China	China (Suzhou)	Case study	Reviews lessons from low-carbon city development in Suzhou
51. Achieving energy savings by intelligent transportation systems investments in the context of smart cities	India	Case study	Investigates energy savings through smart transport in India
52. Smart city innovation through IoT in India	India	Case study	Examines IoT system designs in Indian smart cities
53. Financing eco-cities and low-carbon cities: the case of Shenzhen International Low-Carbon City	China (Shenzhen)	Case study	Reviews financing for low-carbon city development in China
54. Smart mobility in developing countries	Vietnam	Case study	Reviews mobility solutions in developing country smart cities
55. Smart social development key for smart African cities	Africa	Case study	Discusses smart social development for African cities
56. Lessons from Suzhou in China	China (Suzhou)	Case study	Reviews Suzhou's low-carbon city development

In the 56 studies synthesized in this review, 14 studies have attempted to conceptualize smart cities as technology-enabled digital services in developing countries. One commonality shared among these studies is that a technology-enabled digital service is an essential smart city feature. These investigations show that an intelligent city can never be achieved without the full-scale use of information and communication technologies (ICT) in the urban management system. A smart city is conceptually referred to as an intelligent urban system, and is usually broken into four layers that serve corresponding functions: perceptive layer, including sensors, smartphones, smart cameras, and signal lamps for information collection; network layer, containing the internet, IoT, and mobile networks for information transfer; platform layer, which is similar to the human brain and fulfils the function of real-time data analytics with cloud computation or data centers; the behavioral layer, acting as human decision making and supports the policy makers decision making based on information obtained from other layers. Gathering and processing data with ICTs is at the heart of the development of smart cities and helps understand how to manage resources in the public sector better. A: The concept of the smart city, used in certain studies, is extended beyond technology to include related concepts such as low-carbon city and eco-city. This is consistent with other studies, emphasizing sustainability's significance in smart city-building. A smart city must also be sustainable a smart city vision. The vision of a smart city should interweave e-cecity features to provide better public services, achieve higher efficiency in government service delivery, and decrease environmentally harmful aspects such as waste and pollution. In addition, developing a smart city should focus on generating low-carbon economies to underpin sustainable growth and make cities clever, live able, efficient, and affordable (Augustyn *et al.*, 2025). Intelligence and sustainability combined are necessary to develop the physical and social environment to improve people's quality of life. In addition, ICT-supported smart cities need to be aware of other forms of development, such as social, economic, legal, and human development. In this respect, these components are crucial for realizing a smart city in developing countries. For example, research in Mexico explains that developing a smart city is a complex process that entails more than just fortifying technology-based solutions; it also requires architectural redefinition, political backing, and institutional overhaul. These processes and mechanisms are not seen in isolation, but rather are mutually reinforcing and must be synchronized to make the urban development process a holistic, innovative city development (Turoń, 2025). Human resources, which include intelligence, expertise and public participation, are also necessary. Smart city implementation can never be possible without human involvement in transferring knowledge, experience, and

ideas. In addition, smart institutions and smart laws are necessary to shape a human-centered and inclusive smart city. Enhancing the effectiveness of government in delivering public service: The first driver for innovative city development is government efficiency in delivering public service. The objectives of smart cities are to exploit the technology provided by IoT platforms to minimize transaction costs in the delivery of public services, enable better information flows, and increase production efficiency in firms. Data collected through IoT systems is also applied to predict demand, enhance quality, and detect abnormal situations in crucial public services, thus boosting service efficiency.

The feasibility and readiness of resources such as technology and infrastructure are essential in enabling innovative city programs. Reliable and safe infrastructure which preserves user privacy is the basic requirement of innovative city systems. Smart cameras, sensors, IoT networks, and other technologies allow for better services to the public and improved work efficiency. The e-government portal, as adopted in Romania, is one of the ways information technologies could be used to simplify services like procurement, tax payment, and education services for better public service delivery and resource utilization. Human capital is key to realizing innovative city projects in developing countries. Citizens must be well-informed and intelligent enough to deal with smart cities. Governments should invest in technical capacity and tech-savvy in data management, IT security, IoT, ML, etc. As numerous developing world cities do not have the technical capacity to integrate and run innovative systems, governments need to invest in human capital development, including purchasing third-party skills for tasks such as data integration, where required. Economic stability is also key to securing investment and the continued success of innovative city initiatives.

Table 3: summarizing the drivers for smart city development in developing countries:

Drivers for Smart City Development in Developing Countries	**References**
Financing capacity of the government	[35, 36, 53]
Building a strong regulatory environment that fosters the confidence and trust of citizens and investors	[63, 69, 70, 73, 77, 83]
Technology and infrastructure readiness	[39, 46, 63, 64, 76, 77, 82, 83]
Human capital	[44, 70, 77, 82]
Stability in economic development	[71, 83]
Active citizen engagement and participation	[42, 49, 58, 63, 69, 71, 83]
Knowledge transfer and participation from the private sector	[44, 49, 71, 77]
Creating a supportive ecosystem that promotes innovation and learning	[44, 47, 77]

Discussion

This paper identifies essential contrasts between developing and developed nations in innovative city governance (Mallik, 2025). The obstacles described in the review, particularly those in developing countries, are challenges that developed countries with better human development indices have previously overcome. To achieve the potential of a smart city, countries and cities should adopt the most relevant enablers to their context (Mallik *et al.*, 2025). Nevertheless, not all the challenges presented in this review necessarily apply to all cities in developing countries. The economic environment, foreign capital investment in city intelligent construction and political structure significantly impact the smart city practice process (Chowdhury *et al.*, 2025). Latecomer developing countries are grouped under five headings, based on socioeconomic and macro-economic factors such as poverty, income distribution, productivity, GDP, political liberalization, governance, carbon emissions and external networks (Mahim *et al.*, 2025). These aspects should be considered when considering the development requirements for smart cities in various regions. It does not mean that all these obstacles are equally important in all settings, and the urgency and relevance for local governments might determine prioritization. While this categorization is not the focus of this review, expanding this dimension about smart cities in developing countries is an area of future research worth investigating. A review also suggests that smart city definitions in developing countries are concerned with infusing digital technologies into the built environment and services (Mallik & Rahman, 2024). It cannot contribute substantially to poverty reduction without technology penetration, but its contribution is primarily affected by both simultaneous socioeconomic and institutional changes. Some technology, with blockchain being one example, can offer secure spaces for communications, decrease cybersecurity risks and integrate information systems to enforce accountability in public services (Mallik & Rahman, 2024). Building and sustaining smart cities requires long-term planning, policies that are constantly refined and governance structures that are frequently revised. Developing countries' Local and national governments need to increase their efforts to reinforce the identified drivers of smart cities to catch up with the developed nations. Contextual terms are fundamental in developing smart cities in developing countries, given significant differences across cities even in the same country (Sharmin *et al.,* 2025). The local economic structure and human capital, technological literacy, and governance capacity

cannot be ignored in planning and development. For example, mega-cities in China with higher development may utilize integrated city planning, while less developed cities may turn to infrastructure improvement. These disparities in infrastructure requirements are typical in many developing countries (Rhaman *et al.,* 2025). This review has also used sources such as book chapters and grey literature (policy documents, research, conference publications). Although grey literature may lack rigour compared to journal articles, it provides essential preliminary findings in a field that remains formative in many developing countries. To bridge this, disconnect, one of the identified key research gaps is the dearth of a deeper inquiry into the policy processes that advance smart cities within these regions, which is specific to urban planning, public administration and governance. We must bear this constraint when developing more nuanced conceptual frameworks of innovative city governance in the developing country context, indicating a need for more empirical research.

CONCLUSIONS

This research work, informed by a systematic review of existing literature, makes the case that the development of ICT-enabled smart cities in developing countries depends on ICT reforms being integrated with ongoing and parallel social, human, legal, and regulatory reforms in the long-term developmental strategies of developing countries. The success of innovative city projects in these contexts is determined by contextual factors, which include social development, economic policy and financial resources of a state, technological wherewithal of citizens, willingness of citizens to be involved in innovative city projects and culture-specific variables. Noticeable future research directions drawn from this review are to investigate the smart city policy diffusion and how successful lessons learned from one city's development can be shared and affect other cities domestically and abroad. Moreover, further empirical case studies, at the national or city level, are required to understand the evolution, design, and governance of smart cities in DCs. These case studies, whether concentrated within one jurisdiction or as comparative case studies across jurisdictions, will offer a wealth of experience that underpins governance structures which are key to tackling the new challenges developing countries present when implementing smart cities. This research will substantially enrich governance and policy to promote more innovative and sustainable urban developments in developing economies.

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