What are the driving factors of innovation in Smart City? – A systematic review of journal publications from 2014 to 2024

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Abstract
Smart cities have continuously reinvented themselves, striving for increasingly intelligent goals since their inception. However, current research still falls short of providing a clear understanding of smart cities innovation. In response to this shortfall, this paper offers a systematic review y of the ten years` studies on smart cities innovation. Each article focuses on two aspects: 1) What are the driving forces behind smart city innovation? 2) How do these forces influence smart city innovation? The findings disclose that government, society, environmental awareness, and technology driving innovation in smart cities. Specifically, the government promotes innovation in smart city devices and technologies through policies and governance, society through human capital and social capital, environmental awareness through health and safety needs, and technology through user and enterprise technologies. Overall, this analysis offers a comprehensive and systematic view of how a smart city innovation can be understood theoretically, which will offer a positive impact on developing a sustainable smart city.

Keywords: government, social facilitation, environmental awareness, technology.

1. Introduction
Over the decades, studies of Smart City (SC) and the digital deployment have surged worldwide [1]. These studies and practices have been approached from various viewpoints conducted by diverse scholars [2]. The focused and adopted dimensions, indicators, factors, and criteria presented by scholars are also extensively varied, which have led the SC practice and theory beyond the uncertainty with no shared and common knowledge and definition [3, 4], even the concept of smart cities is wavering between smart cities, digital cities, and resilient cities [5]. Despite the differences in numerous studies and definitions of smart cities, there is a consensus on the goal of establishing better cities and achieving a better life for citizens, which cannot be realized without innovation in smart cities.

Smart cities, as an innovative approach to urban development, offer a potential solution to the development challenges [6]. Cities around the world are striving to become smarter and more efficient. It is worth noting that not all cities that have embraced smart initiatives have achieved positive outcomes in past practices. On one hand, excessive focus on technology-centered approaches has posed challenges related to data management, privacy, security, and new policies concerning digital infrastructure [7]. On the other hand, emphasis on smart governance has led to the complexity of traditional aspects within cities such as healthcare, education, and others [8]. Consequently, smart cities have been continuously

seeking comprehensive solutions, striving for transformation and innovation. However, the driving forces behind smart city innovation are not yet fully understood.

Smart cities are the result of innovation, and they are increasingly associated with the concept of innovation [9]. On this base, existing research views smart cities as a result of innovation, neglecting the reasons for innovation in smart cities. Therefore, our guiding research questions are: what are the drivers of innovation in smart cities innovation and what factors contribute to their development and renewal? How they promote smart city innovation? Current literature has overly focused on individual cases and typical examples of smart cities, and there is a need for a more comprehensive and holistic perspective to identify the detailed genealogies of factors that promote innovation in smart cities. Additionally, it is still unclear what future research needs to be conducted in this field.

In order to address this gap in the knowledge and literature, we performed a systematic review, which is aimed at carefully identifying all the relevant studies on the topic and creating an accessible synthesis based on the pieces of information from multiple studies [10]. This systematic literature review aims to discuss the relationship between smart cities realizing innovation as an outcome and the reasons for realizing innovation. This is timely for several reasons. First, smart cities have achieved technological leaps and diversity in fields in practice, existing reviews do not respond to innovation head on. Second, this review will bring together key contributions in this field of research to shed light on how smart city innovations are made possible. Third, this paper is timely to show what future research efforts should focus to move this area of research forward. Following this introduction, Section 2 provides a concise review of the literature. Section 3 introduces the methodological approach. Section 4 presents the results of the analysis. Section 5 and Section 6 discussed the findings and limitations. Section 7 offers concluding remarks.

2. Theoretical background

2.1 The concept of SC

SC grassroots was located back in 1994 and the launch of the digital city of Amsterdam [11] and the Geneva metropolitan area network (so-called Geneva-MAN) [12]. Initially, smart cities were defined as urban areas that utilize digital data and technology to enhance efficiency, promote economic development, improve quality of life, and enhance urban sustainability [13, 14], such as sensors, real-time monitoring, and digital knowledge-sharing platforms.

However, the technology-driven approach of smart cities has brought along a series of potential risks, including the digital divide and data security concerns. In response to this, the concept of smart cities goes beyond technology, citizen participation [14], collaborative governance structures, competitive, smart governance [15], sustainable mobility [16], sustainable development [6], and equitable market environments [17] have been incorporated.

2.2 Theoretical background

In an increasingly digital society, existing literature reviews focus on development models, governance pathways, influencing factors, and critical analysis of SC [2, 18, 19, 20].

Although some literature has paid attention to the connection between smart cities and innovation, which explained the four dimensions of smart city innovation: openness, urban, sustainability, and digital innovation [21], and proposes types of innovation such as community organization, frugality, entrepreneurial, and institutional pioneering [21, 22] The literature reviews that treat smart development as a result of urban innovation and focus on the result of smart city innovation are relatively limited.

From the perspective of innovation systems theory, innovation is a systemic process that involves multiple interdependent components, such as technology, market, organizational structure, and culture. Scholars have proposed two models for development of smart city: technology-driven and human-driven modes [23].These two perspectives are also understood as a technical perspective originating from the American business community and a holistic perspective instigated from European institutions [13]. Advocates of the technical perspective suggest that digital innovation should be at the heart of successful smart city initiatives [24]. However, the excessive focus on the technological deployment may led to an imbalance of the urban ecosystem, in which social, human and environmental capital facets are neglected causing a negative social impact, including safety problems, ethical dilemmas, surged inequality [25]. Existing studies have proposed a citizen-centered, people-oriented approach [26]. It is important to stress that cities are human settlements and they are supposed to serve us. Therefore, the human element in smart city innovation cannot be overlooked.

Previously, many smart city reviews have been published already, in particular with the focus on the research focusing area and concept of smart city studies based on the bibliometric analysis [27, 28, 29] These analyses on smart city researches indeed provide a holistic insightful agenda for the future smart city development, where the engagement with the role of technology and human to provide a healthy and sustainable dynamics for smart city innovation has not been adequately reviewed. This is manifested in the emphasis on the role of a particular technology in smart city innovation within the technological dimension, such as blockchain, infrastructure and physical assets [30]. In the social dimension, the role of only partial subject is focused on, such as human resources, organizational transformation [30]. We propose to systematically study of SC innovation from technology and non-technology point of view, taking into account the different subjects, focusing on mechanisms of action of these factors, aiming to provide a comprehensive picture of the domain.

3. Methodology

A systematic literature review can bring these scattered pieces of knowledge into comprehensive analysis [31]. It is suitable for research topics where knowledge is dispersed and uncertain. Literature for systematic review were selected only if the following eligibility criteria were satisfied: field of study, topic, research method, language, publication status and database, and publication year (Table 1).

Table 1. Literature conditions

Conditions	Details
field of study	social science
topic	"smart city/smart cities/intelligent city/intelligent cities/ digital city/ digital cities innovation"
research method	Theoretical, empirical, qualitative, or quantitative researches
language	English
publication status and database	Scopus and Web of Science
publication year	2014-2024

Field of study: The emergence of digital technology has given rise to a substantial and continuously growing body of literature on smart cities, primarily in the fields of computer science, engineering, and social sciences. This review will focus on the social sciences, as they encompass articles that also touch upon technological and engineering aspects. Focus on high quality journals in urban planning, social and humanities research.

Topic: Search keywords are "smart city/smart cities/intelligent city/intelligent cities/digital city/ digital cities innovation" in title, abstract, or keywords.

Research method: Theoretical, empirical, qualitative, or quantitative researches are all included, no specific research method is excluded.

Language: English written articles were included.

Publication status and database: Published in a peer-reviewed journal or conference proceedings. The articles are peer-reviewed journal articles or full-article proceedings collected from Scopus and Web of Science.

Publication year: Research on early literature primarily focused on the definition and practical exploration of smart cities, with less attention given to innovative development. With the development of the smart city concept in the last decade, there has been a gradual increase in research on smart city innovations. Therefore, the publication year of articles herein is limited to 2014 through 2024.

The inclusion and exclusion criteria were developed by considering the research topic, application field, types of data, and relevance to the research questions of this study. Specific criteria were used to select and filter the studies discovered from the databases(Table 2).

Table 2. Inclusion and exclusion criteria

Inclusion /Exclusion Criteria	Position
Criteria 1: No direct connection (not within the scope)	yes/no/not sure
Criteria 2: Irrelevant focus including developing a new technological framework or system or application.	yes/no/not sure
Criteria 3: Book/book sections are excluded.	yes/no/not sure
Criteria 4: The article extensive focus on indicator, or assessment tool are excluded.	yes/no/not sure
Criteria 5: Does the main content answer at least one of the research questions? (Non-empirical papers are excluded)	yes/no/not sure

An initial search was carried out in the Scopus and Web of Science on titles. Following the eligibility criteria, 587 articles were identified from Scopus and 471 articles from Web of Science. In total, 758 articles were eligible for screening after excluding duplicates(n=350) ensure that the selected articles were able to answer the RQs. We screened the titles, abstracts and keywords of these papers and removed 699 articles that were deemed not relevant, 1) irrelevant topic such as logistics governance in smart cities (n=273); 2) irrelevant focus including developing a new technological framework or system, for example: conceptual papers, opinion pieces, other emergent technologies (e.g., virtual reality, augmented reality, 3D, EEG/ECG sensors, etc.) (n=225); 3) not an article or not available (n=43); 4) articles focusing on the content of smart city innovation, such as types or standards, were excluded (n=158). Excluding these articles, a total of 155 articles were eligible for screening.

Based on reading the full article, 108 articles were excluded. The article has to provide either potential or observed transformation or innovations of smart city development, the main content answer at least one of the research questions. Finally, 47 studies were included and synthesized in the systematic review (Fig.1). The researchers held regular meetings to discuss the selection process, review selection decisions, and ensure adherence to inclusion and exclusion criteria. The two authors and two graduate students used an open coding approach to identify themes in key sections of each paper, develop codes for these themes, and group the codes into themes. The reliability is crucial for minimizing bias in the systematic review process. Some strategies adopted in this review include: clearly defining inclusion and exclusion criteria, using standardized coding sheets for data extraction, involving multiple reviewers for cross-checking, and clearly documenting methods for reproducibility.

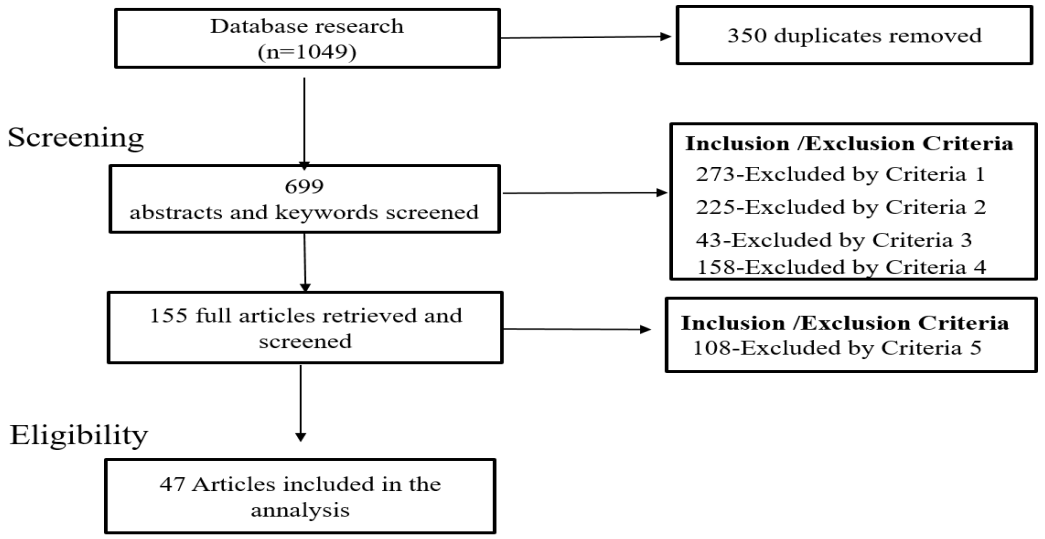


Fig. 1. Literature selection procedure

4. Results

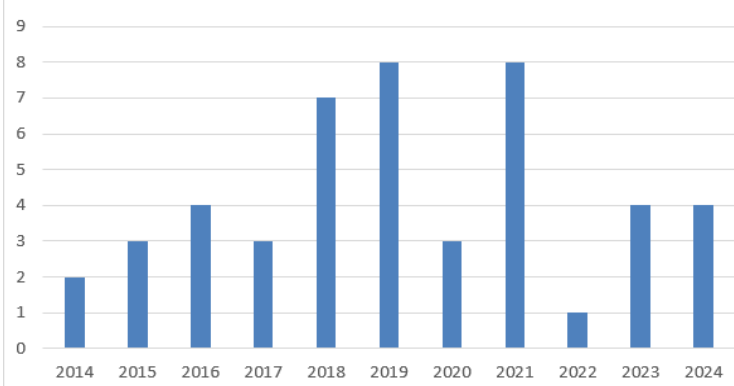
4.1. General observations

Through a systematic literature approach, this paper combed through 41 articles for analysis. These papers are diverse, covering different journals in terms of field and innovations in terms of topics related to different elements of smart cities. Specifically, the selected articles have diversity among fields of study, research method, database and publication years as shown in Table 3. First, 41 articles are published, mainly in the field of Social Science. The most popular publication outlets for smart city research are those with technology and society development focus, with *Technological Forecasting and Social Change* (9 publications), followed by journals that have a link with an urban/city development, i.e. *Cities* (10), *the International Journal of Urban and Regional Research* (1), *Smart Cities* (1), *Sustainable Cities and Society* (1), etc. and being the single largest source in this category (see Appendix 1 for more detail). These publications can be categorized into five major fields based on the volume of publications: Urban Studies, Technology, Public Administration, Business& Economics, and Environment.

Research methods are diverse because no specific methods are excluded if the article satisfies the criteria. The results showed that 58% of selected articles used qualitative methods while 42% used quantitative methods. Empirical studies account for 70% of the total and theoretical studies represent 30%. The sharp rise in 2019 and 2021 smart city research provides new evidence to support the findings of the literature reviews.

Table 3 Characteristics of the records.

Criteria	Category	No	%
Field of study	Urban Studies	17	35%
	Technology	11	24%
	Public Administration	12	26%
	Business& Economics	3	5%
	Environment	4	9%
research method	Qualitative	26	58%
	Quantitative	19	42%
	Empirical	31	70%
	Theoretical	14	30%
publication year			



4.2 Kinds and characteristics of results

What are the major innovative factors of smart city research in these areas? How they play a role? We seek to address two questions in this section. We take a closer look at the specific types of innovation drivers by analyzing the contents of the literature in this section. Similar innovative factors are summarized into a single representative factor.

4.2.1 Government: Policy and governance

In the transformation and innovation of smart cities, the government plays a central role as the leader. Government facilitates smart city innovation through policy and governance, 11 articles focused on these two ways among the articles we reviewed. Urban policy represents the government's idea and demand for innovation in smart cities, aiming to provide more efficient services to citizens, enhance urban competitiveness, and achieve more efficient and well-rounded urban development [32].

On the one hand, there is both conceptual advocacy. The government proposes concepts of smart city governance, such as frugal governance [33], humanistic governance [34], and democratic participation [35] to provide more possibilities for smart city innovation and development. For example, the Belgian government believes that smart cities should particularly utilize "innovative technologies" and be willing to "change behaviors related to energy consumption" to achieve climate goals [30]. On the other hand, concrete measures are formed. For example, municipal authorities and decentralized governance structures in the public sector encourage collaboration among stakeholders and stimulate innovative business models in both private and public sectors [36]. By maintaining the necessity of public funding and other resource allocations and implementing long-term institutionalization, the interaction between stakeholders is integrated into regional networks [37]. Effective co-creation practices/mechanisms are implemented to ensure diversity in collaboration among stakeholders, enhance the innovation capacity of cooperation, and ensure sustained commitment [38]. Developing smart city innovation indicators to provide direction for their development [16, 39]. Furthermore, expanding the scope of smart technology applications, regulating data usage, enacting legislation, standardizing software platforms, and establishing digital platforms are all powerful measures by the government to promote innovation in smart cities [40].

4.2.2. Social facilitation: human capital and social capital

The second area of research focuses on issues relating to social dynamics, with a total of 17 articles. Trencher [41] emphasized that smart city research has shifted from being techno-economically driven to a more people-centered approach. Based on the existing literature, this shift is mainly driven by human capital and social capital, which together promote innovation in smart cities. Human capital refers to the skills and competencies embedded in individuals or groups. human capital and citizen skills play a crucial role in driving innovation and sustainable development in smart cities [42].Robert Solow's pioneering work in the 1950s demonstrated that most of the productivity growth in society comes from human knowledge and skills rather than technology. Studies by Biswas [43] highlighted the importance of empowering citizens to ensure inclusivity and improve efficiency, equity, and quality of life for citizens.

Social capital refers to the quality and number of connections between social institutions and individuals. According to Ferraris et al [44], understanding the reasons and outcomes of stakeholder relationships and interactions in networks is crucial for sustainable innovation. Market model innovation has contributed to the expansion of the smart city domain [45], while citizens have also expanded their social networks through the use of smart technologies, generating innovation drivers [46]. Ardito [47] discussed the role of universities, while Edge et al. [48] investigated the role of politicians, business leaders, and the community in smart city governance and planning. Innovation in smart cities is driven by a trilateral relationship among governments, corporations, and universities [44]. Thus, the innovation ecosystem of smart cities has transitioned from a three-helix model, which connects citizens, governments, and businesses [49], to a four-helix model known as the Quadruple Helix, which adds the dimension of educational institutions [50], and further evolves into a five-helix model that includes citizens, governments, businesses, educational institutions, and markets [51]. Additionally, higher expectations have been placed on smart cities regarding consumer involvement, social compatibility, usability for end-users, local job creation, and increased civic awareness [45].

4.2.3 Environmental awareness: green awareness and environmental initiatives

We identified 9 articles focusing on the role of environmental awareness and the concept of green development in driving innovation in smart cities. These articles primarily assessed how well smart cities have benefited from environmental awareness and the ecological environment, which drive the decision to adopt smart technologies through demand and participation, thus enhancing digital capability within these cities [52]. Rapid urbanization and influx of a large population into cities have posed significant challenges to air and soil quality. The quest for healthy and safe urban environments have stimulated the creation of new smart technologies [53]. For example, the demand for urban ecological environments promotes innovation in smart devices to provide real-time data that guides citizens' behaviors and choices, such as home energy usage [54]. Installing photovoltaic panels in community households for self-consumption, combined with demand response and ICT-supported programs, allows surplus energy to be traded behind the electricity meter at lower prices, providing electricity to vulnerable groups in the city [55]. By leveraging smart city technologies and applications, resource efficiency can be improved, environmental pollution can be reduced, and residents' quality of life can be enhanced [56]. The tendency of many smart city projects to prioritize top-down introduction of enterprise service technologies without understanding citizen needs and skills has been a key reason for the failure of such projects [57]. The pursuit of eco-cities has prompted citizens to place more emphasis on green construction in the face of smart cities [58]. People's concern for environmental issues and their search for solutions have driven the enrichment and content innovation of the smart city concept [59, 60].

4.2.4 Technological drivers: User technology and research & digital innovation

The most direct driving force for smart city transformation and innovation is technological innovation. We identified 13 articles focusing on technology to drive smart city innovation. Innovative technologies can be adopted to manage urban growth more effectively [61].This aspect of innovation research primarily focuses on smart technologies, applications, systems, architecture, infrastructure, and issues related to technology diffusion in smart

cities, including Information and Communication Technologies (ICT), Artificial Intelligence (AI), Internet of Things (IoT), blockchain, big data, and digital twin [62, 26].

Technology's innovation for smart cities is realized in two main ways. First, user technology innovation, such as the application of wireless network technology in urban public spaces [63], the adoption of sustainable technologies or clean technologies at different stages of technology diffusion [64], and wearable devices and mobile phones. Governments, citizens, and businesses can gain flexible and timely information through the innovation of communication infrastructure [65]. The second aspect is from the perspective of developers, who realizes technological and digital innovation. For example, the development of 5G technology [66], the redesign of product frameworks [67], new forms of automated correlation that integrate geographic information systems and spatial analysis [68], the fusion of language, image, and concepts from quantum physics in quantum technology [69], machine learning for data analytics of smart cities [70]. and the evaluation of smart cities [71]. These innovations provide technological support for the "smarter" aspects of smart cities or a deeper understanding of intelligence in smart city development.

5. Discussion

The total 47 articles have been reviewed based on technology-centered and human-centered perspectives, which focused on what drives SC innovation and how it works. In this review, the authors develop a balance between dichotomy aspects including in between digital technology and social fabric, administration, efficiency development and green development. There are some significant findings.

1) The government has fostered innovation in smart cities, playing a role through policies and governance. The factors of policy and strategy driven by the government sector are revealed to be the following predominant factors engaged by SC innovation studies [18]. Adjustments in economic structure and technological means incentivize and constrain the government to adapt and encourage the development and application of smart city technologies [72]. Planning, governance and innovation of SC mainly led by policy maker and government authority [1], which reveals that the current SC studies lack in engaged by the lens of professionals whom have the perspective of urban planning context, including architects, urban designer and environmental expert.

2) Social forces have driven innovation in smart cities, exerting their influence through human capital and social capital. The innovation of smart cities is the result of a dynamic process where public and private sector participants coordinate their activities and resources on open innovation platforms. The different yet complementary connections formed by these actors further coordinate and align the SC based on their developmental stages and embedded cultural and social capacities [3].

3) Environmental awareness has propelled innovation in smart cities, playing a role through green consciousness and eco-friendly initiatives. The development goal of SC is to establish a place where all residents can live in a healthy and sustainable manner; the concept of greenness and environmental interventions cannot be overlooked during the process of smart city innovation. The contradiction between urban resource consumption

and the limited availability of natural resources, current improvements and sustainable development lead to higher demands for efficiency, conservation, and sustainability in smart cities. There is a scarcity of literature focusing on the green environment and the ecological needs of residents, which implies that further emphasis on this content is needed.

4) Technology has driven innovation in smart cities, exerting its influence through user technology and the adoption of new technologies. The effectiveness and accuracy of smart cities rely on technological conditions. Data collected through technological means informs policies, planning, and public life. Therefore, advancements in technology and the richness of technological scenarios enable smart cities to evolve and undergo systematic upgrades.

Researchers have focused on the role of innovation based on new technological practices, products and services, leverage of organizational projects, and urban partnerships with local knowledge as sources of innovation potential in smart cities [73, 71].It is important to note that these factors do not act alone but rather as a combination of multiple factors, a combination of technology, stakeholders, and institutional advancements were needed, various innovation elements play their roles. The government aims to better serve societal needs, guided by innovation awareness, who facilitates the orderly operation of technology through governance policies and institutional promotion in smart cities [68]. The social factor aims to better utilize human and social resources to support smart cities and enhance resource quality and efficiency, co-production makes cities more intelligent [74]. The environmental awareness aims to improve the urban ecological systems, promotes smart city devices and technologies by the desire for a better quality of life. The technological factor represents objective technological conditions, which facilitates the digitalization process of SC. These four dimensions of factors collectively drive innovation and sustainable development in smart cities (Fig. 2).

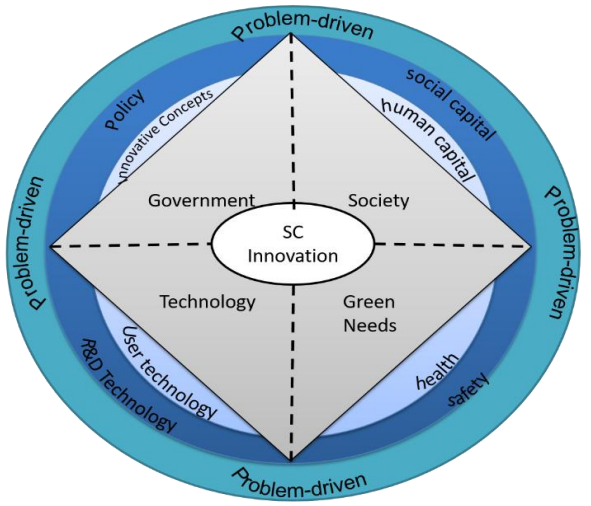


Fig. 2. A proposed framework for the innovations of smart cities

6. Future research and limitations

6.1 Areas for future research

The systematic review analysis indicates that smart cities are emerging as a fast-growing topic of scientific enquiry. The social intelligence, cultural artifacts, and environmental attributes required for urban innovation in the context of technologies have become important driving factors in meeting the needs of urban development and fostering smart city innovation. To address the challenges posed by this situation, it is necessary to enhance knowledge exchange among different disciplines involved in smart city research. Researchers should seek common ground beyond differences through 'collective action.' More importantly, smart city researchers need to go beyond the 'sum-of-its-parts' by integrating their respective research domains. By building a collaborative environment across different disciplines and fields, research can be enhanced to improve our understanding and promotion of smart city innovation and development.

In addition, despite the recognition and importance given to citizen participation in both research and practice, this study offers an important research insight into exploring how citizens can enhance their digital literacy and engage in smart city initiatives. The city cannot be totally smart without the effective interaction between human, social and environmental facets of urban context [4] .Therefore, scholars in this field can, on one hand, research on how to develop plans and strategies to provide citizens with digital literacy, reducing barriers to technological adoption and increasing acceptance rates. On the other hand, study suitable communication strategies that can facilitate the interaction among government agencies, public institutions, and citizens, in order to develop truly grassroots plans and attract public participation in smart city development.

6.2 Limitations

This review focuses on the drivers of innovation for sustainable development in smart cities, with limited discussion on the outcomes of innovation, such as whether innovation is successful and how success is achieved. Additionally, the discussion on the innovation process is not extensive, including the challenges faced in urban innovation and how to overcome them. Research on the drivers of innovation is the starting point for smart city innovation, and the process and outcomes of innovation also require ongoing attention. This will be the focus of future research in this paper.

7. Conclusion

This study reveals the drivers of innovation in smart cities and the mechanism of operation. An extensive review of literature was performed in this paper, and based on that, we conducted an in-depth analysis. From four perspectives, we identified scholars' discussions on the factors of innovation in the context of smart cities. With the rapid development of global smart cities and the application of smart technologies in urban areas, a diverse and collaborative approach is needed. Smart city renewal and innovation go beyond the establishment of communication infrastructure; it is more important to achieve sustainable and rational development of smart cities, ensuring that technology and urban development serve the needs of people. It is expected that this review will animate enthusiasm for further conversations and research in these zones.

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Submission of an article implies that the work described has not been published previously, that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyright-holder.

Declarations of interest
None

Appendix 1.

No.	Authors	Title	Journals	Years
1.	Waghmare, M.	Democratic participation and smart city citizenship in emerging economies	Cities	2024
2.	Sorri, K., Yrjönkoski, K., & Seppänen, M.	Smart cities, smarter values: Unpacking the ecosystem of urban innovation	Technology in Society	2024
3.	Karatzimas, S.	Smart cities' actions, performance and reporting practices on climate change challenges	Cities	2024
4.	Banerjee, A., Costa, B., Forkan, A. R. M., Kang, Y., Marti, F., McCarthy, C., Jayaraman, P. P.	5G enabled smart cities: A real-world evaluation and analysis of 5G using a pilot smart city application	Internet of Things	2024
5.	Aysan Bashirpour Bonab, Francesco Bellini, Ihor Rudko	Theoretical and analytical assessment of smart green cities	Journal of Cleaner Production	2023
6.	Alahakoon, D., Nawaratne, R., Xu, Y., De Silva, D., Sivarajah, U. Gupta, B.	Self-Building Artificial Intelligence and Machine Learning to Empower Big Data Analytics in Smart Cities	Information Systems Frontiers	2023
7.	Abdullah Addas.	Influence of Urban Green Spaces on Quality of Life and Health with Smart City Design	Land	2023
8.	Bonab, Aysan Bashirpour, et al.	Urban quantum leap: A comprehensive review and analysis of quantum technologies for smart cities	Cities	2023

9.	Yigitcanlar, Tan, et al.	What are the key factors affecting smart city transformation readiness? Evidence from Australian cities	Cities	2022
10.	Rehm, Sven-Volker, Shane McLoughlin, and Giovanni Maccani	Experimentation platforms as bridges to urban sustainability	Smart Cities	2021
11.	Yahia, Nesrine Ben, et al.	Towards sustainable collaborative networks for smart cities co-governance	International journal of information management	2021
12.	White, G., Zink, A., Codecá, L., & Clarke, S.	A digital twin smart city for citizen feedback	Cities	2021
13.	El Hilali, Souad, and Ahmed Azougagh	A netnographic research on citizen's perception of a future smart city	Cities	2021
14.	Balicki, Jerzy	Many-objective quantum-inspired particle swarm optimization algorithm for placement of virtual machines in smart computing cloud	Entropy	2021
15.	Allam, Zaheer, and David S Jones	Future (post-COVID) digital, smart and sustainable cities in the wake of 6G: Digital twins, immersive realities and new urban economies	Land use policy	2021
16.	Chu,Zhen, Mingwang Cheng, and Ning Neil Yu	A smart city is a less polluted city	Technological Forecasting and Social Change	2021
17.	Nakano, Satoshi, and Ayu Washizu	Will smart cities enhance the social capital of residents? The importance of smart neighborhood management	Cities	2021
18.	Fraske, Tim, and Bernd Bienzeisler	Toward smart and sustainable traffic solutions: a case study of the geography of transitions in urban logistics.	Sustainability: Science, Practice and Policy	2020
19.	Ferraris, Alberto, Zhanna Belyaeva, and Stefano Bresciani	The role of universities in the Smart City innovation: Multi-stakeholder integration and engagement perspectives	Journal of Business Research	2020
20.	Edge, Sara, et al.	Exploring diverse lived experiences in the Smart City through Creative Analytic Practice	Cities	2020
21.	Appio, Francesco Paolo, Marcos Lima, and Sotirios Paroutis	Understanding Smart Cities: Innovation ecosystems, technological advancements, and societal challenges	Technological forecasting and social change	2019
22.	Giourka, Paraskevi, et al.	The smart city business model canvas—A smart city business modeling framework and practical tool	Energies	2019

23.	Desdemoustier, Jonathan, Nathalie Crutzen, and Rudolf Giffinger	Municipalities' understanding of the Smart City concept: An exploratory analysis in Belgium	Technological Forecasting and Social Change	2019
24.	Ardito, Lorenzo, et al.	The role of universities in the knowledge management of smart city projects	Technological forecasting and social change	2019
25.	Biswas, Arindam	A framework to analyse inclusiveness of urban policy.	Cities	2019
26.	Trencher, Gregory	Towards the smart city 2.0: Empirical evidence of using smartness as a tool for tackling social challenges.	Technological Forecasting and Social Change	2019
27.	Nilssen, Maja	To the smart city and beyond? Developing a typology of smart urban innovation.	Technological forecasting and social change	2019
28.	Leitheiser, S., & Follmann, A.	The social innovation–(re)politicisation nexus: Unlocking the political in actually existing smart city campaigns? The case of SmartCity Cologne, Germany	Urban Studies	2019
29.	Foth, Marcus	Participatory urban informatics: towards citizen-ability	Smart and sustainable built environment	2018
30.	Batty, Michael, et al	Smart cities of the future	The European Physical Journal Special Topics	2018
31.	Karvonen, Andrew, Federico Cugurullo, and Federico Caprotti	Inside smart cities: Place, politics and urban innovation	The planning review	2018
32.	Bibri, Simon Elias	The IoT for smart sustainable cities of the future: An analytical framework for sensor-based big data applications for environmental sustainability	Sustainable cities and society	2018
33.	Angelidou, M., Psaltoglou, A., Komninos, N.,Kakderi, C., Tsarchopoulos, P., & Panori, A.	Enhancing sustainable urban development through smart city applications	Journal of Science and Technology Policy Management	2018
34.	Paskaleva, Krassimira, and Ian Cooper	Open innovation and the evaluation of internet-enabled public services in smart cities	Technovation	2018
35.	Mora, L., Deakin, M., Reid, A.	Combining co-citation clustering and text-based analysis to reveal the main development paths of smart cities	Technological Forecasting and Social Change	2018

36.	Kummitha, Rama Krishna Reddy, and Nathalie Crutzen	How do we understand smart cities? An evolutionary perspective.	Cities	2017
37.	Chatterjee, Sheshadri, Arpan Kumar Kar, and MP Gupta	Critical success factors to establish 5G network in smart cities: Inputs for security and privacy.	Journal of Global Information Management (JGIM)	2017
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