



Analyzing Research Hotspots and Frontiers in Global Research on Digital Grassroots Governance through CiteSpace

Xiaotao Li¹, Yining Zhang², Ling Xie³

¹Library, Nanjing University of Aeronautics and Astronautics, Nanjing, China

²School of Humanities and Social Sciences, Nanjing University of Aeronautics and Astronautics, Nanjing, China

³College of Economics and Management, Nanjing University of Aeronautics and Astronautics, Nanjing, China

Email: lixiaotao@nuaa.edu.cn

How to cite this paper: Li, X.T., Zhang, Y.N. and Xie, L. (2023) Analyzing Research Hotspots and Frontiers in Global Research on Digital Grassroots Governance through CiteSpace. *Open Access Library Journal*, 10: e10927.

<https://doi.org/10.4236/oalib.1110927>

Received: October 25, 2023

Accepted: November 27, 2023

Published: November 30, 2023

Copyright © 2023 by author(s) and Open Access Library Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

In order to explore the research hotspots and development trends of digital grassroots governance abroad, this study focuses on 227 documents related to “Digital Grassroots Governance” within the Scopus database, covering a span of nearly 20 years (2005-2023). We utilized CiteSpace software to perform a visual analysis of these documents. Subsequently, we constructed keyword co-occurrence networks and cluster maps to better comprehend the landscape of “digital grassroots governance”. The study reveals that foreign research on Digital Grassroots Governance primarily revolves around three core areas: public participatory governance, regional research on digital grassroots governance, and aspects related to smart city technology and services. Based on these key thematic areas, we can summarize three major research directions in foreign digital grassroots governance. All of these directions are intertwined with the governance of smart cities, encompassing smart citizen participatory governance, the digital transformation of smart city infrastructure, and the sustainable development of smart cities.

Subject Areas

Administration and National Administration,
Library Information and Digital Library

Keywords

Digital Grassroots Governance, Smart City, Foreign Literature, CiteSpace

1. Introduction

Grassroots governance can reflect the level of modernization of a country’s go-

vernance system and capacity. “Rule the country, protect the state, emphasize the grassroots.” Practice has shown that the effectiveness of grassroots governance directly determines whether the cornerstone of national governance is solid or not [1]. With the advent of the digital age, grassroots governance practices are facing new opportunities and challenges. Digital technologies and applications represented by big data, cloud computing, artificial intelligence, etc. are continuously driving the transformation of the social governance model. In the face of increasingly complex governance needs, it has become an inevitable choice to utilize digital technology to promote grassroots governance model innovation.

China’s research on Digital Grassroots Governance is still showing a rapid upward trend, with research hotspots focusing on “Digital Governance”, “Rural Governance” and “Smart Cities”. For the time being, no scholars have explored studies related to that abroad. So, are there digital innovations in grassroots governance abroad, and what are the key areas of digital transformation? This study will explore these questions. The discussion of these issues can not only help us understand the development of Digital Grassroots Governance abroad but also provide a reference at home, which will help us to jointly address the global digitalization challenges.

CiteSpace is a visualization tool that helps us to better understand existing scientific discoveries and also to explore the development of scientific knowledge in specific areas, providing a basis for new scientific discoveries in the future [2]. This study uses CiteSpace visualization software to study foreign literature on “Digital Grassroots Governance”, to grasp the development history and cutting-edge hotspots of digital grassroots governance abroad, and to provide a basis for foreign follow-up research, as well as a reference for domestic in-depth research in this area in the future.

2. Data Sources and Research Methodology

Literature data analyzed in this study were obtained from the Scopus database, an abstract and citation database launched by Elsevier in 2004 that provides a comprehensive overview of global research in 240 disciplines, including science, technology, medicine, social sciences, arts, and humanities. The search formula: (TITLE-ABS-KEY("digital governance" OR "digitized governance" OR "digitization of governance" OR "e-governance" OR "e-government" OR "digital transformation" OR "smart governance" OR "smart city" OR "digital innovation" OR "digital technology" OR "digital infrastructure" OR "digital society" OR "in-formation technology governance" OR "ICT governance" OR "data governance" OR "technology governance" OR "governance strategy" OR "governance implementation" OR "policy governance" OR "governance framework")) AND (TITLE-ABS-KEY ("grassroots governance" OR "local governance" OR "community governance" OR "village governance" OR "town governance" OR "rural governance" OR "county governance" OR "neighborhood governance" OR "ward

governance" OR "municipal governance" OR "bottom-up governance" OR "decentralized governance" OR "participatory governance") AND ("governance" OR "administration" OR "management")). Retrieval time is September 9, 2023. The interval of publication was chosen to be 2005-2023 (the last 20 years), as the amount of literature published in 2004 and before shows a relatively sparse state, with only one or zero publications in several years. A total of 227 relevant documents were obtained to be used for post hoc analysis after excluding documents with low reference value such as conference proceedings, notices, book reviews, and so on.

The data funnel diagram for filtering literature is shown in **Figure 1**.

3. Findings

3.1. Annual Distribution of Publications

A common method of analyzing the volume of publications and identifying trends in the growth of publications is to count the annual number of publications in the literature. From 2005 to 2023, the trend of annual publications on “Digital Grassroots Governance” is shown in **Figure 2**. The growth trend can be categorized into two phases, the initial phase and the rapid growth phase.

Between 2005 and 2016, research on “Digital Grassroots Governance” was in its initial stages. European countries were actively exploring new concepts and mechanisms of local governance aimed at improving the effectiveness of local governance, such as the introduction of citizen participation in decision-making to build political trust between the State and citizens [3]. With the rise of the internet, foreign countries were also evaluating the impact of Information and Communication Technologies (ICT) on governance [4]. They examined case

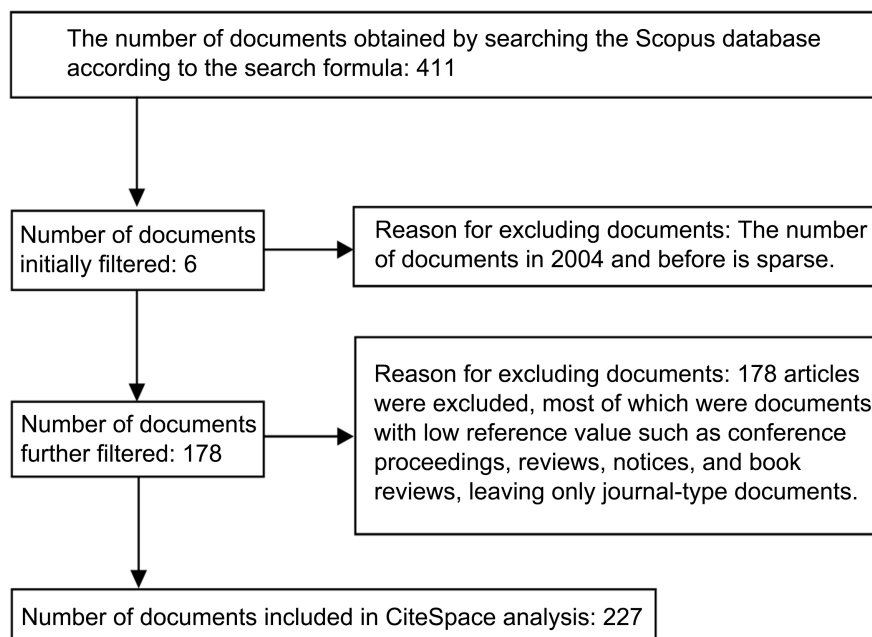


Figure 1. Literature filtering funnel diagram.

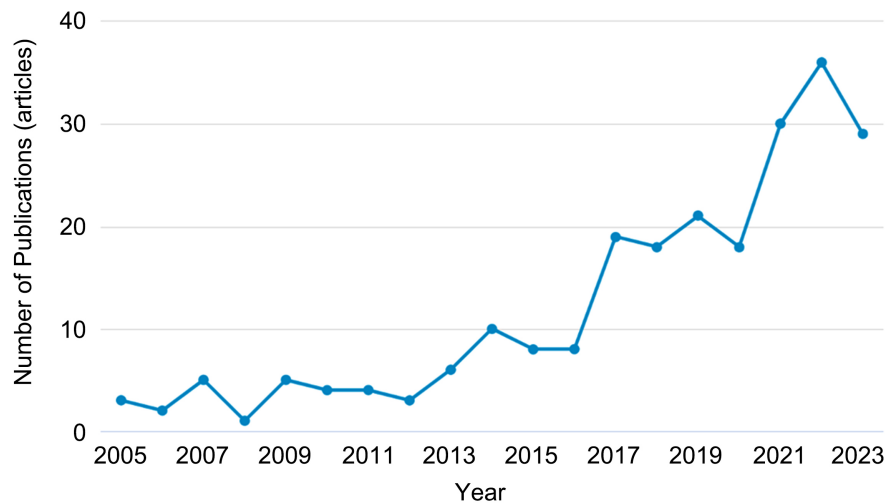


Figure 2. Temporal distribution of research literature on “digital grassroots governance” in the scopus database (January 1, 2005-September 18, 2023).

studies from both developing and developed nations in e-government to understand how network technologies facilitated citizen participation in decision-making, enhanced government governance efficiency, and promoted the development of smart organizations [5]. During this period, an increasing number of countries began to experiment with using ICT to enhance governance transparency [6] and foster greater political involvement of their citizens [7]. Ultimately, the goal was to elevate the level of local governance.

In 2012, “Smart City” was introduced in Europe, describing in detail the objectives, research challenges, construction scenarios, and project areas for the construction of smart cities [8]. It further integrated information and communication technologies (ICT) into traditional infrastructures, integrated digital technologies into the construction of future cities, explored new models of urban governance, and related research entered a phase of rapid development. Digital technologies also drove the transition from traditional nature conservation to “digital conservation” and continued to facilitate the exploration of digital innovations [9]. As a result, from 2012 to 2015, there was a fluctuating upward trend in the amount of literature published.

In 2016, the rise of the European Smart Cities Initiative caused a significant increase in the amount of literature published. European countries wanted to tackle climate change and energy security challenges by practicing the use of new digital technologies to make cities smarter and more competitive [10]. Starting from 2017, the research on “Digital Grassroots Governance” entered a phase of rapid development. However, opportunities for digital technologies to have a positive impact on the lives of citizens were missed due to the inadequacy of the European Smart Cities Initiative in considering social sustainability. Given this, citizen-centered mechanisms were proposed in subsequent countries [11]. Subsequently, “Participatory Governance” attracted a lot of attention, with some countries arguing that although participatory governance had been implemented

in Asian countries, it was difficult for people at the bottom to express their needs through e-governance, as opposed to the middle class [12]. Some countries were eager to utilize digital technologies to empower the practice of public administration, rather than remaining at the theoretical level [13].

Starting in 2018, a number of studies were added that closely link citizen “Participatory Governance” and “Smart Cities” [14]. Policymakers drove the development of open government data, advanced analytics, visualization, and personalized applications to increase interaction with citizens to promote citizen engagement in local governance [15]. Since 2021, there has been a significant increase in the relevant literature. During this period, countries continued to focus on e-government. Such as Qatar [16], for example, sought to address the low level of public participation in e-government services and the low quality of information received by citizens, and actively explored new models of e-government development to enhance the level of services provided to the public. Moreover, China believes that how to use smart governance technology to promote the modernization of governance capacity has become a challenge of the new era [17] [18], especially as the key technology of digital transformation—artificial intelligence, the public value that the public sector services supported by it can create in local governance is very worth exploring [19]. Meanwhile, issues such as public engagement, human-centeredness, and digital transformation in health-care [20] and other areas have been hot topics of discussion in Smart City Governance [21]. In the future, it is expected that there will be more in-depth exploration of digital transformation and public participation in governance.

3.2. Keyword Co-Occurrence Analysis and Keyword Frequency Statistics

Keywords serve as highly condensed representations of the content in literature and provide a concentrated reflection of research topics. By analyzing the keywords in foreign literature on “Digital Grassroots Governance”, we can track the research hotspots in this field abroad. Using CiteSpace, a knowledge mapping tool, we created knowledge graphs for 227 documents related to Digital Grassroots Governance. The result can be seen in **Figure 3**, where the size of the circles in the graph represents the frequency of keyword occurrences.

From **Figure 3**, we can see that there are a total of $N = 416$ nodes and $E = 1712$ edges in the network. Keywords such as “smart city”, “governance approach”, “local government”, “governance”, “China”, “human”, “sustainable development”, “e-government”, “urban governance”, “local governance”, “strategic approach” and “urban development” have relatively high co-occurrence frequencies. These keywords are associated with aspects such as smart cities, e-government, grassroots governance, governance strategies, and rural development.

Furthermore, a statistical analysis of the term frequency and centrality of the top 21 keywords is conducted, and a list of high-frequency keywords is compiled, as shown in **Table 1**.

The centrality of keywords represents their importance and influence within the network. The greater the importance and influence of a keyword, the stronger its centrality [22]. Analyzing the frequency and centrality of keywords can help identify the topics with high research interest in the field of big data governance. Typically, nodes with an intermediary centrality >0.1 can be considered relatively important. In **Table 1**, keywords such as “smart city” (0.23), “governance approach” (0.34), “local government” (0.25), “governance” (0.16), and “decision-making” (0.12) can be seen as relatively important intermediary nodes.

3.3. Research Hotspot Analysis

Through clustering analysis of keywords, hot topics in the field of digital grassroots governance can be effectively extracted, as shown in **Figure 4**. **Figure 4** provides modularity value (Q value) and average silhouette value (S value), which can serve as criteria for evaluating the effectiveness of the map. In **Figure 4**, $Q = 0.6309$ (>0.3) and $S = 0.8684$ (>0.7), indicating that the clustered module structure is significant and the results are efficient [2]. The LLR algorithm was employed to identify key topics within each research cluster. These 12 clusters and their respective themes can be summarized as follows:

0 public participation, # 5 governance, # 6 nongovernmental organization: Public Participatory Governance;

7 information dissemination, #10 blockchain, # 11 demand side smart city service: Smart City Technologies and Services;

1 eurasia, # 3 China, # 4 article, # 8 Australia, # 9 low income population: Regional Analysis of Digital Grassroots Governance.

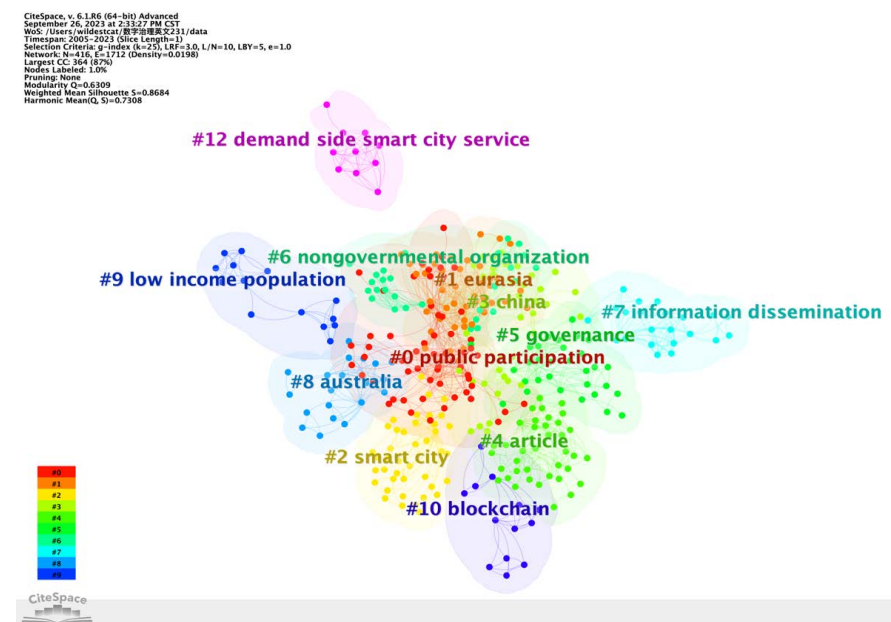


Figure 4. Clustered knowledge map of key keywords in the digital grassroots governance field from 2005 to 2023.

Combining keyword co-occurrence analysis and cluster analysis and based on a review of representative literature within corresponding cluster numbers, it is evident that recent research trends in foreign digital grassroots governance are closely associated with the concept of “smart cities”. The concept of smart cities emerged in the United States as early as the 1990s, but it wasn’t until after 2010, with the rapid development of network technologies, that the construction of smart cities began to accelerate. The concept of smart cities evolved to focus on enhancing the efficiency of resource utilization through network infrastructure, achieving economic and political benefits, and improving the development of urban areas. European Union-supported smart city projects also demonstrated the potential of smart cities for sustainable development [23].

Over time, there has been a consensus that smart cities should not solely concentrate on “Technology”. The development of smart cities is also dependent on community transformation, with a key aspect being the effective utilization of technology by society. As a result, “Citizen Participation” has received increasing attention. The construction of smart cities emphasizes the active involvement of citizens in urban design, development, and management. In recent years, with the advancement of digital technologies, promoting community governance through digital means has become a significant agenda within the context of smart cities. The aim is to enhance transparency in public participation in the development and governance of smart cities, with the digitization of infrastructure playing a critical role. Furthermore, in response to escalating environmental, climate, and energy-related challenges, smart cities seek to meet the growing demands of urban areas, drive economic growth, address mounting social challenges, and become a key driver for sustainable development, contributing to the development of more resilient and sustainable cities. This article, with a focus on the construction of smart cities, delineates three hot topics in foreign digital grassroots governance research:

1) Smart Citizen-Participatory Governance

Citizen participation in governance is crucial for the normal functioning of democracy. With the development of information technology and increasing citizen demands, electronic participation has become a tool to promote democracy and efficiency in smart cities [24]. Governments around the world are using information and communication technology in their operations, effectively disseminating information through open websites and providing better public services. E-government marks a new phase in the use of information technology by public institutions, aiming to enhance the transparency of government governance to increase political participation by citizens. This allows public officials to better understand local situations and citizen needs, ultimately contributing to policy decision-making. Early e-government systems primarily focused on the provider’s perspective, neglecting the democratic purpose. Subsequently, e-government websites were improved, shifting the focus from citizens’ acceptance to citizens’ participation, thereby providing better public services and

promoting the democratic process [25].

Currently, data-driven societies have rapidly developed globally and have become an important trend. This social model emphasizes the use of big data, information technology, and analytical tools to base decision-making, problem-solving, and planning on data, thereby enhancing the accuracy and adaptability of decisions. Smart cities are actively investing in data-driven intelligent technologies, using real-time data and information to provide effective services to citizens. Whether it is early smart transportation, smart environment, smart economy or later implementations such as smart people, smart living, and smart governance methods, smart cities are moving toward transparent governance methods within the data-driven society. The current new wave of smart cities with real-time data is also promoting citizen participation [26].

However, the implementation of citizen participation in governance mechanisms still faces some problems. Firstly, there are technical issues, such as the lack of effective tools for analyzing public opinions. Some scholars have proposed using historical data from social networks to analyze and predict public opinion on specific decisions [27]. Secondly, there are social organization issues. While citizen participation in governance has to some extent alleviated the digital divide between the government and citizens, enhancing governance transparency, the extent and quality of citizen participation in data-driven smart cities are influenced by many factors, such as citizen data privacy issues, citizen digital literacy issues, as well as citizen awareness and motivation to participate in governance. The research on how citizens can improve their individual capabilities to enhance public participation is not yet well-established, and this is an area that can be explored in the future [28].

2) Digitization Transformation of Smart City Infrastructure

The goal of a smart city is to achieve intelligent and sustainable development in urban areas while improving the quality of life. A prerequisite for this goal is to use network infrastructure to enhance the efficiency of resource utilization [23]. Foreign countries have actively pursued digital transformation and infrastructure investments to cope with the rapid growth of populations and urbanization on a global scale. One of the methods to address this challenge is to integrate digital technology into the city's infrastructure, including local government departments, information systems, educational institutions, libraries, transportation systems, hospitals, energy suppliers, water networks, waste management, and law enforcement departments, among others [29]. Additionally, countries like India have found that improving the quality of urban data infrastructure helps address the digital divide, enhance the capabilities of government agencies, and avoid further digital polarization [30].

With the outbreak of the COVID-19 pandemic in 2019, the volume of data generated by clinical care and public health services has been continuously increasing, and the analysis of this data has become fundamental in combating the novel coronavirus. Countries like the UK have established relevant healthcare

infrastructure to transform diagnostic datasets into searchable, interoperable, and reusable datasets, which are then shared with relevant research institutions, while ensuring patient privacy and local management procedures [31]. During the same period, China also embraced digital technologies in entry management, such as health codes, smart gate magnets, and itinerary codes, simplifying entry processes and integrating digital measures with local governance to enhance governance efficiency [32]. Presently, there is a substantial global drive for the development of digital healthcare systems, with extensive plans for digitization transformation within the healthcare sector. These plans can facilitate urban progress through prudent fund allocation, the establishment of effective governance structures, and leveraging the credibility of participating healthcare institutions to coordinate a cohesive vision for transformation [20].

Although “artificial intelligence” is a key element in digital transformation, its potential role in community governance is little known both domestically and internationally. Therefore, in future research, in-depth exploration of the application of “artificial intelligence” in the public sector of smart cities, especially the progress of artificial intelligence in the provision of public services in local governance departments and the public value it creates, can be examined further [19].

3) Sustainable Development of Smart Cities

Sustainable development in smart cities encompasses three key aspects: environmental sustainability, economic sustainability, and social sustainability. Unlike traditional sustainable development, smart city sustainability relies on the application of intelligent technologies [11].

The first aspect concerns environmental sustainability. Waste management is a paramount task in urban management, particularly in the face of the increasing per capita waste generation. Some countries have introduced “Urban Waste Management Plans” that consider the interplay between waste and multiple domains such as tourism, energy, transportation, and more. Effective measures are taken across the stages of waste collection, transportation, disposal, recycling, and value addition to reduce both the quantity and the level of harm caused by waste [33]. Over the past few decades, the rise in the number of private vehicles and the inefficiency of public transportation systems have necessitated substantial investments by governments to address issues like traffic congestion and emissions. As a result, some countries have formulated intelligent transportation development strategies that leverage modern technology to enhance system quality and efficiency, thus reducing emissions and achieving environmental sustainability [34]. Additionally, energy transition presents a significant challenge in the realm of environmental sustainability. Italy has proposed an open innovation and sharing approach based on the social city network model to address challenges arising from low technology adoption rates [35]. Efforts in the direction of environmental sustainability abroad help smart cities reduce carbon emissions, enhance resource utilization efficiency, improve air and water quality,

thus promoting environmental sustainability. In the future, digital city planning and the application of digital technology will aid in addressing issues of land wastage and raise awareness among citizens about environmental concerns, encouraging sustainable lifestyles.

Secondly, economic sustainability and social sustainability are equally critical. In the digital era, digital resources inherently possess sustainability and have become fundamental technologies and platforms for maintaining social and economic sustainability. Smart cities also emphasize the development of digital industries using digital infrastructure, such as internet technology and Internet of Things (IoT) technology, particularly IoT [23]. This can maximize resource utilization efficiency and promote economic sustainability. Especially during the COVID-19 pandemic, digital transformation achieved significant progress in the public health service sector. It not only provided valuable data for government decision-makers but also enhanced citizen service experiences [36], improving resource utilization efficiency.

Furthermore, active citizen participation is crucial for creating livable smart cities and addressing urban sustainable development challenges. And in future cities, information issues will become even more important, and information and communication technologies will affect and affect all aspects of citizens' daily lives [37]. Therefore, some countries are actively exploring the use of digital technology to enhance citizen engagement. Some experts have proposed a method of virtual interaction with city infrastructure, which triggers feedback on the urban environment from the community, thus analyzing citizen opinions and improving digital technology in urban community governance to enhance citizen participation and promote sustainable development in urban and social governance [27].

4. Discussion

Based on the relevant literature published in the Scopus database over the past 20 years, this article employs CiteSpace visualization analysis tools to explore the temporal distribution and key themes related to Digital Grassroots Governance in foreign contexts. Through in-depth research on the latest trends and key areas of Digital Grassroots Governance in foreign countries, this study fills the gap in Digital Grassroots Governance research and is committed to collaborating to address global digital challenges. The purpose of this study is to promote cooperation between domestic and foreign governments in governance innovation and experience exchange, in order to promote further development in the field of grassroots governance in the digital age. This study not only helps to gain a deeper understanding of the development of Digital Grassroots Governance abroad, but also provides valuable experience and inspiration for domestic Digital Grassroots Governance. The research findings indicate that foreign literature on Digital Grassroots Governance predominantly revolves around the development of "smart cities". Additionally, the article summarizes three key focal

themes in the field of foreign digital grassroots governance: smart citizen participation, the digital transformation of smart city infrastructure, and the sustainable development of smart cities.

The focus of digital governance in foreign contexts typically centers on urban areas, with relatively less attention given to the digital transformation and governance of rural regions. Furthermore, there exist significant disparities in the level of digitalization in smart cities across different countries. In the future, the international community may consider conducting more in-depth research into the digital development pathways at the rural level, particularly in those countries where digital development lags behind, and actively draw insights from more advanced nations' experiences.

Moreover, countries that are at the forefront of digitalization in smart cities can proactively explore new technologies, with the metaverse being a potential source of novel ideas for the long-term development of smart city systems. Faced with the convergence of new-generation technologies such as 5G, augmented reality, blockchain, and digital twins in the metaverse, the smart city systems of the future have the potential to transition from the era of flat internet connectivity to the three-dimensional metaverse era. Foreign nations can, based on the core principle of "People Oriented" philosophy, construct a diverse range of social content in the metaverse to provide users with immersive experiences and enhance user engagement.

Funding

This paper was supported by the Fundamental Research Funds for the Central Universities (NO. ND2022016).

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Ma, H.D. (2023) The Importance of Digitalization of Grassroots Governance and the Path to Improvement. *Zhejiang Academic Journal*, No. 5, 5-11.
- [2] Chen, Y., Chen, C.M., Liu, Z.Y., *et al.* (2015) The Methodology Function of CiteSpace Mapping Knowledge Domains. *Studies in Science of Science*, **33**, 242-253.
- [3] Font, J. and Blanco, I. (2007) Procedural Legitimacy and Political Trust: The Case of Citizen Juries in Spain. *European Journal of Political Research*, **46**, 557-589. <https://doi.org/10.1111/j.1475-6765.2007.00701.x>
- [4] Waema, T.M. (2009) E-Local Governance: A Case Study of Financial Management System Implementation in Two Municipal Councils in Kenya. *International Journal of Electronic Governance*, **2**, 55-73. <https://doi.org/10.1504/IJEG.2009.024964>
- [5] Lim, J.H. (2010) Empowering Citizens' Voices in the Era of e-Government: Implications from South Korean Cases. *Theoretical and Empirical Researches in Urban Management*, **7**, 19-31.
- [6] Martinez, J., Pfeffer, K. and Van Dijk, T. (2011) E-Government Tools, Claimed Po-

- tentials/Unnamed Limitations: The Case of Kalyan-Dombivli. *Environment and Urbanization Asia*, **2**, 223-234. <https://doi.org/10.1177/097542531100200206>
- [7] Kim, B.J., Kavanaugh, A.L. and Hult, K.M. (2011) Civic Engagement and Internet Use in Local Governance: Hierarchical Linear Models for Understanding the Role of Local Community Groups. *Administration and Society*, **43**, 807-835. <https://doi.org/10.1177/0095399711413873>
- [8] Batty, M., Axhausen, K.W., Giannotti, F., *et al.* (2012) Smart Cities of the Future. *European Physical Journal: Special Topics*, **214**, 481-518. <https://doi.org/10.1140/epjst/e2012-01703-3>
- [9] Arts, K., Van Der Wal, R. and Adams, W.M. (2015) Digital Technology and the Conservation of Nature. *Ambio*, **44**, 661-673. <https://doi.org/10.1007/s13280-015-0705-1>
- [10] Salvia, M., Cornacchia, C., Di Renzo, G.C., *et al.* (2016) Promoting Smartness among Local Areas in a Southern Italian Region: The Smart Basilicata Project. *Indoor and Built Environment*, **25**, 1024-1038. <https://doi.org/10.1177/1420326X16659328>
- [11] Marsal-Llacuna, M.L. (2016) City Indicators on Social Sustainability as Standardization Technologies for Smarter (Citizen-Centered) Governance of Cities. *Social Indicators Research*, **128**, 1193-1216. <https://doi.org/10.1007/s11205-015-1075-6>
- [12] Patel, S., Sliuzas, R. and Georgiadou, Y. (2016) Participatory Local Governance in Asian Cities: Invited, Closed or Claimed Spaces for Urban Poor? *Environment and Urbanization ASIA*, **7**, 1-21. <https://doi.org/10.1177/0975425315619044>
- [13] McDonald, L., Hickey, A. and Reynolds, P. (2016) Discerning the Air: Locating Local Government Community Engagement Practice-Reflections on Selected Australian Experience. *Asia Pacific Journal of Public Administration*, **38**, 154-167. <https://doi.org/10.1080/23276665.2016.1213034>
- [14] Leleux, C. and Webster, W. (2018) Delivering Smart Governance in a Future City: The Case of Glasgow. *Media and Communication*, **6**, 163-174. <https://doi.org/10.17645/mac.v6i4.1639>
- [15] Janssen, M. and Helbig, N. (2018) Innovating and Changing the Policy-Cycle: Policy-Makers Be Prepared! *Government Information Quarterly*, **35**, S99-S105. <https://doi.org/10.1016/j.giq.2015.11.009>
- [16] Benmansour, N.A., Lari, N.A. and Shockley, B. (2019) Exploring Local Governance and e-Services in Qatar. *International Journal of Public Administration in the Digital Age*, **6**, 1-13. <https://doi.org/10.4018/IJPADA.2019100101>
- [17] Sgantzios, K. and Grigg, I. (2019) Artificial Intelligence Implementations on the Blockchain. Use Cases and Future Applications. *Future Internet*, **11**, Article No. 170. <https://doi.org/10.3390/fi11080170>
- [18] Kang, J. and Wang, X. (2020) The Organizational Structure and Operational Logic of an Urban Smart Governance Information Platform: Discussion on the Background of Urban Governance Transformation in China. *Complexity*, **2020**, Article ID: 6638958. <https://doi.org/10.1155/2020/6638958>
- [19] Li, Y., Fan, Y. and Nie, L. (2023) Making Governance Agile: Exploring the Role of Artificial Intelligence in China's Local Governance. *Public Policy and Administration*, 1-26.
- [20] Krasuska, M., Williams, R., Sheikh, A., *et al.* (2021) Driving Digital Health Transformation in Hospitals: A Formative Qualitative Evaluation of the English Global Digital Exemplar Programme. *BMJ Health and Care Informatics*, **28**, e100429.

- [21] Bąkowska-Waldmann, E. and Kaczmarek, T. (2021) The Use of PPGIS: Towards Reaching a Meaningful Public Participation in Spatial Planning. *ISPRS International Journal of Geo-Information*, **10**, Article No. 581. <https://doi.org/10.3390/ijgi10090581>
- [22] Xu, Y.E. and Li, Z.H. (2023) Research Hotspots and Trend Analysis of Big Data Governance Based on Knowledge Graph. *Information Science*, 1-19.
- [23] Masik, G. and Studzińska, D. (2018) Evolution of the Smart City Concept and of Research into It. *Przegląd Geograficzny*, **90**, 557-571. <https://doi.org/10.7163/PrzG.2018.4.2>
- [24] Malek, J.A., Lim, S. and Yigitcanlar, T. (2021) Social Inclusion Indicators for Building Citizen-Centric Smart Cities: A Systematic Literature Review. *Sustainability*, **13**, Article No. 376. <https://doi.org/10.3390/su13010376>
- [25] Lee-Geiller, S. and Lee, T.D. (2019) Using Government Websites to Enhance Democratic E-Governance: A Conceptual Model for Evaluation. *Government Information Quarterly*, **36**, 208-225. <https://doi.org/10.1016/j.giq.2019.01.003>
- [26] Kaluarachchi, Y. (2022) Implementing Data-Driven Smart City Applications for Future Cities. *Smart Cities*, **5**, 455-474. <https://doi.org/10.3390/smartcities5020025>
- [27] Parygin, D., Sadovnikova, N., Gamidullaeva, L., *et al.* (2022) Tools and Technologies for Sustainable Territorial Development in the Context of a Quadruple Innovation Helix. *Sustainability (Switzerland)*, **14**, Article No. 9086.
- [28] Pinto, F., Macadar, M.A. and Pereira, G.V. (2023) The Potential of eParticipation in Enlarging Individual Capabilities: A Conceptual Framework. *Information Technology for Development*, **29**, 276-298. <https://doi.org/10.1080/02681102.2022.2136129>
- [29] Laramee, R.S., Turkay, C. and Joshi, A. (2018) Visualization for Smart City Applications. *IEEE Computer Graphics and Applications*, **38**, 36-37. <https://doi.org/10.1109/MCG.2018.053491729>
- [30] Chatterji, T. (2018) Digital Urbanism in a Transitional Economy—A Review of India's Municipal e-Governance Policy. *Journal of Asian Public Policy*, **11**, 334-349. <https://doi.org/10.1080/17516234.2017.1332458>
- [31] Jefferson, E., Cole, C., Mumtaz, S., *et al.* (2022) A Hybrid Architecture (CO-CONNECT) to Facilitate Rapid Discovery and Access to Data across the United Kingdom in Response to the COVID-19 Pandemic: Development Study. *Journal of Medical Internet Research*, **24**, e40035. <https://doi.org/10.2196/40035>
- [32] Li, Y. and He, Q. (2023) Techno-Biopolitics under a Tentative “State of Exception”: The Institutional Logic of the Digital Governance of Inbound Travelers during the COVID-19 Pandemic in China. *Chinese Journal of Communication*, 1-20.
- [33] Pirlone, F. and Spadaro, I. (2014) Towards a Waste Management Plan for Smart Cities. *WIT Transactions on Ecology and the Environment*, **191**, 1279-1290. <https://doi.org/10.2495/SC141072>
- [34] Palmentieri, S. (2021) Smart Cities and the Sustainability of Urban Transport: Strategic Directions for the Metropolitan City of Naples. *Journal of Urban Regeneration and Renewal*, **15**, 83-94.
- [35] Lee-Geiller, S. and Lee, T. (2019) Co-Creating Public Value in e-Government: A Case Study of Korean Municipal Government Websites. *International Journal of Electronic Government Research*, **15**, 19-36. <https://doi.org/10.4018/IJEGR.2019100102>

- [36] Palos-Sánchez, P.R., Baena-Luna, P., García-Ordaz, M., *et al.* (2023) Digital Transformation and Local Government Response to the COVID-19 Pandemic: An Assessment of Its Impact on the Sustainable Development Goals. *SAGE Open*, **13**, 1-12. <https://doi.org/10.1177/21582440231167343>
- [37] Marco, A., Mangano, G. and Zenezini, G. (2015) Digital Dashboards for Smart City Governance: A Case Project to Develop an Urban Safety Indicator Model. *Journal of Computer and Communications*, **3**, 144-152. <https://doi.org/10.4236/jcc.2015.35018>