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Digital Governance Hotspots and Trends: A Knowledge Mapping Analysis Based on CiteSpace

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Abstract: This paper summarizes the evolution and trends in digital governance from 2003 to 2023, highlighting China's rapid development in this field. This study uses CiteSpace to identify research hotspots like frontier technologies and environmental governance. The study suggests that future digital governance in China should integrate technology with tradition, address sectoral risks, and utilize digital advantages for risk reduction, advancing national governance efficiency.

Keywords: Digital governance; CiteSpace; Knowledge mapping; Bibliometrics; Chinese-style modernization

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1. Introduction

The modernization of national governance is an integral part of Chinese-style modernization. After a century of struggle and exploration, the Communist Party of China has led the Chinese people on a new path toward modernizing national governance in a Chinese context [1]. In line with the digital age, contemporary national governance is inherently supported and empowered by digital technologies. The construction of a digital China serves as a crucial engine for advancing Chinese-style modernization in the digital era and a formidable pillar for building new competitive advantages for the country. The "Overall Plan for the Construction of a Digital China" issued in 2023 emphasizes, "Driving changes in production, lifestyle, and governance through digitalization, thereby injecting robust momentum into comprehensively advancing the great rejuvenation of the Chinese nation with Chinese-style modernization" [2]. The extensive application of digital technologies in national governance is both the essence and necessity of building a digital China, holding significant implications for advancing the modernization of China's national governance system and capabilities.

With the progression of digitization, related theoretical research and practical achievements have emerged rapidly. Studies encompass the intrinsic value of digital governance, good governance by the government, digital villages, digital technologies and digitization, and e-government, among others [3–8]. Xu et al. define digital governance (Digital governance), also known as e-governance, as a novel and advanced governance

model emerging after e-commerce and e-government in the digital era [5]. Qiao et al. further interpret digital governance as "governance through digital means" and "governance of digital entities", proposing a new concept of the digital governance landscape [8].

Currently, digital governance research remains a hotspot, encompassing diverse fields with rich content and practical activities. However, a systematic knowledge system has yet to be established, and issues such as inconsistent cognition and conceptual confusion persist. Hence, there is an urgent need to conduct phased summaries of digital governance research outcomes, identify knowledge maps, and grasp research dynamics and frontiers. While some scholars have qualitatively reviewed and prospected domestic digital governance based on extensive literature analysis, their work carries a degree of subjectivity [9–10]. Therefore, this paper employs the CiteSpace information visualization software to quantitatively analyze domestic and international digital governance research outcomes, draw knowledge maps, and summarize the developmental trajectory, research hotspots, frontier directions, and trends in digital governance, aiming to inspire theoretical research and practical activities in this field.

2. Research methodology and data sources

2.1. Research methodology

CiteSpace, an information visualization software developed within a Java environment, specializes in bibliometric analysis, demonstrating remarkable efficiency in identifying seminal works, pivotal literature, and overarching trends within a given research field [11]. CiteSpace maps research evolution via keyword frequencies, linkage strengths, & doc co-citations, outlining foundational knowledge, research traits, frontiers, hotspots, and trends.

2.2. Data sources

Data from WOS (2003–2023) for SCI-E, SSCI, and A&HCI articles/reviews on "Digital governance" or "Electronic governance" were analyzed. Domestic (China) and international publications were identified and compared. After screening, 4,399 documents were selected and processed uniformly.

3. Empirical analysis

This article uses keyword co-occurrence, clustering, and burst analyses to clarify the trajectory and dynamics of international digital governance research, exploring hotspots and anticipating trends.

3.1. Domestic and international publication outputs

The US tops WOS publications on digital governance (751), followed by the UK (652). Both contributed to the initial 2003 articles. China ranks 3rd, showing a recent surge. International research started earlier, but digital governance remains globally prominent with annual publication growth.

Digital governance was first introduced by Don Tapscott in the late 20th century [12]. According to **Figure 1**, domestically, the number of publications remained relatively low until 2017, with fewer than 20 articles per year. However, since 2012, the field has entered a period of rapid growth, with the number of publications exceeding 100 for the first time in 2016 and surpassing 200 in 2018, continuing to climb thereafter. By 2023, the publication volume reached a high of 832 articles. Influenced by international research trends, domestic digital governance research commenced in 2007, albeit with fewer publications than its international counterparts.

Nonetheless, significant growth has been observed, with the number of publications exceeding 200 in 2022 and reaching 352 in 2023, marking a rapid acceleration in research activity.

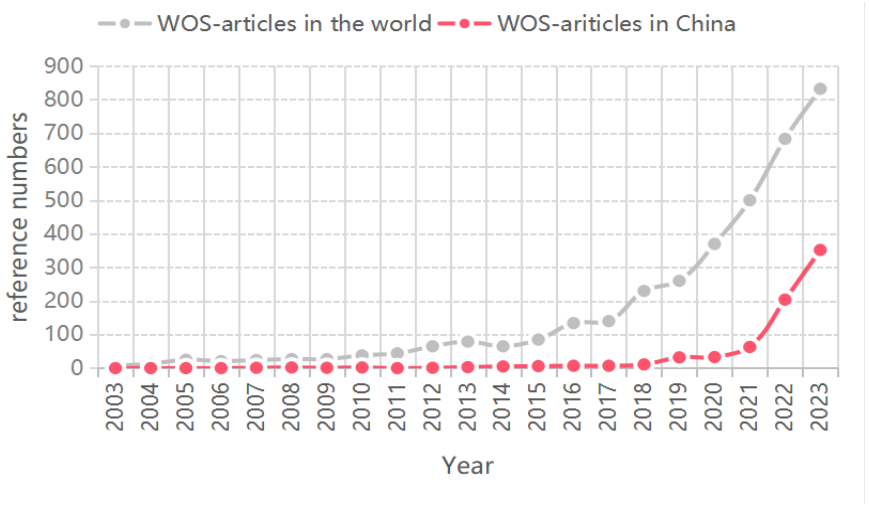

Figure 1. Line chart illustrating the international and domestic publication outputs from 2003 to 2023

3.2. Analysis of international digital governance research

The keyword map visualizes research hotspots in digital governance (**Figure 2**). Analyzing international keywords, this study created a map with 298 nodes. Node size reflects keyword frequency, while centrality shows a keyword's ability to connect to others. Critical nodes (centrality > 0.1) are "governance", "management", "service", and "technology", highlighted in pink.

The first cluster revolves around "governance", which first appeared in 2004 with a centrality of 0.19 and a frequency of 557, the highest among all keywords. Currently, extensive research focuses on smart cities, future cities, and other related topics, as part of the broader "city" governance landscape [13]. The "digital transformation" of governments represents an inevitable trend, introducing a new governance paradigm that, to some extent, fosters changes in "policies" and "strategies" across various industries. The concept of "framework" is prevalent across domains, establishing theoretical foundations to underpin subsequent research endeavors [14]. This keyword cluster forms the foundational basis within the overall keyword map, offering theoretical frameworks and research methodologies for digital governance studies.

The second cluster focuses on "management" (centrality 0.18, debut 2006), examining digital governance's profound "impact" on IT, models, systems, and management. Assessing "performance" and practices is crucial, as innovations drive evaluations. Challenges spur novel tech, approaches, and systems. Evolution and measurement are key research areas.

The third cluster focuses on "service" with a centrality of 0.18. The involvement of "social media" and shifts in population scope and engagement modalities necessitate governmental efforts or the utilization of "knowledge" to redesign services to meet contemporary demands.

The fourth cluster centers on "technology" (258 mentions), highlighting "big data" (217) and "AI" (107) as key enablers for digital governance. It focuses on technical innovation and future perspectives, outlining feasible directions and trends.

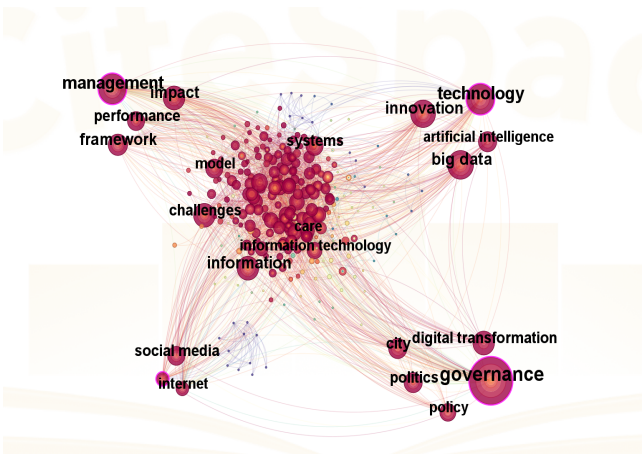

Figure 2. Keyword map of international digital governance research

4. Analysis of domestic digital governance research

In 2015, the construction of "Digital China" was announced for the first time at the opening ceremony of the Second World Internet Conference. Initially, domestic research on digital governance was largely in line with international trends, but now, integrating China's unique national conditions, it has taken on a more distinctively Chinese character.

4.1. Keyword frequency analysis

Table 1 provides a profound insight into the research trends in the field of digital governance and the impact of time factors on these trends through specific numerical data. Among them, "governance" tops the list with a frequency of 127 occurrences, highlighting its significance as a core theme and consistent attention since its first appearance in 2009. The increasingly complex public issues and rapid advancements in modern Information and Communication Technology (ICT) have imposed high demands on local governments, which must respond to numerous social, economic, cultural, and other policy challenges in a coordinated and flexible manner. This underscores the urgency of innovative governance approaches. The application of digital technology has had a profound impact on government governance and social management. Current research focuses on areas such as government governance innovation, the construction of a social credit system, the development of e-government, the opening and sharing of government data, intergovernmental cooperation, government-enterprise relations, and so on, aiming to promote innovation and enhancement in digital governance and social governance [15–16]. Following closely behind with 89 occurrences, "innovation" emphasizes the pivotal role of technological innovation in driving digital governance transformation. Notably, emerging fields such as "digital transformation", "digital economy", and "digital finance", despite their relatively late first appearances (in 2022, 2021, and 2022, respectively), have achieved high frequencies of 76, 52, and 43 occurrences, respectively, indicating that these areas are rapidly becoming new research hotspots. Additionally, "impact" appears 83 times and was first mentioned in 2019, suggesting that researchers have increasingly focused on the practical implications of digital governance on various aspects of society and the economy in recent years. These specific numerical data, combined with time factors, jointly outline the research trends and development trajectory of the digital governance field.

Table 1. Frequency analysis of keywords in domestic digital governance research

Orders	Keywords	Frequency	First time
1	Governance	127	2009
2	Innovation	89	2009
3	Impact	83	2019
4	Digital transformation	76	2022
5	Performance	73	2007
6	Management	67	2017
7	Technology	65	2008
8	Digital economy	52	2021
9	Information	51	2020
10	Digital finance	43	2022

4.2. Evolutionary analysis of keyword research

Figure 3 offers a comprehensive view of how research themes in domestic digital governance have evolved over time. The centrality of certain keywords, highlighted by the pink outer circle, signifies their foundational role in shaping the current research landscape. These early introductions have matured into robust areas of inquiry, illustrating the dynamic nature of the field. Beyond economic growth and digital finance, which are prominent within the digital economy group, digital transformation emerges as a pivotal research hotspot, underscoring its significance in fostering government collaboration and enhancing governance capabilities. Digital government and e-government initiatives have gained traction in recent years, reflecting the increasing adoption of technology to streamline administrative processes and improve service delivery. Smart cities, which represent the convergence of technology and urban planning, and technological innovation, encompassing advances in AI, big data, and the Internet of Things, are also key research domains attracting substantial scholarly attention. Furthermore, the figure highlights a notable shift in focus triggered by China's ambitious climate targets set in September 2020. The commitment to achieving carbon peaking by 2030 and carbon neutrality by 2060 has sparked a wave of research exploring low-carbon development strategies, sustainable urban planning, and the environmental implications of digital technologies. This shift underscores the interconnectedness of digital governance with broader societal and environmental challenges, emphasizing the need for interdisciplinary approaches to address the complex issues of the time.

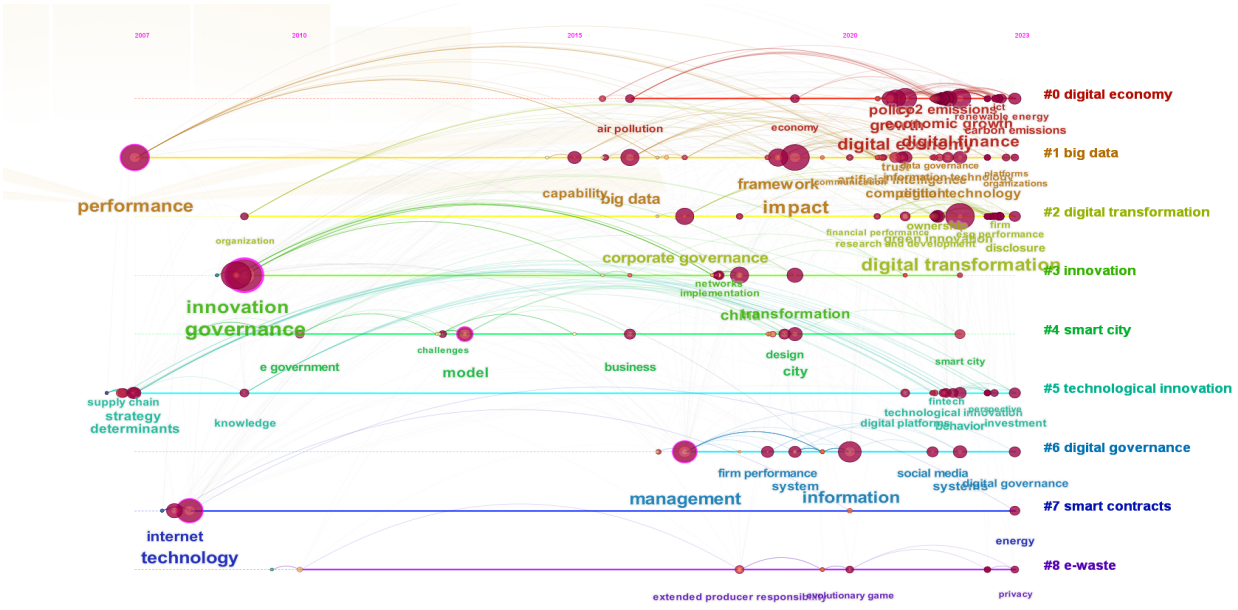

Figure 3. Evolutionary map of keywords in domestic digital governance research

5. Conclusion

This paper utilizes CiteSpace software to analyze the development process and evolutionary trends of digital governance research, systematically reviewing the research trajectory of international and domestic digital governance. The conclusions are as follows.

5.1. International digital governance

Originating in the late 20th century, international digital governance entered a developmental phase from 2012 onwards, forming a comprehensive knowledge system with high interconnectivity, encompassing various domains such as theoretical foundations, framework concepts, case analyses, government, traditional industries, and public resources. With advancements in technologies like the Internet, Internet of Things, Artificial Intelligence, and the Metaverse, digital technologies have empowered national governance and industry management, spurring the digital transformation of governments. Classical theoretical knowledge is utilized to illuminate the reforms induced by new technologies in governance, exploring their limitations. Industries like finance and healthcare have undergone revolutionary shifts in their management and service models, ushering in a new era marked by near-disruptive transformations. Within the classical research paradigm, digital governance has carved out fresh perspectives.

5.2. Domestic digital governance

The first domestic digital governance publication in WOS emerged in 2007, trailing international efforts. Recently, domestic publications nearly matched the international volume, though their scope is narrower. Themes mirror global trends with overlaps but retain China's unique conditions and path. New research focuses on public resources and environmental impacts of low-carbon strategies.

5.3. Digital governance as a fundamental concept

Digital governance, blending traditional methods with tech advancements, constantly evolves. Researchers must stay abreast of tech trends, integrating past, present, and future insights to innovate and transform digital governance paths and models.

6. Outlook

China put forward the vision of "building a powerful nation in science and technology, quality, aerospace, cyberspace, transportation, a digital China, and an intelligent society", clearly outlining the grand plan for constructing a digital China. Against the backdrop of Digital China, people should actively explore the potential of combining technology with tradition in the future. Attention should be paid to the risks and challenges posed by issues such as the "aging population", "population loss", "globalization and the new development paradigm", "climate change", and "disaster changes", and strive to open up new frontiers for digital governance in addressing these diverse risks.

Disclosure statement

The author declares no conflict of interest.

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