

Research progress on digital governance in the context of the digital economy at home and abroad—visualization analysis based on citespace

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Abstract: *In recent years, with the rapid development of society, the traditional local governance model can no longer meet the complex and multi-subject governance needs of modern society, and the digitization of the governance model is urgent, and the research on digital governance has come to a hot issue widely considered by scholars at home and abroad. To clearly understand the current status and future development trend of digital governance research at home and abroad, this paper uses Citespace to visually analyse the CSSCI literature in CNKI and the literature in WOS database, and summarize the development context and the latest research trends of digital governance, to provide enlightenment for the research of digital governance by domestic and foreign scholars, and then promote the development of digital governance research and practice.*

Keywords: *Digital Governance; Citespace; Digital Age; Bibliometric*

1. Introduction

The rapid development and widespread application of digital technology have promoted profound changes in various fields such as social economy, politics, and culture. In this context, digital governance, as a new type of public management model and policy practice, has received increasing attention and attention. Digital governance aims to utilize modern technological means, improve government efficiency and quality, and promote social progress and development through information sharing, decision-making optimization, and scientific public management. In recent years, domestic and foreign scholars have conducted extensive research and exploration of digital governance, revealing its internal mechanisms, influencing factors, and practical effects from different perspectives and levels. However, due to the interdisciplinary, interdisciplinary, and complex nature of digital governance research, its research field and methodological system have not yet been fully established and unified. Therefore, a systematic and in-depth analysis and comparison of the current status and development trends of digital governance research is of great significance in actively promoting digital governance research and practice. After analyzing existing research, this article found that international research on digital governance has shown a relatively mature research system, while domestic research started relatively late, and the research hotspots for digital governance are still unclear. In the digital era, governance of Digital transformation is becoming increasingly important. Therefore, it is necessary to strengthen the research of domestic scholars in the field of digital governance. Based on this, this paper uses the method of literature metrology to conduct an in-depth discussion and analysis of the current situation of digital governance research at home and abroad based on cite space visual analysis tools, reveal the differences between domestic and foreign digital governance and further find the root causes of the differences, to provide new ideas and methods for domestic digital governance research, and promote the development of domestic digital governance research and practice.

2. Research Design

The research on digital governance based on Cite Space in this article is mainly divided into four aspects: data collection and preprocessing, data analysis, visual analysis, and result interpretation, ultimately presented in the form of graphs and text.

2.1. Research object

The literature data source of this article consists of two parts: domestic and foreign. Domestic data is supported by the China National Knowledge Infrastructure (CNKI) database. Finally, 489 journal articles were retained. The foreign data is supported by the Web of Science core collection, with "Digital governance" as the main body, type "Article", language "English", and the search time is unlimited. A total of 3349 articles were searched, and 934 valid articles were obtained after inspection, screening, and deduplication operations.

2.2. Research Tools and Methods

"CiteSpace" is a data analysis software based on literature metrology, which can help users visualize and quantitatively analyze literature. It can help users discover and visualize the main research trends, well-known authors, important journals, and high-frequency vocabulary in a certain field. At the same time, it can also provide various visual effects such as co-citation network maps, spatiotemporal distribution maps, and keyword co-occurrence maps. CiteSpace software is widely used in scientific research, academic evaluation, strategic planning, and other fields, helping users conduct in-depth literature analysis and structured thinking, improving research efficiency and quality. This article is based on Citespace and uses bibliometric methods to visualize and analyze the retrieved information, draw visual graphs of keywords, relevant scholars, and research institutions, and conduct research and analysis on the research hotspots and trends of digital governance in combination with text.

3. Current Status and Analysis of Digital Supply Chain Research

3.1 Trends in the number of papers

The annual publication volume can to some extent explain the development status and changes in research popularity of this research field every year[1]. To understand the annual number of articles published in the field of digital governance, this article compares the total number of articles related to digital governance in the CNKI and WOS databases (as shown in Figure 1) and finds that although foreign research started earlier than domestic research, the number of articles is only slightly higher. The research on digital governance at home and abroad originated in 2004, and the number of foreign literature publications slowly increased from 2004 to 2018, with an annual number of papers below 100. Before 2018, there was only very little literature on digital governance research in China. However, after 2018, the number of domestic and international research has significantly increased, with the number of foreign publications skyrocketing from 100 to 970, while the number of domestic publications has also increased from 20 to 680. Both domestic and international research has entered a period of rapid development. The possible reason is that the global outbreak of COVID-19 at the end of 2019 prompted the government and enterprises to use digital technology to mitigate the impact of the epidemic. Digital governance has become an important means to prevent and control the epidemic and restore the economy. With digital governance becoming a hot topic of global concern, governments, scholars, and enterprises around the world have strengthened their research and practice on digital governance, further promoting research on digital governance.

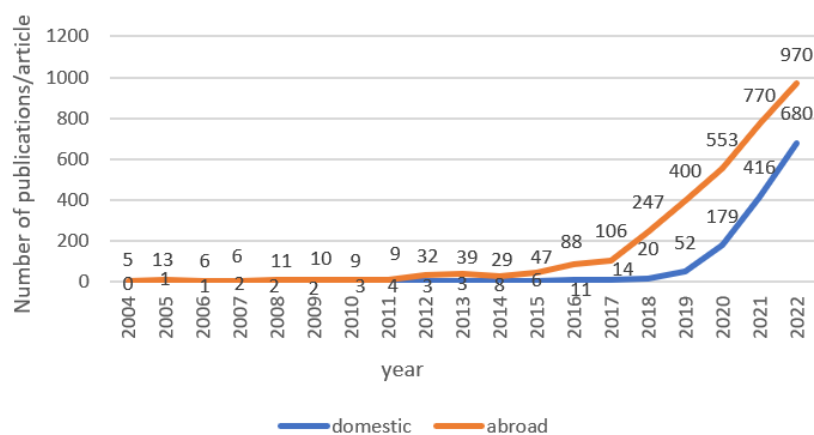


Figure 1: Total number of digital governance publications both domestically and internationally

3.2 Research by Relevant Scholars and Analysis of Their Collaborative Networks

The research author collaboration network is a key work that reflects research capabilities and evaluates the development of academic fields. By analyzing the structural characteristics of authors and their collaborative networks, the core author groups and their collaborative relationships in this field can be reflected[2]. The size of nodes and text indicates the amount of authorship, and the degree of collinearity in the connections between nodes, which together form the graph of author groups and collaborative networks.

3.2.1. Analysis of Cooperation among Foreign Authors

From Figure 2, it can be seen that $N=457$, $E=392$, and $Density=0.0038$, indicating a trend of a large research base but not close cooperation among each other. However, from the cooperation network, it can be seen that foreign research has initially formed several core research teams, such as Florida and Morley (2018), which mainly research the impact of digital governance on government, policies, and laws [3]; The research team composed of Madnick, Huang (2021), and others mainly focuses on cross-border governance of digital trade driven by digital governance [4]; The team composed of Magnusson and Koutsikouri (2020) mainly researches the application of digital governance in the public sector[5].

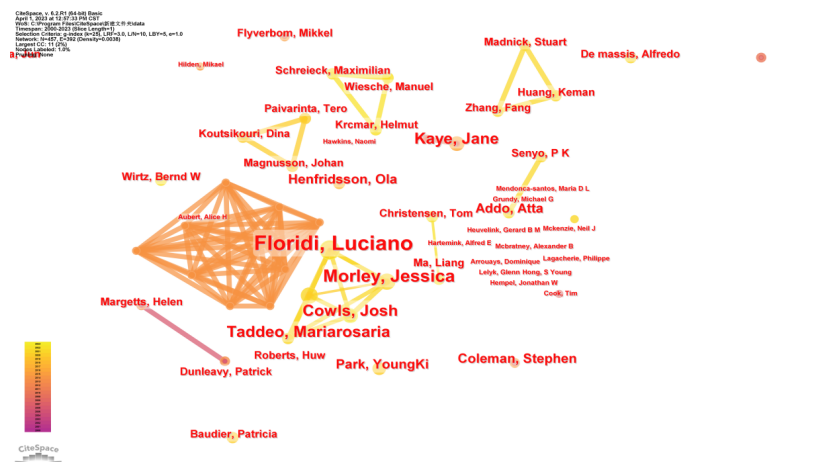


Figure 1: Co-linear Network of Foreign Authors

3.2.2. Analysis of domestic author cooperation

From the cooperative network in Figure 3, $N=146$, $E=46$, and $Density=0.0043$, it can be seen that the research on digital governance by domestic scholars at this stage is generally in a state of "large dispersion and small concentration". Most scholars tend to explore independently, with Professor Ren Baoping's research being the most prominent. Professor Ren Baoping (2023) focuses on the impact of the digital economy on digital governance, believing that the introduction of biometrics in the digital economy era enriches the content of population basic information databases and is more conducive to enhancing government digital governance capabilities[6]. At the same time, there have been multiple research groups emerging, among which two are more core groups. The team led by Professor Hu Weiwei (2023) believes that the digital rural governance community aims to stimulate the enthusiasm of various entities to participate through endogenous cultivation, promote the restructuring of rural full-factor governance structure in a holistic collaborative manner, and shorten the urban-rural digital divide through the construction of information platforms[7]. The team led by Professor Wang Mingfeng and Professor Kuang Aiping (2023) believes that the promotion of digital governance in urban and rural areas is closely related to current local practices in China, and requires specific analysis of specific issues[8].

Through analysis of domestic and foreign authors, it can be seen that scholars have achieved certain results in the research of digital governance, but the academic cooperation atmosphere between scholars is still not strong enough. Collaboration only exists within the team, and there is less collaboration between teams.

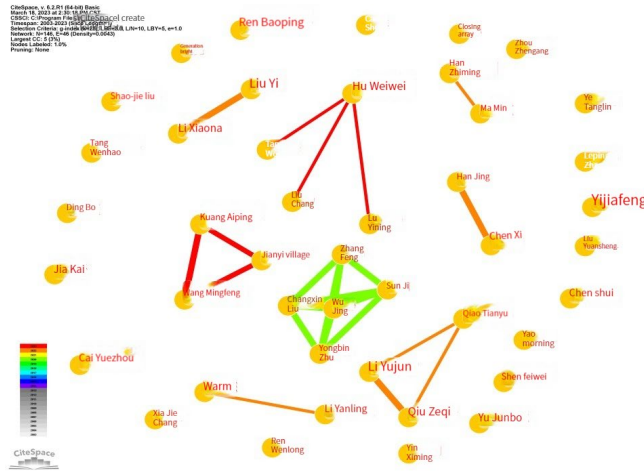


Figure 2: Co-linear Network of Domestic Authors

4. Analysis of hot research topics in digital governance research

4.1. Analysis of digital governance hotspots

4.1.1. Foreign research hotspots

Keywords are words or terms extracted from literature to vividly and intuitively reflect the subject matter of the literature, Studying keywords can help analyze hot topics in a certain scientific field[9]. This article ranks the top 10 keywords with higher frequency in foreign countries and their centrality through a collinear analysis of keywords (Table 1). It can be seen from the table that governance (167) is the most popular topic in digital governance, followed by big data (93) and technology (88). Centrality is an indicator of the importance of a node network, and nodes exceeding 0.1 can be referred to as critical nodes. The centrality of Information is the highest, with a size of 0.16; The centrality of information, technology, digital government, governance, and policy is greater than 0.1. Information, technology, and big data are in the front position in frequency and centrality, which indicates that foreign countries pay more attention to governing the influencing factors of Digital transformation. For example, Sarker, Wu, and Hossin (2018) [10] believe that big data is a potential tool to transform traditional governance into intelligent governance, and Lee (2022) [11] believes that science and technology are the enabling and driving force of Digital transformation, and Struijk and Angelopoulos (2023) [12] believe that information quality management can help digital organizations to achieve Digital transformation.

4.1.2. Domestic research hotspots

Table 1: Frequency and centrality of domestic and foreign keywords

abroad				domestic			
Serial number	Frequency	Centrality	Keywords	Serial number	Frequency	Centrality	Keywords
1	119	0.44	Digital Economy	1	167	0.1	governance
2	57	0.37	Digital governance	2	93	0.09	big data
3	40	0.21	digitization	3	88	0.13	technology
4	38	0.25	Digital government	4	86	0.08	innovation
5	36	0.08	Digital Village	5	82	0.05	management
6	32	0.12	digital technique	6	67	0.16	information
7	28	0.07	rural revitalization	7	49	0.03	performance
8	24	0.04	Rural governance	8	48	0.06	digital transformation
9	13	0.07	Big data	9	44	0.04	framework
10	12	0.04	Digital empowerment	10	43	0.05	City

Calculate the frequency and centrality ranking of domestic keywords, as shown in Table 1. The digital economy has the highest frequency of occurrence, with a total of 119 times, followed by digital governance (57) and digitization (40). The centrality of the digital economy is the highest, with a size of 0.44; The centrality of the digital economy, digital governance, digital government, digitalization, and digital technology is greater than 0.1. The frequency and centrality of keywords such as digital government, digital village, and digital governance are all at the forefront. Through analysis, it can be seen that domestic research focuses on the Digital transformation of government infrastructure governance. For example, Zhao Xiaofeng (2022) [13] believes that the Digital transformation of rural governance is an important measure to strengthen the construction of national basic power in the new era; Wu Jiafeng, a scholar (2022) [14], believes that network technology enables rural governance to promote the Digital transformation of rural governance. Wu Ruijia (2022) [15] believes that the Digital transformation of grass-roots governance is an inevitable trend of the modernization of the national governance system and governance capacity.

4.2. Cluster Analysis of Digital Governance

Cluster analysis can combine related topics and concepts into larger clusters of concepts, helping researchers understand the research network structure and knowledge system present in the literature. Based on the co-occurrence frequency of keywords in sample table 1 of the WOS database in this article, keywords with similar meanings are clustered into one category to obtain a keyword clustering view (as shown in Figure 4 and Figure 5), thus forming a research direction theme word. We can obtain the main research directions of digital governance in foreign countries by analyzing clustering networks. Here, we only display the top 10 #0internet governance, #1big data, #2digital platforms, #3corporate governance, #4Digital divide, #5data governance, #6digital government, #7rise, #8supply chain management, and #9digital governance. By analyzing the cnki database aggregation, we can get the main directions of domestic digital governance research: #0 digital economy, #1 grassroots governance, #2 digital village, #3 Digital, #4 digital government, #5 big data, and #6 data governance. From this, we can see that the research field of digital governance in foreign countries mainly focuses on the practical research of Digital transformation, which is greatly influenced by business, while in China, because it is in the critical stage of rural revitalization, the research field of digital governance mainly focuses on the research field of grass-roots governance, which is greatly influenced by policies. Data governance, digital government, and big data have become the common research fields of scholars at home and abroad, which indicates that data governance, digital government, and big data are the hot spots of scholars at home and abroad. The following article will analyze the relationship between clustering and digital governance based on the above results.

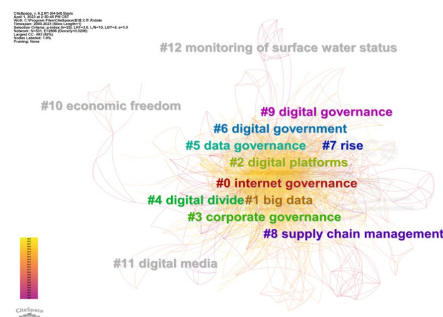


Figure 4: Cluster Analysis of Digital Governance in Foreign Countries

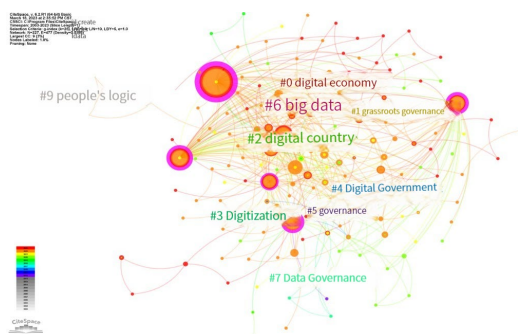


Figure 5: Cluster Analysis of Domestic Digital Governance

4.2.1 Differences in Research Subjects of Digital Governance at Home and Abroad

Based on the above keyword analysis and cluster analysis, it can be seen that the research field of foreign digital governance mainly focuses on the practice of Digital transformation, and the hot topics are "internet governance", "digital platforms", and "corporate governance". For example, De Gregorio (2022) [16] mainly studies the impact of the evolution of Internet governance on digital constitutionalism in the new era; Shipovalova (2021) [17] mainly studies how to involve citizens in digital governance through the construction of digital platforms; Ziniuk (2022) [18] mainly studies the feasibility of Digital transformation of corporate governance in the context of Digital transformation. However, domestic policies have had a significant impact, and research mainly focuses on the research field of grassroots governance, with hot topics such as "grassroots governance" and "digital rural". For example, Wang Wenbin (2022) [19] studied the overall digital transformation of grassroots governance from three aspects: ecology, logic, and strategy; Han Qingling (2023) [20] studied the operational mechanism of rural digital governance from two aspects: diverse foundations and practical paths.

4.2.2 Common Points of Domestic and Foreign Digital Governance Research Subjects

Through keyword analysis and cluster analysis, this paper finds that data governance, digital government, and big data are hot spots for scholars at home and abroad. The following article will introduce the relationship between this hot spot and digital governance, as well as the research perspectives of scholars at home and abroad.

(1) Digital government

The digital government refers to a modern governance model in which the government utilizes information technology and digital means to improve the quality of public services, innovate governance methods, strengthen citizen participation, and enhance administrative efficiency. Its essence is to comprehensively enhance the government's ability to perform its duties in areas such as economic regulation, market regulation, social governance, public services, and environmental protection by establishing new mechanisms and platforms driven by big data[21]. Digital governance requires the support and promotion of digital government, which is the foundation and important guarantee of digital governance. For example, Liu Mixia (2022) [22] believes that the government's Digital transformation should be taken as the support at present, and the improvement of social digital capability should be taken as the basis to promote the Digital transformation of national governance; Zhao (2021) [23] believes that in the digital age, the digital construction of the government has a significant impact on improving government governance performance.

(2) Data Governance

Data governance refers to the behaviour mode of establishing norms, processes, and control means within the organization to ensure data quality, reliability, security, and compliance. It is the core foundation of digital governance, which ensures the reliability, security, and compliance of data used by the government and supports various practices of digital governance. Its fundamental significance and purpose are to promote the overall data-driven process of society [24]. Domestic scholar Zhao Xin (2022) [25] believes that promoting the establishment of a domestic data governance system is the only way to promote domestic Digital transformation; At the same time, Omar (2020) [26] also believes that a smooth and effective Digital transformation requires good data governance practices.

(3) Big data

Big data, as an important product and resource in the digital era, can provide rich information and data support for digital governance. At the same time, digital governance can utilize big data technology for data analysis and mining, thereby achieving more scientific, accurate, and efficient decision-making and public management. Therefore, the combination of big data and digital governance can help governments, enterprises, and the public better respond to social issues and challenges, and promote social progress and development. Miao Wensheng (2023) [27] believes that data empowers the integrated transformation of grassroots digital governance; Lofgren (2020) [28] believes that the emergence of big data has added new aspects to the conceptualization of digital technology in achieving digital governance.

5. Evolution Trends of Digital Governance at Home and Abroad

The time zone view is a view that focuses on representing the evolution of knowledge from a time dimension, which can display the updates and mutual influences of literature [29]. To conduct in-depth research on the evolution trend of domestic digital governance hotspots, the article uses Citespace's

Timezone function based on literature data to generate a time zone map. The changes in keywords over time indicate that the development of digital governance at home and abroad has phased characteristics.

5.1. Evolution Trends of Digital Governance Abroad

(1) Initial experimental stage (2002-2009)

This stage mainly involves basic research and pilot projects on digital governance conducted by academia and government agencies, which have been widely applied in various fields. The government has gradually launched a series of digital governance policy documents and action plans. For example, the Electronic Government Act of 2002 in the United States.

(2) Intelligent upgrade phase (2010-2013)

At this stage, the government actively carries out intelligent governance reform, strengthens information technology and network security construction, and vigorously promotes the development of online services, smart city establishment, and other fields. In 2010, the "Open Government Plan" was released, which systematically laid out the work of government information openness and strengthened the collection and coordination of government data[30]. It provides preconditions for the governance of Digital transformation.

(3) Data-driven stage (2014-2018)

In 2012, the US government released "Digital Government: Building a Platform for the 21st Century to Better Serve the American People", which began the digital process of the US government from four aspects: information-centric, building a shared platform, customer-centric, and ensuring security and privacy[31]. At the same time, the US government has long attached great importance to the application of new digital technologies, actively adopting technologies and services such as cloud computing, big data, and artificial intelligence to build a higher level of digital government. Since then, we have entered the data-driven stage.

(4) Digital transformation stage (2019 -present)

Since the outbreak of COVID-19, many countries have accelerated the development of digital governance to meet the challenges brought by the epidemic. At this stage, governments around the world actively promote online services, while many countries further open up government data to promote economic recovery and social innovation. According to the analysis of hot keywords in the figure, future research on Digital transformation abroad will tend to study the influencing factors of governance Digital transformation.

5.2. Evolution Trend of Digital Governance in China

(1) Initial exploration stage (2004-2008)

The initial stage of digital governance research in China, this stage relies on the informatization construction of government departments and enterprises, mainly focusing on the informatization construction of government administrative departments and e-government, such as the construction of government portal websites and public service platforms. E-government, e-government, and informatization are the key hotspots in this stage. Since 2002, when the General Office of the Communist Party of China Central Committee and the General Office of the State Council jointly issued the "Guiding Opinions of the National Informatization Leading Group on the Construction of Electronic Government in China"[32], the electronic government has become the main mode of government governance in China.

(2) High growth stage (2009-2018)

In the high-speed growth stage of digital governance research in China, the main focus is on the introduction of concepts such as intelligent transportation and intelligent communities in urban governance. Smart cities, smart communities, and smart healthcare are key hotspots in this stage. Since 2009, with the proposal of Smart Earth in China, research on digital governance in China has gradually shifted from electronic to intelligent, officially entering the golden age of digital governance development in China. During this period, concepts such as "smart city", "big data", and "blockchain" have been proposed, ultimately forming a group of digital governance demonstration cities represented by cities such as Beijing, Shanghai, Guangzhou, and Shenzhen.

(3) Deep integration stage (2018- present)

The current stage of domestic digital governance research mainly focuses on the Digital Transformation of governance mode. Digital technology, digital rural areas, and digital empowerment are key hotspots in this stage. Since 2019, the Report on the Work of the Government has pointed out the importance of the digital economy. In the era of the epidemic, digitalization has also played an important role in national governance. As can be seen from the keywords in the figure, the trend of research on the development of national governance is still to study the path and method of governance Digital transformation in the future.

5.3. Analysis of Differences in the Evolution of Digital Governance at Home and Abroad

Compared to China, digital governance in foreign countries started earlier. As early as the 1990s, it began to explore the concept and application of digital government, while focusing on the construction of e-government systems. At the same time, China is currently undergoing infrastructure construction; When China began promoting "e-government" in 2002, research on e-government abroad was relatively mature and developing towards a more developed and intelligent direction; However, since 2010, the digitalization process in China has significantly accelerated, gradually catching up with foreign research progress. In 2011, the concept of a "smart city" was proposed, and the construction of smart cities such as Beijing, Shanghai, and Shenzhen was completed. Although foreign research was still faster during the same period, the gap between the two has become smaller and smaller. Until 2019, the outbreak of the epidemic provided opportunities for digital development at home and abroad, Governance of Digital transformation is the top priority at home and abroad, and a large number of the digital economy and innovative enterprises have emerged. At the same time, data security is also receiving increasing attention. Overall, digital development in China focuses on improving the efficiency and quality of government services, as well as using technological means to promote the modernization of governance. Although it started relatively late compared to foreign countries and has gradually caught up with them after 20 years of catching up, there are still gaps. However, the development of digital governance in foreign countries started earlier and has already completed the exploration and practice process. Currently, it is more focused on promoting digital technology and improving citizen participation.

5.4. Prospects for the Development of Digital Governance at Home and Abroad

The development of digital governance in the future will face more challenges and opportunities. From a technical perspective, with the continuous development and application of new-generation information technologies such as 5G, the Internet of Things, and cloud computing, digital governance will further achieve innovation and upgrading. From a policy perspective, the government will further promote the development of digital governance and strengthen the standardization and legalization of digital governance. From an application perspective, digital governance will pay more attention to people's needs and social benefits, and promote the integration and collaboration of digital governance with multiple fields such as urban governance, economic development, and environmental protection [33].

In short, digital governance is one of the important development directions currently and in the future, requiring joint efforts and support from all parties. This study suggests that in the future development of digital governance, attention should be paid to the following aspects: firstly, strengthening innovation and practice of digital governance, and promoting deep integration of digital governance with fields such as technology and industry. At the same time, it is necessary to strengthen international cooperation and exchange in digital governance. It is recommended to strengthen cooperation among scholars from different institutions or universities to jointly promote the globalization of digital governance. At the same time, it is necessary to strengthen the risk management and information security guarantee of digital governance and prevent the potential risks and problems that digital governance may bring[34]. Finally, strengthen the talent cultivation and management of digital governance, cultivate a talent team with digital governance thinking and abilities, build a talent cultivation platform and mechanism for digital governance[35], establish an evaluation system and incentive mechanism for digital governance, and promote the sustainable development of digital governance.

6. Conclusion

This study analyses and explores the hot topics and evolution trends in the field of digital governance both domestically and internationally. It can be found that there are certain connections and differences between domestic and foreign scholars in terms of literature quantity, research content, and evolution

trends. (1) In terms of literature quantity, changes in the number of domestic and foreign literature are driven by changes in social environment and national policies. (2) In terms of research themes, foreign scholars pay more attention to the research on the governance of economic activities, mainly focusing on corporate governance, while domestic scholars are greatly affected by policy factors. Because of the proposal of rural revitalization, most of the research themes of domestic scholars focus on the research on rural and government governance Digital transformation (3) In terms of research trends, both domestic and foreign scholars, Research trends tend to study how to carry out industrial Digital transformation. (4) In terms of research fields, domestic digital governance research mainly focuses on areas such as government informatization, e-government, digital economy, and smart cities. However, research on digital governance abroad places greater emphasis on open government, electronic governance, digital society, and digital innovation. Overall, the research field of digital governance in foreign countries is more extensive and diverse.

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