Bibliometric and Visual Analysis of Mapping in Digital Governance Research

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Abstract. With the continuous improvement of network connectivity, how to effectively manage digital resources, technologies, and interactions in the network has become a focus of attention for governments, enterprises, organizations, and even the entire society. It is precisely due to such concerns that the concept of "digital governance" has emerged, which is a multidimensional framework that guides digital activities from strategic, ethical, regulatory, and operational perspectives. In addressing issues such as security, privacy, fairness, and responsibility, digital governance includes a series of principles, policies, practices, and mechanisms. In the continuous evolution of the digital landscape, digital governance will play a more important role in various aspects such as society, morality, and law. Under the framework of the new era, we utilized VOSviewer and Bibliometrix software to perform spectral analysis on 277 scientific literature from 2008 to 2023. A study was conducted on four aspects: the co-occurrence of major countries and sources, the co-occurrence of author keywords, factor analysis of strategic coordinate maps and thematic tree maps, and summary. This study is based on the theory of system thinking and knowledge exchange, as a reference for future research.

Keywords: Digital Governance, Visual Analysis, Big Data

1 Introduction

Digital governance provides an important framework for interaction, transactions, and relationships in the digital field. It integrates traditional governance principles with the complexity of the digital age, to develop the potential of technology and prevent its potential flaws. Digital governance is closely linked to big data, artificial intelligence (AI), and blockchain technology, as they have a significant impact on the digital landscape. These technologies have shaped both digital governance practices and digital governance practices. It is an indispensable component of the digital landscape that intersects with digital governance. The governance framework ensures that these technologies are responsible, ethical, and by social values and legal norms. With the development of technology, digital governance is constantly adapting to the new challenges and opportunities brought by these technologies. The emergence of big data has added new aspects to the conceptualization of the application of digital technology in public service delivery and digital governance[1]. Big data has not only become an important resource for business but also for governance[2]. Artificial intelligence technology has flourished and been widely applied in various aspects of social life, further promoting the accelerated leap from digitization and networking to intelligence in various fields

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of the economy and society. These technologies are conducive to the continuous development and improvement of theories and methods related to digital governance and affect sustainable development.

Electronic government utilizes information and communication technology (ICT) to enhance and simplify government processes, improve public services, and interact more effectively with citizens. It utilizes digital tools to change the way government operates and interacts with voters. E-government plays a crucial role in the following areas: online public services, digital communication, open data initiatives, electronic participation, government efficiency, disaster management and emergency services, digital identity and authentication, data analysis for policy formulation, economic development, healthcare and social services, education services, smart cities and urban planning, and election management. The application of e-government aims to improve the efficiency, transparency, accessibility, and accountability of government operations, and provide better services for citizens and enterprises.

Scholars have proposed research on this, such as the role that artificial intelligence (AI) can play and is currently playing in addressing global climate change[3].Design a functional framework for agricultural supply chain governance based on blockchain technology [4]. In the context of the rapidly expanding new learning style in the field of artificial intelligence education, design and develop a globally available and powerful SIMRECH intelligent learning system ISSIMA (SIMRECH uses intelligent systems) [5]. The development of digital technology has provided new governance ideas for "carbon peaking and carbon neutrality". Taking smart cities as an example, digital governance can effectively reduce regional carbon emissions. The improvement of digitalization has made a significant contribution to reducing carbon emissions. In terms of its impact pathways, regional green patent innovation has a significant local mediating effect on digital emission reduction. At the micro level, digital technology is one of the key factors in promoting green innovation in highly polluting enterprises.[6]. By integrating the two established concepts of digital ecosystem and entrepreneurship ecosystem, the framework of digital entrepreneurship ecosystem consists of four concepts: digital infrastructure governance, digital user citizenship, digital entrepreneurship, and digital market, providing a theoretical framework for multilateral platforms.[7]. By reconfiguring, re-examining, criticizing, and improving the "Digital Entrepreneurship Ecosystem" (DEE) proposed by Sussan and Acs, user privacy is protected, platform efficiency is improved, market competition is encouraged, and digital infrastructure is protected[8]. Topological Genealogy (TG), as a method of studying cross-border digital governance, especially how digital infrastructure participates in the development of this form of governance, helps to unravel digital governance through, and as a result of change[9]. Drawing on the unified framework of the BM concept, exploring the main components of the public sector, and constructing a context-specific BM framework, decision-makers can benefit from management to plan and evaluate institutional mechanisms that can improve the effectiveness of digital governance initiatives[10]. Digitization not only helps communication between users but also makes preparations smoother. In addition, the use of Extensible Business Reporting Language (XBRL) to encode financial statements has been proposed to improve business reporting and meet the challenges posed by digitization and the global economy[11]. The EU has developed a complete data protection system, with a focus on protecting personal data rights internally and setting high standards for cross-border data transmission externally. China's data law also focuses on data protection legislation[12].

This article summarizes the current status and future development trends of digital governance research through bibliometric analysis, to strengthen public value creation through innovation in digital governance. It provides suggestions for researchers to further promote digital governance, which is of great significance for improving the level of digital development and building a global digital ecosystem [13].

2 Data and Methods

By using the science network (WoS) tool to conduct an "advanced search" on TS=("Digital Governance"), obtain literature related to digital governance and e-government. This study compiled 277 papers retrieved from 1900 to 2023 and mapped them using VOSViewer and Bibliometric software.

3 Research Findings

3.1 Main Countries and Sources

In Figure 1, the streamline width is directly proportional to the quantity of keywords shared by other related topics, and represents the relevance between them. From 2008 to 2019, the keywords of academic research mainly focused on e-government, divide, innovation, and other aspects. Among them, politics is highly correlated to these keywords. From 2020 to 2023, the keywords of academic research mainly focused on technology and public management. Politics remains highly relevant,which are closely related to newly developing research topics or research directions in recent years.

In Figure 2, "AU" represents the author, "AU_CO" represents the country of the author, and "So" represents the source of publication. The graph shows the correlation between these three. From the author's perspective, the academic contributions of the USA, China, the United Kingdom, and Brazil in the digital economy and internet technology rank high. From the sources of publications, the main sources are sustainability, the 14th International Conference on Theory and Practice of Electronic Governance (icegov 2021), the International Journal of Public Administration in the Digital Age. This indicates that with the accelerated development of the world's digital economy and internet technology, both developed and developing countries attach great importance to this issue.

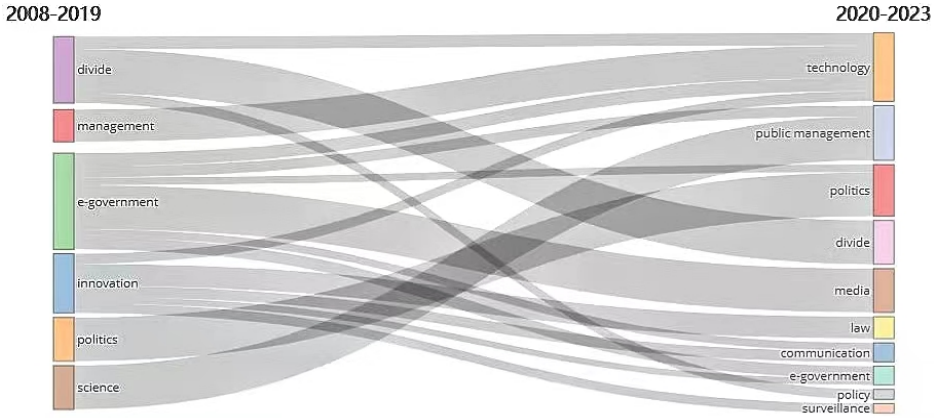

Fig. 1. Thematic Evolution

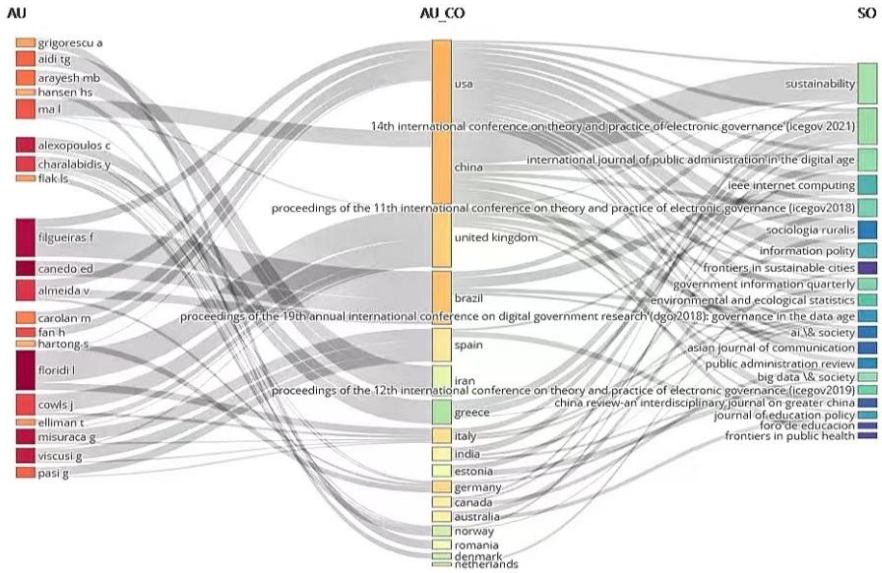

Fig. 2. Three-Fields Plot

3.2 Co-occurrence of Author Keywords

Figure 3 shows a 56-keyword co-occurrence network generated using Vosviewer, including six sets of concepts. The first concept cluster is the "Digital Governance" cluster, shown in red in the upper left corner of Figure 1, which highlights the importance of citizen participation and e-democracy for digital development and their relevance to barriers, e-democracy, and e-practices. The second concept cluster is orange, highlighting the collaborative governance and management crisis affecting COVID-19, its difficult governance, and the impact of COVID-19 on social development, and also bringing indirect negative impacts on long-term economic development through the impact on the operation of the industrial chain, the impact on

employment and the challenges of the survival foundation of micro, small and medium-sized enterprises. The third category is the blue "sustainable development" related topics, which not only meet the needs of the present generation but also do not pose a danger to the ability of future generations to meet their needs of development, it includes smart cities, China, etc., the development of the country is inseparable from sustainable development, they are an inseparable system, indicating that they interact and affect sustainable development. The fourth cluster is purple, emphasizing the closeness of governance and governance, technology, and government, and the need to focus on governance, technology, and government. The fifth conceptual cluster is green "intelligence", such as service digitalization, e-government, and social media, which shows that intelligent manufacturing systems can continuously enrich the knowledge base in practice and occupy an important position in human life. The sixth conceptual cluster is digitalization and digital transformation, "including key terms such as blockchain and big data."

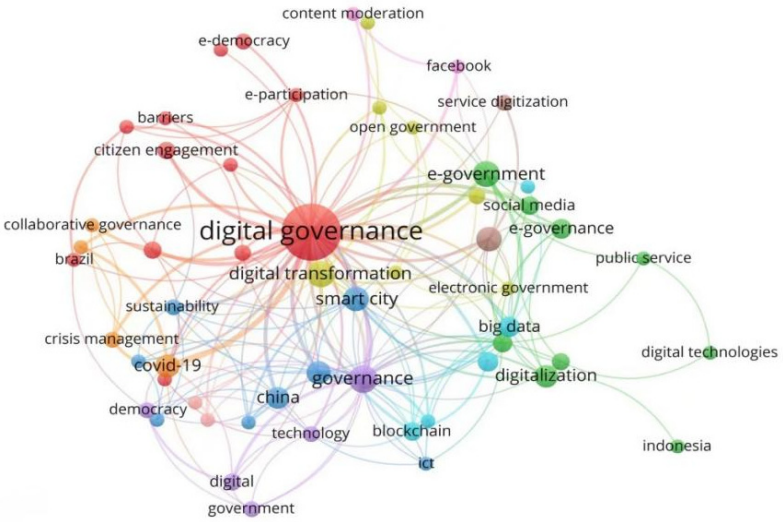

Fig. 3. Co-occurrence of author keywords

3.3 Strategic Coordinate Chart

The graph usually consists of four quadrants, with density on the vertical axis and centrality on the horizontal axis. Centrality is how related different topics are; density measures cohesion between nodes. The first quadrant of figures 4 represents core themes with high maturity. Important development areas include e-government management era, privacy knowledge, trust acceptance. The second quadrant represents isolated themes with high maturity: China, institutions, ontology, sociology, but none of them matter. For the current field, it can be further developed into important topics, leaving simple niche fields as core topics. Model scale in the third quadrant, e-commerce is a marginal topic. If there is no good development, it may just appear, or it may disappear soon; the fourth quadrant represents basic themes with low maturity, which may become future development trends or research directions. Topics such as monitoring and affecting economic growth, political cities, etc. This field is very important, there is still a

lot of research work and development space, it is worth exploring in depth, and it is expected to become a core topic in the future.

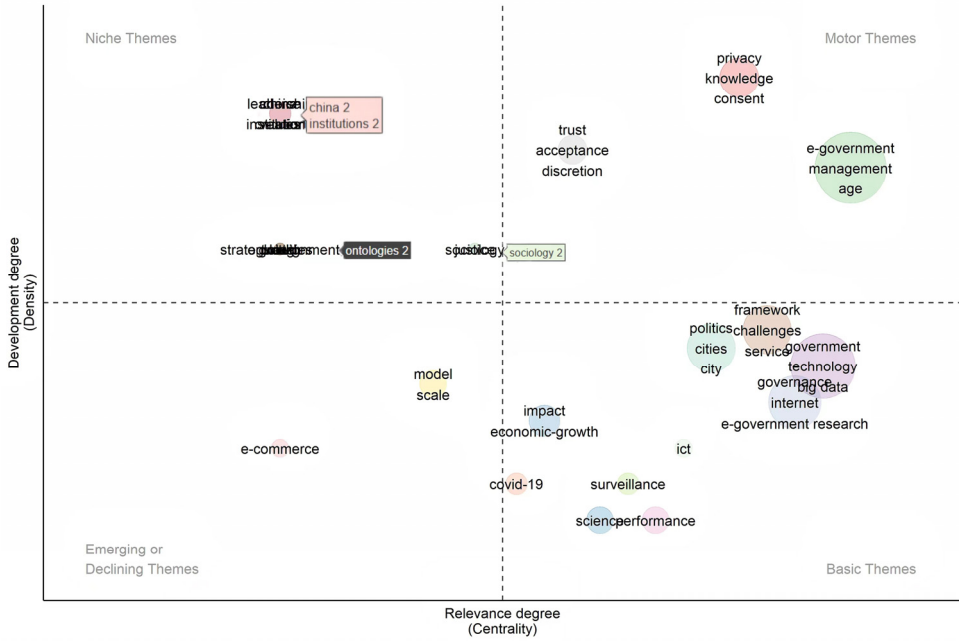

Fig.4. Thematic map

3.4 Factorial Analysis of Topic Dendrogram

Figure 5 shows the results of identifying the correlation between variables using the Multiple Correspondence Analysis (MCA) method, and determine the importance of four key fields and corresponding contributions, which are: (1) big data, communication, political status; (2) technology and information communication technology; (3) social media and digital governance; (4) business. According to the MCA results, the first dimension accounted for 20.97% of the overall explained variance. The results of this comprehensive analysis are important for understanding the relationships between variables as well as the clustering of popular keywords.

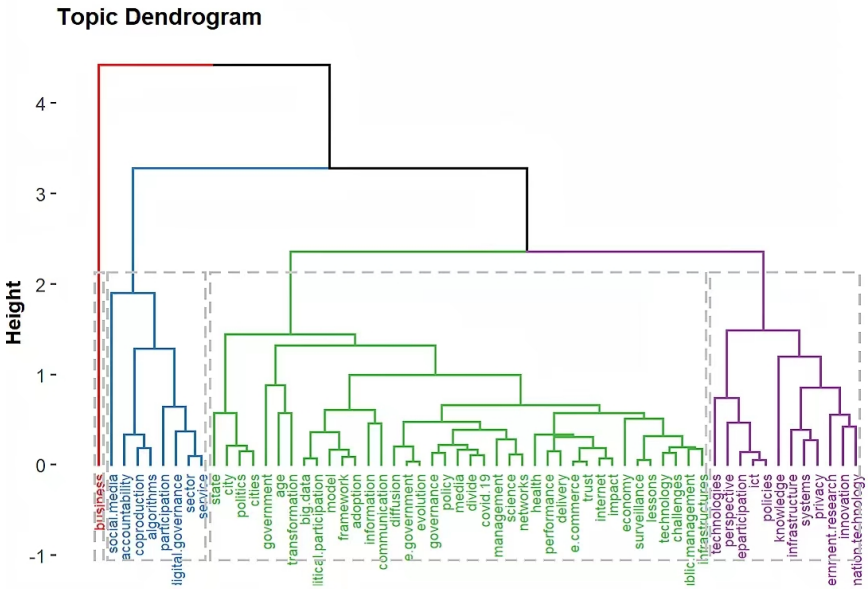

Fig. 5. Multiple Correspondence Analysis (MCA): topic dendrogram

4 Conclusion

The results of scientific econometric analysis indicate that the overall research trend in digital governance in the academic community is good. Countries such as the United States, China, and the United Kingdom are increasingly paying attention to the digital economy and internet technology, which may continue to play a powerful role within the existing research scope: the United States is the main driving force for global discussions on internet governance; Europe's attitude towards digital governance places great importance on personal privacy, consumer rights, and fair competition. The EU's General Data Protection Regulations highly recognize the fundamental values of personal data protection laws, and all data processing activities applicable to GDPR must comply with seven data processing principles: fairness, transparency, and legality; Purpose restrictions; Minimize data; Accurate; Storage restrictions; Integrity and confidentiality; Accountability and compliance. It is the core embodiment of GDPR's privacy protection spirit. GDPR is not just a law that protects personal data, and it has an inseparable relationship with market competition. China's unique political and social environment determines its model of digital governance. With rapid technological progress, a focus on innovation, and the adoption of strategic policy measures, China has been able to establish a comprehensive digital governance framework that promotes economic growth while also raising concerns about privacy and human rights.

Digital governance is a constantly evolving field that is influenced by technological advancements, social and political backgrounds, and global trends. Overall, digital governance balances technological development with ethical considerations, privacy protection, and citizen participation. No matter how much a country's digital governance strategies are influenced by political and institutional factors, in order to solve the sustainable development problems caused

by various digitizations, there must be an adaptive management approach.Each country is engaged in exchanges with each other around the world based on its own cultural, political, and economic environment.

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