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The 21st Century in Smart Governance and Transparency Research: A Bibliometric Analysis

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ABSTRACT

This study aims to provide a broad survey by synthesizing the fragmented literature on smart governance and transparency. Data were obtained from Scopus for the period 2002-2023. This study utilizes VOS Viewer and Biblioshiny R-Packages as the main analytical tools. The analysis encompasses common characteristics, conceptual structure, and social structure. The study results indicate a growing interest in smart governance and transparency research during the 21st century. The development of literature on smart governance and transparency is driven by the productivity of authors, institutions, and countries, manifested through publication output, relevant sources, and the most cited countries. Current trends in research on smart governance and transparency include the exploration of blockchain and e-government. Variables such as compliance, challenges, corporate governance, the Internet of things, public procurement, digital technologies, economic and social effects, performance, culture, education, regulation, trustworthiness, institutional factors, administrative aspects, infrastructure, security, and value creation have received limited attention. This study contributes to the literature on smart governance and transparency by synthesizing previously fragmented literature and summarizing the development, key trends, and research gaps in the field.

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1. Introduction

The government is increasingly intensifying its campaign on the importance of good governance. Good governance practices have become essential for the government to achieve its strategic goals and to positively impact various sectors. These impacts include increased levels of public satisfaction (Chien & Thanh, 2022), strengthening the relationship between bureaucracy and accountable performance (Hastuti & Mardijuwono, 2020), preventing corruption (Prakasa et al., 2022; Setyaningrum et al., 2017), and enhancing government performance through transparency (Basri et al., 2021).

Transparency in policy and public resource management is crucial for supporting accountability and informing the public about governmental efforts. Through transparent information, the public can perform a monitoring function that encourages organizations to improve performance (Brito et al., 2010; Kosack & Fung, 2014). Transparency is considered a fundamental value in building public trust (Bastida Albaladejo, 2019; Husni et al., 2023). Transparency affects government performance, thereby enhancing public trust (Tran & La, 2022). It can be concluded that transparency in governance needs to be realized for better government performance. Smart governance, characterized by technology, is essential for achieving transparency and improving government efficiency through the balanced participation of the government and the public (Rubasundram & Rasiah, 2019; Scholl & Scholl, 2014)

Due to the essential role of smart governance in promoting transparency and accountability in the public sector, reviews on this topic are increasing every year. However, the studies are still scattered, with limited synthesis, making it difficult to conclude the development and contributions of recent studies. Therefore, it is necessary to synthesize the existing literature to provide a comprehensive overview that can provide further research directions. A way to do so is through bibliometric analysis. This analysis helps researchers develop an up-to-date review, recognize research trends, and pinpoint areas that have received less attention and are underdeveloped (Mushtaq et al., 2023).

Existing bibliometric studies on smart governance have focused on smart cities, digital-era governance, and e-government (Biancone et al., 2022; Ibrahim & Nurmandi, 2023; Ravšelj et al., 2022; Sulistyaningsih et al., 2023; Vujković et al., 2022; Zhou et al., 2020). Biancone et al. (2022) discusses the relationship between technology adoption and its impact on governance, such as e-government (Ibrahim & Nurmandi, 2023). Some studies have only discussed smart governance in cities (Zhou et al., 2020), while others have simply studied the Asia countries (Sulistyaningsih et al., 2023). However, there is no specific bibliometric study that discusses the relationship between smart governance and transparency. This creates an important research gap that needs to be addressed to provide a comprehensive snapshot of how transparency can be integrated and utilized in smart governance practices to address the complex challenges of technological advances. This research will guide policymakers and researchers in developing more transparent and accountable approaches to technology-enabled governance.

Based on this background, the objectives of this study are to comprehensively discuss the smart governance and transparency literature that has not been explored by previous bibliometric research. It addresses smart governance in all its forms, including smart cities, smart villages, and other settings. This study focuses on analyzing the topic of smart governance in relation to transparency. Smart governance literature that does not have implications for transparency will not be discussed in this study. In addition, this study analyzes articles published during the 21st century as technology rapidly develops and is expected to increase in transparency and accountability. More specifically, this bibliometric study focuses on the following questions:

RQ1. How do studies on smart governance and transparency appear regarding publication development, authors, institutions, and country production?

RQ2. What are the main trends in the literature regarding the relationship between smart governance and transparency?

RQ3. What are the research gaps related to smart governance and transparency?

By addressing these research questions, this study contributes in several ways. First, it provides a comprehensive review of the fragmented literature on smart governance and transparency by using big data analysis. Second, it identifies key trends in smart governance and transparency research. Third, it informs both emerging and established themes and explores gaps and potential for future research.

Finally, it serves as an enabler for policy development in the realm of smart governance to promote transparency and public accountability.

2. Literature Review

Since the late 20th century, smart governance has evolved from the smart community movement (Liu & Qi, 2021), which defines the government's use of technology to enhance decision-making and collaboration (Viale Pereira et al., 2017). In this context, adaptive governance and complex systems theory encourage governments to respond to rapid and dynamic social and technological change. Willke (2009) views smart governance as adaptive to societal needs across historical periods, emphasizing its role in integrating technology and fostering effective governance.

Smart governance is not merely a trend but an adaptive response to the evolving demands of society, characterized by its flexibility and adaptability to changing societal needs and technological dynamics (Luo, 2023; Nastjuk et al., 2022). This continuous transformation enables smart governance to effectively address the complexity of contemporary challenges, leading to a more responsive and effective form of governance. By intelligently integrating technology, smart governance not only enhances decision-making but also fosters closer collaboration between government and society, thereby promoting transparency and accountability. Through this perspective, smart governance not only responds to existing conditions but also anticipates future complexities, positioning it as a proactive and transformative governance model (Parappallil Mathew & Bangwal, 2024).

Implementing smart governance, such as expanding e-government, shifts government administration and fosters innovation, thereby enhancing public service quality, community participation, and government efficiency (Norris & Reddick, 2013). This transition presents a practical application of smart governance, which involves transforming operations to meet citizens' needs more effectively and to reduce bureaucratic inefficiencies. It also impacts how government and society interact.

Smart governance also supports sustainability through openness and transparent governance (Oktarina et al., 2023; Tomor et al., 2019), aligning with indicators such as participation in decision-making, public and social services, transparent governance, and political strategy and perspective (Giffinger, 2007). Efforts to develop the concepts of smart governance and smart government continue, even though some projects have touched on their elements (Scholl & Scholl, 2014).

Transparency is essential to the smart government concept, enhancing public access to information and government decisions through technology (Kosack & Fung, 2014). In practical terms, transparent practices involve the creation of accessible digital portals, relevant data disclosure initiatives, and interactive platforms where citizens can monitor government activities and participate, particularly in monitoring government discrepancies and inefficiencies. These practices not only support the principles of transparency and accountability but also make concrete contributions, such as reducing corrupt practices and promoting public trust (Koeswayo et al., 2024).

As society seeks better access to information, transparency in smart government helps in promoting good governance, combating corruption, and enabling citizens to challenge improper actions (Carothers & Brechenmacher, 2014; Rodrigues, 2020). Originally central to democratic governance, it now extends to the private sector. Greater openness enables the public to identify and correct political misdirection, while increased participation leads to addressing citizen needs and improving decision-making by highlighting obstacles and inefficiencies (Kopits & Craig, 1998).

In conclusion, research on smart governance and transparency is essential, as these concepts enhance accountability, public trust, and responsive governance through technology. A bibliometric analysis of the literature is required to map trends, and to focus on areas and gaps in the existing literature, which provides a foundation for future research to develop more transparent, smart and efficient governance strategies.

Building on this understanding, it is crucial to explore how research on smart governance and transparency has evolved over time. Analysing publication trends, key contributors, and geographical distribution will provide valuable insights into the development of this field. The first research question concerns publication trends and scientific production. This topic is important to discuss, considering that smart governance and transparency have increasingly become primary focuses in various studies, reflecting the growing role of technology in governance and the public sector.

Analysing publication trends can provide insights into how this field has evolved, who the key contributors are, and which countries and institutions have made the most significant contributions.

H1a: Publications on smart governance and transparency have presented an increasing growth trend over the past decade.

H1b: Research on smart governance and transparency is dominated by developed countries with high levels of digitalization.

H1c: Academic institutions focusing on public policy and technology have made significant contributions to publications related to smart governance and transparency.

The second research question concerns the main trends in the literature regarding the relationship between smart governance and transparency. Understanding these trends is crucial for identifying the predominant research focus, methodologies, and key findings within the existing body of literature. By analysing these patterns, this study aims to uncover how smart governance contributes to transparency, which aspects have been extensively explored, and which areas remain understudied. Furthermore, this analysis provides valuable insights for guiding future research, ensuring that it remains relevant and contributes to the advancement of more transparent and intelligent governance systems. The following hypotheses address RQ2 regarding the key trends in the literature on the relationship between smart governance and transparency.

H2a: Smart governance positively influences transparency by improving access to public information and decision-making processes.

H2b: Research on smart governance and transparency primarily focuses on the role of digital technology, while institutional and regulatory aspects receive less attention.

H2c: The relationship between smart governance and transparency is most frequently examined in the context of e-government and public sector management.

The third research question examines the research gaps related to smart governance and transparency. Identifying these gaps is essential for understanding the limitations of existing studies and highlighting areas that require further exploration. By mapping out these gaps, this study seeks to provide a foundation for future research that can address unanswered questions, explore underrepresented perspectives, and contribute to the development of more effective governance frameworks. Moreover, recognizing these gaps ensures that academic and policy discussions remain dynamic, forward-thinking, and responsive to evolving technological and governance challenges.

The following hypotheses address RQ3 regarding the research gaps in the literature on smart governance and transparency

H3a: Research on smart governance and transparency mainly focuses on technology, while institutional and administrative aspects remain underexplored.

H3b: Studies emphasize national and urban governance, with limited attention to smart villages and local transparency.

3. Methodology

This study uses a bibliometric approach to summarize and synthesize published literature (Ellegaard & Wallin, 2015), examining the structure, evolution, and research trends on smart governance and transparency (Ariffin et al., 2023). It includes journal articles, books, and other relevant sources.

To address the research questions, this study undertook three important steps: data mining, data processing, and data statistics and finding review.

3-1. Data Mining

We employed the PRISMA protocol to track the literature relevant to this study. This protocol, which encompasses identification, screening, eligibility, and inclusion, was utilized to select pertinent articles (Kuckertz & Block, 2021; Lim et al., 2022). The PRISMA stages are detailed in Table 1.

Table 1. PRISMA Protocol

Stage	Description	Results	Excluded
Identification	"smart village" OR “smart governance” OR "technology adoption” OR "smart urban” OR "e-village" OR "IT governance" OR “information technology governance” OR "digitalization" OR "e-government" OR “electronic government” OR "smart cities" OR “smart community” OR “smart government” OR “smart environment” OR "smart city" OR “smart people” OR “smart living” OR "e-arsip" OR “blockchain” AND "accountability" OR “transparency”	8.395	-
Screening	Subject area: Business, Management and Accounting, dan Economics, Econometrics and Finance	1.626	6.769
	Document type: Article	869	757
	Language: English	832	37
	Source type: Journal	823	9
Eligibility	Justification-based keywords	591	232
	Justification-based titles & abstract	462	129
	Error checking	458	4
Inclusion	Co-occurrence and co-authorship analysis	458 articles	

In the identification stage, this study retrieves articles from the Scopus database, selected for its comprehensive coverage and prestigious articles (Ochoa et al., 2019). In the screening stage, the study applies criteria such as subject area (Business, Management, and Accounting; Economics, Econometrics, and Finance), document type (article), language (English), and source (journal). The focus is specifically on smart governance from an economic and business perspective, using only journal articles (Tautiva et al., 2022). Other publications such as book chapters, proceedings, and books are excluded as they do not contribute to empirical discussions (Tautiva et al., 2022).

Furthermore, the study restricts articles to the English language only, citing potential biases that may arise from combining multiple languages in bibliometric analysis (Gulluscio et al., 2020; Stechemesser & Guenther, 2012). The search period encompasses studies on smart governance and transparency since their inception, aiming for a comprehensive summary. Exclusions are documented at each screening stage, totalling to 7,572 articles (Table 1). The final search query employed was as follows (22 November 2023):

(TITLE-ABS-KEY ("smart village" OR "smart governance "OR" technology adoption" OR "smart urban" OR "e-village" OR "IT governance" OR "information technology governance" OR "digitalization" OR "e-government" OR "electronic government" OR "smart cities" OR "smart community" OR "smart government" OR "smart environment" OR "smart city" OR "smart people" OR "smart living" OR "smart heritage" OR "e-arsip" OR "blockchain") AND TITLE-ABS-KEY ("transparency" OR "accountability")) AND (LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "ECON")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE , "j")) AND (EXCLUDE (EXACTKEYWORD, "Supply Chain Management") OR EXCLUDE (EXACTKEYWORD, "Supply Chains") OR EXCLUDE (EXACTKEYWORD, "Supply Chain") OR EXCLUDE (EXACTKEYWORD, "Cryptocurrency") OR EXCLUDE (EXACTKEYWORD, "Sales") OR EXCLUDE (EXACTKEYWORD, "Food Supply") OR EXCLUDE (EXACTKEYWORD, "Food Supply Chain") OR EXCLUDE (EXACTKEYWORD, "Ethereum") OR EXCLUDE (EXACTKEYWORD, "Commerce") OR EXCLUDE (EXACTKEYWORD, "Bitcoin") OR EXCLUDE (EXACTKEYWORD, "Sustainable Supply Chains") OR EXCLUDE (EXACTKEYWORD, "Electronic Commerce") OR EXCLUDE (EXACTKEYWORD, "Supply Chain Finance") OR EXCLUDE (EXACTKEYWORD, "Healthcare") OR EXCLUDE (EXACTKEYWORD, "Health Care") OR EXCLUDE (EXACTKEYWORD, "Food Security") OR EXCLUDE (EXACTKEYWORD, "'current") OR EXCLUDE (EXACTKEYWORD, "Supply Chain Performance") OR EXCLUDE (EXACTKEYWORD, "Digital Supply Chain"))

The eligibility stage involved reviewing titles, abstracts, and keywords relevant to smart governance and transparency, and if necessary, reading the full text to determine its relevance to this area of study. This stage eliminated 365 out of 823 articles. The inclusion stage involved validation checks (Setiawan et al., 2025). Validation checks consist of double-checking at all stages to ensure that the PRISMA protocol has been implemented properly and that no relevant articles have been overlooked. Finally, 458 articles were selected for analysis.

3-2. Data Processing

Articles selected in the first stage are then analyzed using bibliometric analysis. This study utilized VOS Viewer and the Bibliometrix R-Package (Biblioshiny) (Aria & Cuccurullo, 2017) as analysis tools. First, preliminary statistical analysis was conducted to gather initial insights, such as timespan, number of articles, keywords, author keywords, and citations. Second, network analysis consists of conceptual structure and social structure. The basic assumption is that the frequent co-occurrence of words or keywords signifies close relationships (Zupic & Čater, 2015). The conceptual structure aims to uncover widely discussed topics, highlight current issues, and identify research gaps, addressing RQ1, RQ2, and RQ3. The social structure analysis explores author networks in transparency and smart governance research, primarily addressing RQ1, particularly related to author networks.

3-3. Data Statistics and Finding Review

Based on conceptual and social structure, the results are mapped with the use of statistics and visualizations to illustrate the development and contribution of literature related to smart governance and transparency. Based on bibliometrix data analysis of published articles, this study presents various visualizations to address H1a, H1b, and H1c, specifically publication development, top sources, institutions, and country production. The social structure analysis will map the social network among authors, showing how each author relates to others in terms of collaboration and topic interest, which can encourage the development of research in this area. Subsequently, the conceptual structure analysis will present the co-word network, thematic map, and thematic evolution, illustrating the relationships between variables studied in the smart governance and transparency literature. This provides various insights to verify H2a, H2b, and H2c. Based on this analysis, this study draws conclusions regarding research gaps in smart governance and transparency studies, provides recommendations for future research, and confirms H3a and H3b.

4. Results and Discussion

4-1. General Characteristics of the Literature

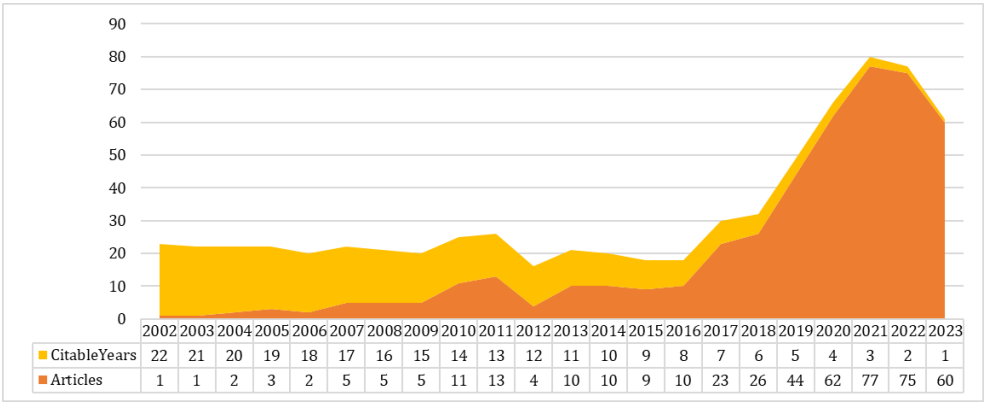
Table 2 summarizes the general characteristics of the corpus in this study. This research uses the literature from 2002 to 2023. The first studies on transparency and smart governance were published in 2002. The beginning of the 21st century marks the onset of rapid technological development, which, in terms of governance, has also leveraged technological advancements and initiated the concept of smart governance. This study analyzes 458 selected articles from 286 journals. According to Table 2, the annual growth rate of publications on transparency and smart governance is 21.53%, with an average citation of 22.9 per document. There are 1,475 keywords, and 1,263 authors included in the bibliometric analysis, along with other relevant information.

Table 2. General Characteristics of the Literature

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2002:2023
Sources (Journals, Books, etc.)	286
Documents	458
Annual Growth Rate %	21,53
Document Average Age	4,21
Average citations per doc	22,9
References	1
DOCUMENT CONTENTS	
Keywords Plus (ID)	910
Author's Keywords (DE)	1475
AUTHORS	
Authors	1263
Authors of single-authored docs	76
AUTHORS COLLABORATION	
Single-authored docs	79
Co-Authors per Doc	2,93
International co-authorships %	27,29
DOCUMENT TYPES	
Article	458

4-1-1. Evolution in the Number of Publications

Figure 1 illustrates the growth of publications and citations on transparency and smart governance from 2002 to 2023, averaging 20 documents annually. Publications peaked in 2021 with 71 articles, reflecting the increasing interest in the relationship between smart governance and transparency. This surge, particularly from 2019 to 2023, was driven by the COVID-19 pandemic, which accelerated technology use and e-government solutions, enhancing governance transparency and accountability. More importantly, numerous e-government solutions were specifically implemented in response to the global pandemic (Danquah et al., 2019; Goh & Arenas, 2020; Mensah et al., 2022).



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
CitableYears	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Articles	1	1	2	3	2	5	5	5	11	13	4	10	10	9	10	23	26	44	62	77	75	60

Fig. 1. Evolution in the Number of Articles Produced and Average Citations

4-1-2. Distribution Across Global Regions and Organizations

Over the last two decades, the USA has led in publications on smart governance with 97 documents, followed by India (86) and China (59) (Figure 2). The increasing trend across the top 10 countries indicates a growing global interest in smart governance as a strategy for achieving Sustainable Development Goals (SDGs). In total, 68 countries, including 65 beyond the top three, have contributed to this field, reflecting its widespread development and global relevance (Figure 3).

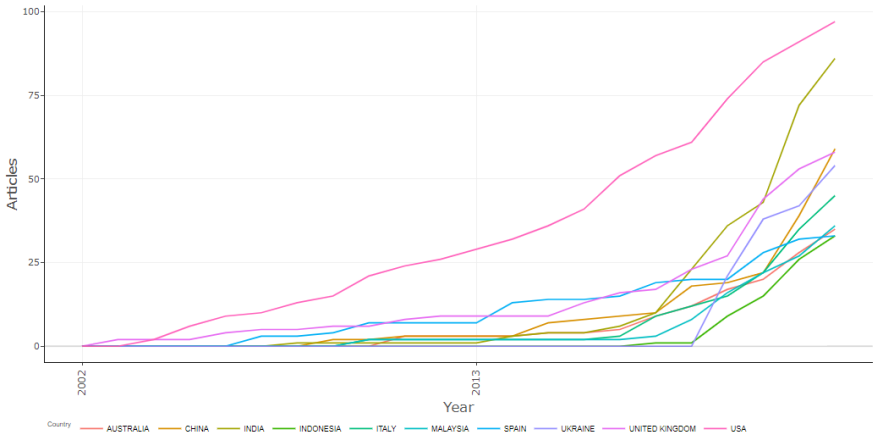


Fig. 2. Top 10 Contributing Countries

The rise in smart governance and transparency publications is driven by universities, which dominate the top three contributing organizations. This indicates that universities serve as key centers for developing smart governance and transparency literature. They position themselves strategically to encourage the transition to smart governance. Led by the University of Granada, which has eight documents, these universities play a pivotal role in advancing this field. Interestingly, most of these universities are not included in the top 100 QS World University Rankings. This may be because top-tier universities are less focused on smart governance and transparency studies, tending to prioritize the private sector over government initiatives, as the private sector often moves faster in terms of

innovation and technology adaptation. Nevertheless, it is hoped that top-tier universities will contribute to the development of literature on smart governance and transparency.

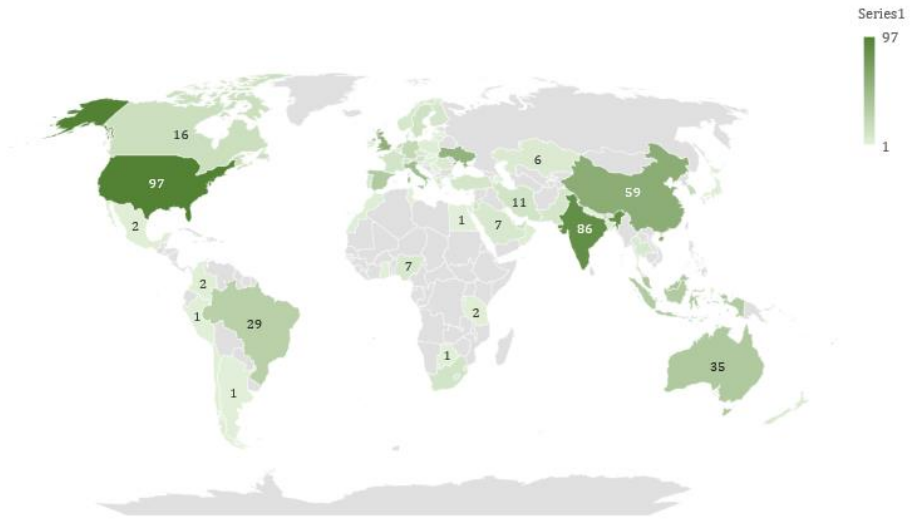


Fig. 3. Global Distribution of Publication Density

Table 3. Top 6 Organizations Contributing to Research on Smart Governance

Organization	Country	Articles
University of Granada	Spain	8
Huazhong University of Science and Technology	China	6
Indian Institute of Management Ranchi	India	6
Sumy National Agrarian University	Ukraine	6
RMIT University	Australia	5
University of Pardubice	Czechia	5

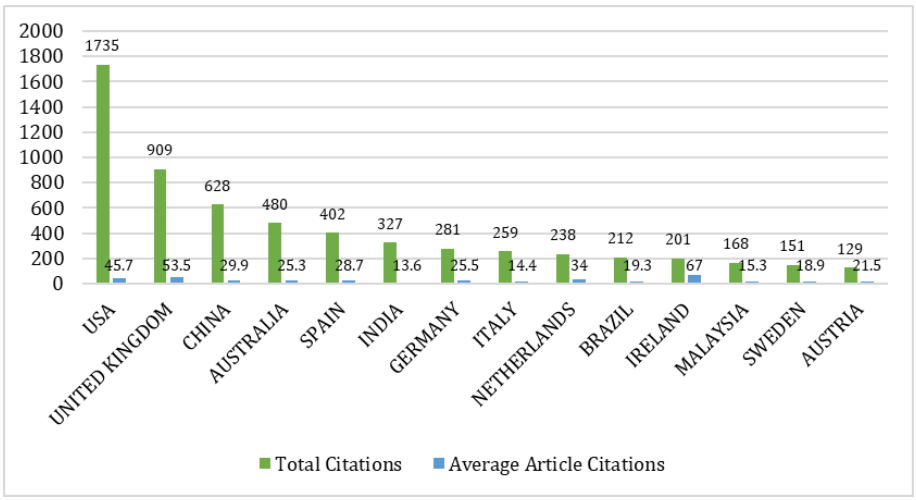


Fig. 4. Top 14 Most Cited Countries

Figure 4 displays the top 14 countries by citations, led by the USA with 1,735 citations, followed by the United Kingdom and China with 909 and 628 citations, respectively. This corresponds with Figure 2, where the USA leads in publications, and China ranks third. India ranks second in publications but trails in citations compared to Australia and Spain. Ireland, ranked 41st in publications, leads in average citations per article at 67, highlighting its significant impact on smart governance and transparency literature. Ireland is noted for its implementation of Open Data in the public sector, enhancing transparency in governance. It actively adopts e-government, smart cities, and public-private partnerships to advance smart governance practices.

4-1-3. Journal Analysis

Table 4 highlights the top 6 journals on smart governance and transparency research. The International Journal of Public Administration leads with 15 publications, an H-index of 11, and 634 citations. The International Journal of Recent Technology and Engineering follows in production with 8 publications but has the lowest impact. Technology Forecasting and Social Change ranks second in both publications (8) and impact (H-index 5, with 255 citations). The American Review of Public Administration is fourth in publications (7) but second in impact (H-index 7, with 537 citations). The UK and USA are prominent in influential sources and research impact.

Table 4. Six Most Relevant Sources and Source Impact

Sources	Country	Articles	H-Index	Total Citation
International Journal of Public Administration	USA	15	11	634
International Journal of Recent Technology and Engineering	India	8	3	31
Technological Forecasting and Social Change	USA	8	5	255
American Review of Public Administration	USA	7	7	537
Records Management Journal	UK	7	3	57
Technology in Society	UK	7	6	184

4-2. Network Analysis of Conceptual Structure

Figure 5 illustrates a network analysis of the conceptual structure using VOS Viewer based on bibliometric analysis. Nodes (circular visualizations) vary in size and color, with larger nodes representing more frequently researched keywords. Different colors indicate clusters. Edges (connecting lines) represent the relationships and strengths between nodes; thicker edges denote stronger relationships, often because the keywords are frequently connected in research studies. The proximity of nodes also suggests a strong relationship (Donthu et al., 2021).

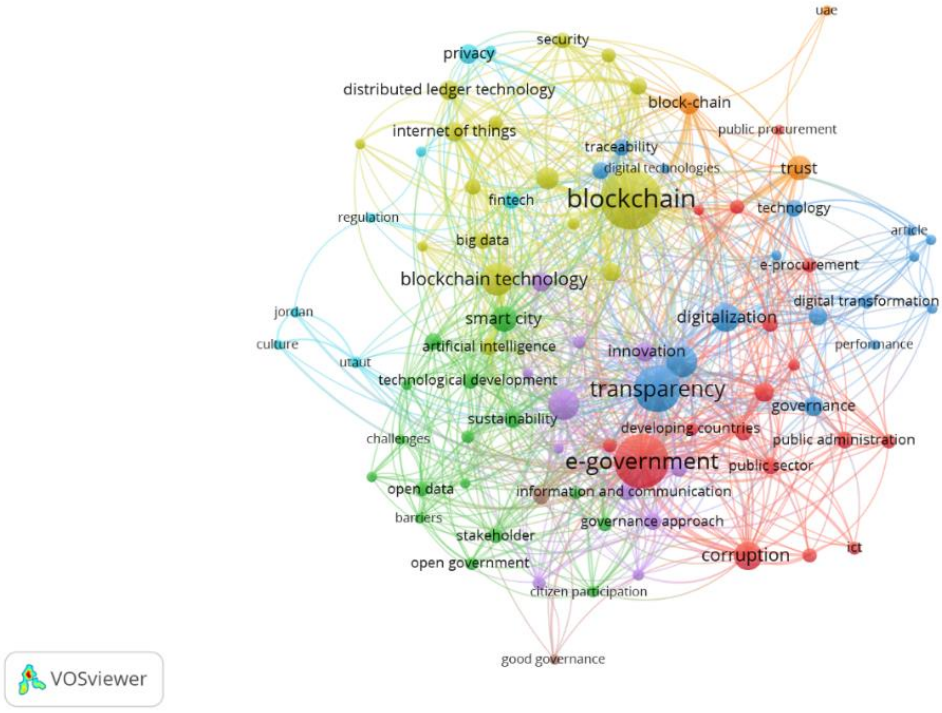


Fig. 5. Graphical Representation of the Co-Word Network

Based on Figure 5, e-government, transparency, and blockchain are frequently studied topics in the 21st century. E-government uses ICT for effective public services, transparency builds trust through open access to information, and blockchain enhances transparency by providing a secure, unalterable record. Their integration fosters a responsive, open, and trustworthy government, driving digital transformation and societal benefits.

Table 5. Variable Used in Smart Governance and Transparency Research

Variables	Cluster	Total Link Strength	Occurrences	Avg. Pub. Year
Blockchain	4	231	114	2020.9912
E-government	1	185	91	2016.4505
Transparency	3	185	67	2017.9104
Blockchain technology	4	51	34	2021.2647
Accountability	3	84	32	2019.0625
Technology adoption	5	91	31	2018.5161
Corruption	1	63	26	2018.3077
Digitalization	3	31	25	2021.24
Smart city	2	66	22	2020.6818
Trust	7	47	19	2019.4737
Block-chain	7	65	16	2021.75
Smart contracts	4	43	15	2020.9333
Distributed ledger technology	4	33	13	2020.6154
Governance	3	32	13	2018.3846
Government data processing	1	53	13	2013.9231
Internet of things	4	60	13	2021.1538
Decision making	5	43	12	2019.0833
Innovation	5	34	12	2020.1667
Privacy	6	22	12	2021.5833
Internet	4	48	11	2018.4545
IT Governance	3	14	11	2017.4545
Artificial intelligence	4	40	10	2021.5
Governance approach	5	46	10	2019.4
Information and communication technology	5	33	10	2015.6
Information technology	1	31	10	2013.7
Smart contract	4	34	10	2021
Sustainable development	8	24	10	2020.5
Technology	3	28	10	2021
Big data	4	15	9	2019.3333
Covid-19	3	20	9	2022

Table 5 reviews around 30 variables in the 21st-century smart governance and transparency research, highlighting key clusters presented in Figure 5. Metrics such as total link strength and occurrence measure the relationships and frequency of variables. Well-studied topics include e-government, transparency, blockchain, accountability, and technology adoption. Less frequent issues such as compliance, culture, education, public procurement, regulation, trustworthiness, and value creation suggest areas for future research. This analysis informs future research agendas by identifying both established and emerging themes.

Integrating technology into government governance encounters challenges such as compliance issues influenced by education, local culture, regulations, and concerns regarding system reliability arising from bugs. Despite these challenges, technology adoption aims to enhance value and transparency. While research has extended smart governance to smart cities (Hartley, 2023; Tomor et al., 2019), there is a scarcity of attention directed towards lower levels such as smart villages, which are pertinent to the Village SDGs. These particular domains necessitate further investigation due to their critical role in enabling successful smart governance and fostering sustainable development.

Figure 6 categorizes topics based on keyword analysis into motor, niche, emerging/declining, and basic themes. Motor themes such as procurement and contracts are highly central and dense, indicating well-established areas. Niche themes such as comparative and institutional topics indicate high density but low centrality, suggesting lower relevance. Emerging or declining themes such as decentralized and fiscal issues exhibit low centrality and density, indicating a need for further development. Basic themes including blockchain, e-government, and transparency have high centrality but low density, emphasizing their foundational significance. The map tracks trends over time, with growth indicated by rightward movement and decline by leftward trends. Research gaps in institutional, administrative, infrastructure, and security themes suggest opportunities for collaboration with less-studied variables identified in Table 5.

The institutional theme emphasizes the critical role of institutions in transitioning to smart governance and transparency. Organizational resources -financial, human, and intellectual capital- affect the adoption speed, enhancing service quality and transparency. Previous research gaps, particularly in human capital, require attention despite studies on education level. Future research could explore the impacts of educational institutions and majors such as MBA (Management,

Business, and Administration) and STEM (Science, Technology, Engineering, and Mathematics), as well as political and military connections, on smart governance and transparency.

Figure 7 outlines the thematic evolution in smart governance and transparency studies. From 2002 to 2017, key themes were the conceptual framework and technology adoption. In 2018-2019, major themes included technology adoption, decision-making, and developing countries. During the 2020-2021 pandemic, technology adoption remained central, with emerging topics such as blockchain, e-government, information management, and accountability. By 2022, blockchain and information management were prominent, with e-government taking precedence in 2023. This indicates a strong, ongoing interest in blockchain and e-government, aligning with their high centrality and low density illustrated in Figure 6, suggesting relevance for further research.

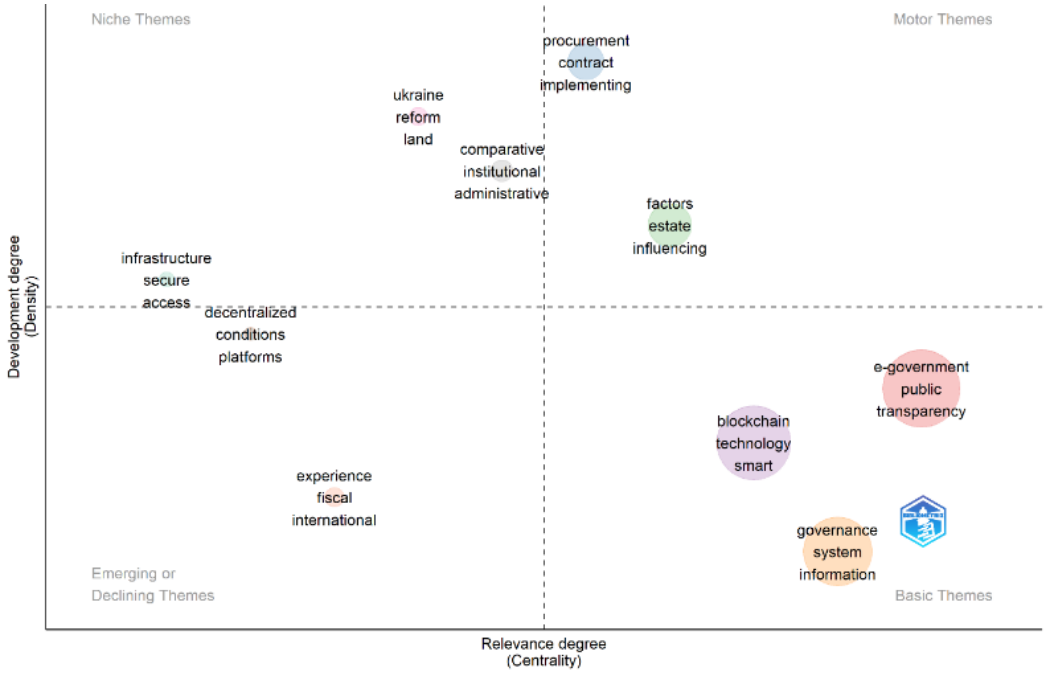


Fig. 6. Thematic Map

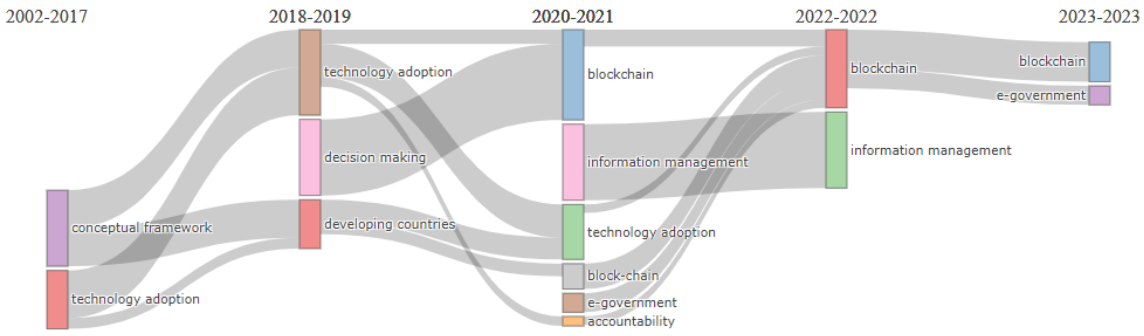


Fig. 7. Thematic Evolution by Keywords

4-3. Network Analysis of Social Structure

Table 6 lists 27 collaborating authors in 11 clusters, presented in different colors in Figure 8. Betweenness centrality measures the role of a node in bridging information gap. Closeness centrality measures proximity to other nodes, with lower scores indicating greater network centrality. PageRank identifies frequently cited articles, revealing current popular themes. Jain and Hashimy hold the highest PageRank, making their scholarly contributions the most influential in smart governance and transparency research.

Table 6. Collaborative Authors

Author	Cluster	Betweenness	Closeness	PageRank
Lněnička m	1	0	1	0.037
Máchová r	1	0	1	0.037
Pina v	2	0	1	0.037
Royo s	2	0	1	0.037
Rodríguez bolívar mp	3	0	1	0.037
López hernández am	3	0	1	0.037
Dunayev i	4	0	1	0.037
Kud a	4	0	1	0.037
De haes s	5	0	1	0.037
Joshi a	5	0	1	0.037
Jain g	6	0	0.50	0.041
Hashimy l	6	0	0.50	0.041
Kumar n	6	0	0.50	0.029
Ameen a	7	0	0.50	0.037
Alshamsi o	7	0	0.50	0.037
Bhumic a	7	0	0.50	0.037
Kumar r	8	0	0.50	0.037
Mukherjee a	8	0	0.50	0.037
Sachan a	8	0	0.50	0.037
Kapinos n	9	0	0.33	0.037
Makarova v	9	0	0.33	0.037
Mykhailov a	9	0	0.33	0.037
Petrova n	9	0	0.33	0.037
Fernando y	10	0	1	0.037
Hendayani r	10	0	1	0.037
Justice jb	11	0	1	0.037
Melitski j	11	0	1	0.037

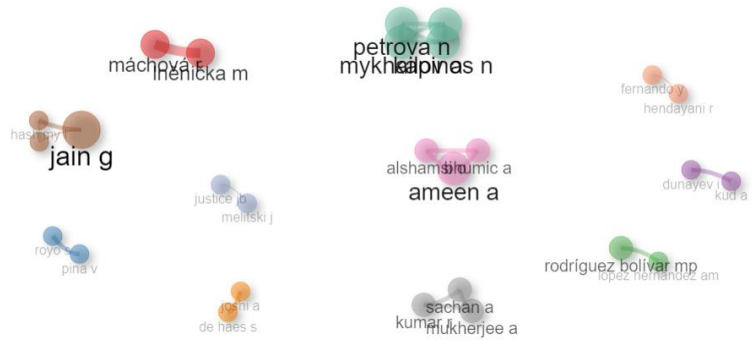


Fig. 8. Collaboration Network by Authors

Figures 8, 9, and 10 illustrate the social structure network in smart governance and transparency research. Figure 8 maps author collaborations and thematic areas. Figure 9 presents collaborations between institutions or universities. Figure 10 highlights countries collaborating in the field. These figures shed light on the fact that the development of literature is driven by collaborations among authors, institutions, and countries.

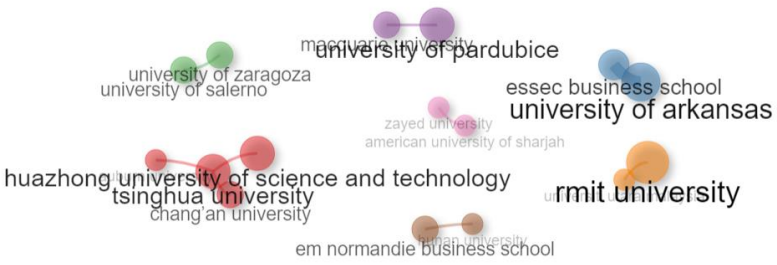


Fig. 9. Collaboration Networks by Institutions

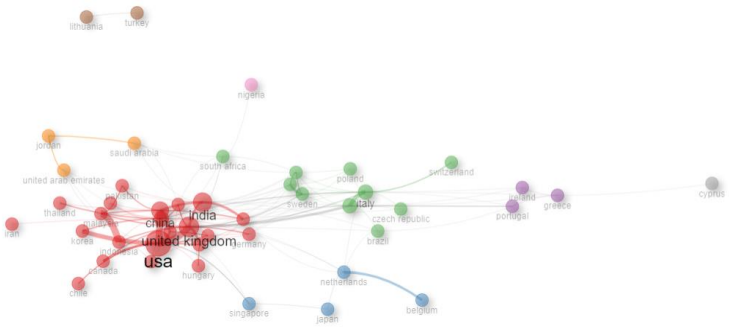


Fig. 10. Collaboration Network by Country

5. Discussion

Since the early 21st century, the conceptual framework of smart governance and transparency has gained traction. Smart governance, integrating smart and open government practices, aims to address challenges such as the information revolution, rapid change, and issues related to government spending more effectively than traditional approaches (Scholl & Scholl, 2014). Studies in Andhra Pradesh, India, highlight that administrative reforms and increased accountability and transparency are integral to governance improvements (Mooij, 2003). This reflects the growing recognition of effective and open governance in democratic processes, encouraging stakeholder participation in policy formulation and implementation for sustainable development and economic growth. Technology and human resources foster collaboration, enhancing openness and societal engagement in governance frameworks (Deligiaouri, 2013; Meijer & Bolívar, 2016).

The implementation of information and communication technology (ICT) significantly enhances good governance. E-government services increase government responsiveness, lower costs, promote transparency, reduce corruption, address rural poverty and inequality, and improve prospects. ICT adoption transforms decision-making by enabling efficient data access, deeper analysis, timely insights, and improved productivity in public service delivery (Glybovets & Mohammad, 2017).

Smart governance uses information and communication technology to enhance decision-making and foster stakeholder collaboration (Criado & Gil-Garcia, 2019; Pereira et al., 2018). Governance challenges vary between developing and developed countries (Tan & Taeihagh, 2020). Developing countries focus on basic needs such as infrastructure, income growth, regulations, human capital, and digital inclusivity. Effective smart city governance in these regions prioritizes citizen participation and environmental sustainability for inclusive development.

The COVID-19 pandemic has accelerated digitalization in multiple sectors (Abidi et al., 2023), pushing both government and private organizations to adopt technology for remote work, healthcare, and education. This highlights the need for secure and transparent data management technologies like blockchain. Blockchain continues to evolve with new projects and use cases, and recent research over the past five years has focused on its role in enhancing security, reliability, monitoring, and transparency in information management and governance (Christodoulou et al., 2023; Contini et al., 2023; Mbaidin et al., 2023). Digital technology adoption has surged due to the pandemic, with governments and organizations integrating artificial intelligence (AI), data analytics, and IoT to enhance efficiency, service quality, and transparency (Hauer et al., 2023; Tawiah et al., 2022; Wang & Ren, 2022). Governments are developing e-government platforms to enhance accessibility, efficiency, and accountability. Ongoing research explores how information technology can improve transparency, public participation, and accountability in government decision-making.

Trust crises in government and private institutions have increased demands for transparency and accountability (Pratolo et al., 2022). Global uncertainties, including the pandemic, have impacted investments, leading to research on technologies such as blockchain for transparent governance to restore trust. Evolving data regulations aim to balance privacy concerns with the benefits of disclosing personal data (Maier et al., 2023). Zhang et al. (2023) found that transparency can reduce privacy concerns in smart surveillance systems. Ongoing research is examining how technologies such as blockchain and information management can help organizations comply with regulations while ensuring data security and privacy in smart governance.

6. Conclusion

The number of publications on smart governance and transparency research indicates a significant growth in the 21st century. Publications have consistently increased in the first decade, but fluctuated in the second decade, with a decline in 2012, and a surge over the past five years, reaching a peak in 2021. This increase aligns with the rising need for technology integration, such as e-government during the pandemic and significant attention to blockchain technology. The key driver is the significant productivity of authors, research collaborations, universities, countries, and scientific journals that actively contribute to the development of smart governance and transparency studies.

Based on the conceptual structure, this study highlights evolving topics and identifies areas for future research. Key trends in this research area include blockchain, e-government, transparency, and information systems, with a notable rise in interest observed during the COVID-19 pandemic due to increased use of IT for communication and management. From a theoretical perspective, this study underscores the importance of smart governance as a means to increase transparency and trust in the public sector, providing a foundation for future studies to develop robust frameworks and models to measure governance effectiveness.

Future research should explore institutional, administrative, infrastructure, and security aspects more profoundly, as well as human capital, focusing on educational backgrounds such as reputable universities and majors such as MBA and STEM. On the practical side, policymakers and practitioners are encouraged to apply the insights from this study to address transparency challenges through smart technology, especially at the local government level, where transparency can have a direct impact on public trust and participation. Investigating smart governance implementation at the village level, in line with Village SDGs, also offers valuable research opportunities. This topic still receives insufficient attention despite its highly foundational role as it is directly related to society and public attention. Therefore, studies related to smart villages need to be accelerated in the future.

This research consolidates fragmented literature on smart governance and transparency, summarizing developments, trends, and research gaps. However, a critical limitation lies in analysing English-language articles, which may narrow the cultural and contextual understanding of smart governance practices across the region. Future studies should incorporate non-English articles for broader insights. Additionally, this study relies solely on the Scopus database; using other databases, such as Web of Science (WoS), in future research could enhance the accuracy of the findings. Bibliometric analysis for future studies can address specific themes based on the geographical research (e.g., based on country) so that the synthesized study findings can be directed towards policy recommendations, theories used, and specific topics such as blockchain in the public sector that have received considerable attention from researchers.

Conflict of interest

No potential conflict of interest was reported by the author(s).

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