



# “Digital transformation and urban governance: A bibliometric analysis of public administration research”

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# DIGITAL TRANSFORMATION AND URBAN GOVERNANCE: A BIBLIOMETRIC ANALYSIS OF PUBLIC ADMINISTRATION RESEARCH

## Abstract

Within the framework of digital transformation, the growing interaction between citizens and local self-government institutions during urban development has become a pressing topic in the international scientific community. The purpose of this study is to perform a bibliometric analysis of the scientific literature on the public administration of urban development during digital transformation. The study covers the period from 2005 to April 2025 and is based on 1,388 articles chosen from the Scopus database. The results obtained using VOSviewer show that since 2015, the rate of scientific publication has accelerated, indicating a substantial increase in interest in this area among researchers. Regarding the distribution of countries, the results emphasize the prominent position of developed countries. Although the USA (187) occupies the leading position in terms of the number of publications, China (161) and Italy (119) have shown wider collaboration networks in international research. Moreover, scientific collaboration among European Union countries is at a high level. Analysis of the keyword network shows that the topic of "smart city" has the highest level of connectivity and is one of the most relevant research directions in the field of urban governance during digital transformation. The results show that improving data-driven governance and the relationship between citizens and local government can contribute to the development of effective urban strategies and enhance public trust in local government. The results provide a general overview of research on digital transformation in urban governance and its main research directions.

## Keywords

public administration, city, development, digital transformation, bibliometrics, VOSviewer

## JEL Classification

H83, O18, R11

## INTRODUCTION

Digital transformation has become one of the central reform agendas in contemporary government. In broad terms, digital transformation denotes a process through which digital technologies trigger significant changes in organizational structures, routines, and public value creation. In public administration, however, this concept requires greater precision. This concept does not encompass only the computerization of existing processes or the implementation of isolated information and communication technologies (Correia et al., 2024). On the contrary, it concerns the process of changing administrative procedures, the service provision model, coordination, and decision-making processes to enable digital technologies and data to permeate all phases of the policy cycle (Johnston, 2015; Issenova et al., 2024). In other words, the digital transformation of public administration can be considered as an institutional and organizational revolution of governments, not only as a technical change. The focus of the present

study is placed on the transformation that institutions, organizations, and services undergo by means of which digital technologies affect urban governance and the relationship between local governments and their residents.

Even though there have been many studies on the topics of smart cities, e-government, and digital governance, the link between digital transformation, urban planning, and public administration is still theoretically fragmented. The majority of current studies focus on one of two areas, either digital technology innovations in the urban environment or digital transformation issues within a wider context of digital governance, without considering any connections between these areas within the context of public administration scholarship. Hence, a bibliometric approach is necessary to uncover the dynamics of development, key players, and major thematic groups in the scholarly literature.

Consequently, the literature gap does not only lie in the fact that no further bibliometric study was conducted; rather, the problem lies in the lack of theory-based bibliometric mapping of the link between digital transformation and public administration issues in urban development. It is therefore vital to identify the publication dynamics, intellectual structure, and thematic organization of this field, and to interpret the findings through the conceptual relationship among digital transformation, urban governance, citizen participation, and data-driven public administration.

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## 1. LITERATURE REVIEW

Studies have highlighted that digital transformation cannot be limited solely to technological issues. As for public administration, digital transformation may be perceived as an institutional and organizational phenomenon impacting administrative processes, public service delivery, decision-making, interorganizational collaboration, and relationships between government institutions and citizens (Sgambati & Gargiulo, 2022; Lafioune et al., 2024). Such an interpretation implies that digital transformation not only changes the tools used by government institutions to achieve their goals but also transforms the way that such institutions produce public value, establish accountability, and deal with societal challenges. Such a notion is especially relevant in the urban environment, where administrative organizations have to cope with the high level of complexity and the involvement of multiple parties within the framework of digital infrastructures.

This change is particularly evident in the field of urban governance, where public authorities have to balance their roles in providing services, managing spaces and infrastructures, implementing sustainability measures, and engaging citizens while governing through data and digital technology and dealing with various social and territorial challenges (Esposito et al., 2024; Zhubanazarov

et al., 2025). As such, urban governance is one of the most critical fields in which the effects of digital transformation on public administration are evident. Within this field, smart city development may arguably be regarded as the most conspicuous example of digital transformation in urban environments (Chang et al., 2020). It should be noted that smart city development cannot be considered as a direct equivalent of digital transformation in public administration. While smart city studies generally center on the role of technological infrastructures, sensor technologies, digital platforms, and innovation ecosystems, those concerned with public administration pay closer attention to institutions, accountability, coordination, leadership, and engagement of citizens. It is crucial to maintain the distinction between these two approaches to digital transformation for the simple reason that the issue is not just about adopting new technologies; it is about transforming administrative systems and state-society relations in doing so.

In terms of urban studies, such changes have been extensively studied through the framework of the smart city. Due to the intensive utilization of big data analysis, artificial intelligence technologies, IoT technologies, and digital platforms in the last ten years, the smart city has become one of the most evident frameworks for studying urban transformation (Sayın, 2024; El-Agamy et

al., 2024). Nevertheless, the smart city approach does not allow one to fully understand the impact of digital transformation on public administration. Technological efforts usually demonstrate the structural problems that include fragmented governance institutions, lack of consistency in administrative capacity, poor inter-agency coordination, limited digital literacy among public sector employees, and insufficient citizen participation (Kurkela et al., 2023; Ahmadzai, 2025). Hence, besides changes brought about by innovations in technology, the key scientific problem of the current period includes an evident gap between technological progress and organizational development in public administration. The former implies new ways to foster greater levels of participation, responsiveness, and evidence-based decision-making. The latter tends to be dominated by hierarchy-based processes and rigid organizational forms. Therefore, a growing gap between urban innovation based on technologies and public administration practices has become an essential issue of contemporary urban governance. In contrast to the smart city approach, where issues of integration, innovation, and efficiency of urban life predominate, the approach that is based on public administration stresses the need for institutions to respond to changes in the digital environment in terms of capacity building, governance structures, leadership, citizen engagement, etc. (Schmidt et al., 2024).

In this light, one can ask how the process of digital transformation is changing the fundamentals of urban governance and the types of changes needed within public administration structures to adequately respond to the challenges of digitized cities. The answers to this question cannot be provided simply by considering digital transformation from a technological perspective. Attention must also be paid to administrative, institutional, and governance aspects through which digital technologies affect decisions, coordination, engagement, and service delivery in cities (Guo et al., 2024). To put it differently, urban digital transformation should be considered both as a technological and public administration process.

This distinction implies the requirement for a more distinct theoretical approach toward the analysis of the topic. In the current study, four in-

terrelated dimensions are used for analyzing the relevant literature. First, it refers to digital transformation, defined as the integration of digital technologies and data into government mechanisms (del Socorro Encinas-Grijalva et al., 2024). Second, there is urban governance or smart governance, which implies coordination among different participants and infrastructure. Third, citizen participation and collaborative governance are discussed due to the increasingly active involvement of citizens in decision-making. Finally, data-driven and public value-based governance is implied by utilizing data and digital systems for improving the efficiency and sustainability of service provision (Lee et al., 2023).

Viewed from this angle, the bibliometric approach employed herein goes beyond being a purely descriptive method. It serves as a theory-based mapping approach that enables the evaluation of the connection between these conceptual dimensions within the scholarly literature (Urs et al., 2024; Shpak et al., 2024; Belgibayeva et al., 2025; Lyeonov et al., 2025). In particular, this framework implies that certain themes should be expected to cluster together. For example, smart city research is likely to be associated with digital transformation, big data, and sustainability, whereas citizen participation may be expected to cluster more closely with governance, local government, public service, and collaborative decision-making (Sharifi et al., 2023; Sareen & Haque, 2023). At the same time, if the literature remains fragmented, public administration concepts may appear only weakly integrated with technology-oriented urban studies. Thus, bibliometric mapping can help identify not only dominant topics, but also the degree of conceptual integration or separation within the field.

Previous bibliometric studies have made an important contribution to understanding the evolution of smart city and urban governance research. Winkowska et al. (2019) and Vujković et al. (2022), for instance, indicate that smart city scholarship has witnessed a considerable growth in size and scope, and become an interdisciplinary discipline with close ties to the areas of sustainability, innovation, and governance. This literature is helpful in discerning some publication trends and interdisciplinary aspects. Yet, despite being highly useful in these respects, much of this literature tends

to concentrate more on the smart city realm per se or smart governance discourses, rather than their cross-section in terms of digital transformation, urban governance, and public administration (Burlacu et al., 2021; Principale et al., 2023).

The aim of this study is to conduct a bibliometric analysis of scientific literature on public administration in urban development within the context of digital transformation, identifying key publication trends, intellectual structures, and thematic relationships among major research domains.

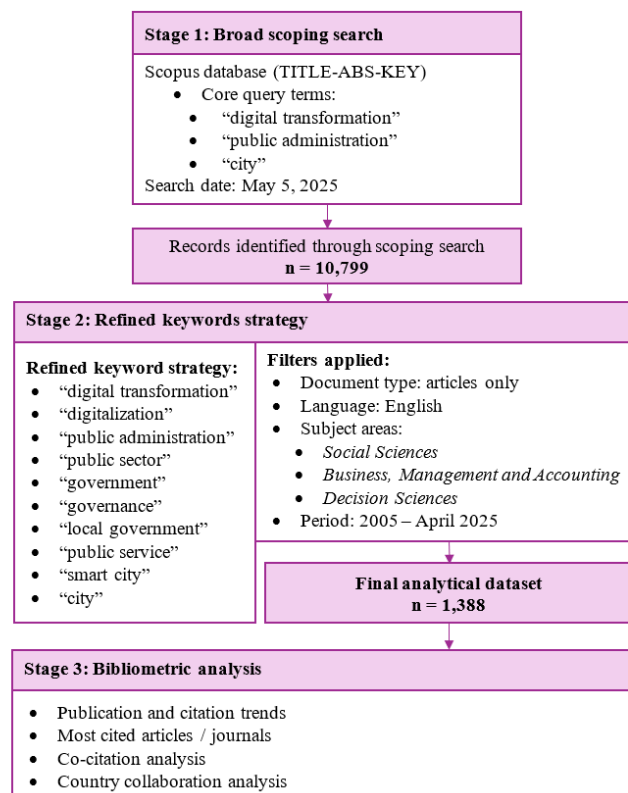
## 2. METHOD

This study employs a bibliometric research design to map the intellectual and thematic structure of the literature on the public administration of urban development in the context of digital transformation. Scopus was selected as the source database because of its broad coverage of peer-reviewed international publications and its suitability for bibliometric analysis. The dataset was analyzed using VOSviewer, which was applied to examine publication dynamics, citation patterns, country and

institutional collaboration, co-citation relationships, and keyword co-occurrence networks.

Two phases of data extraction were employed in the process. First, a wide-ranging scoping search was performed in the Scopus database using the key terms “digital transformation,” “public administration,” and “city” to gauge the scope and extent of literature on this topic. The results obtained in this phase yielded a total of 10,799 articles. These were merged, and duplicates, totaling 565 articles, were eliminated, leaving an initial dataset as the basis for further searches. Nonetheless, since this initial search yielded results not concerned with the aspect of public administration in the context of urban digital transformation, another refined search approach was undertaken.

In the second stage, the final database was formed using an extended list of keywords corresponding to the theoretical scope of this research, such as “digital transformation,” “digitalization,” “public administration,” “public sector,” “government,” “governance,” “local government,” “public service,” “smart city,” and “city.” They helped narrow down the search to those publications that combine as-



**Figure 1.** Data collection, screening, and bibliometric analysis framework

pects of digital transformation, urban governance, and public administration. For further thematic refinement, only articles written in English language and indexed in the subject areas of Social Sciences, Business, Management and Accounting, and Decision Sciences of Scopus were selected. The period covered by this research ranges from 2005 to April 2025. Finally, 1,388 publications have been selected in line with the inclusion criteria listed above.

Bibliometric analysis was carried out based on the resulting dataset. Co-citation map, country collaboration map, and keyword co-occurrence map were constructed using VOSviewer software. Hence, the first stage search acted as a scoping search, and the narrowed-down second stage search provided the resulting dataset that underwent bibliometric analysis. The entire process of data identification, screening, and inclusion is illustrated in Figure 1.

### 3. RESULTS AND DISCUSSION

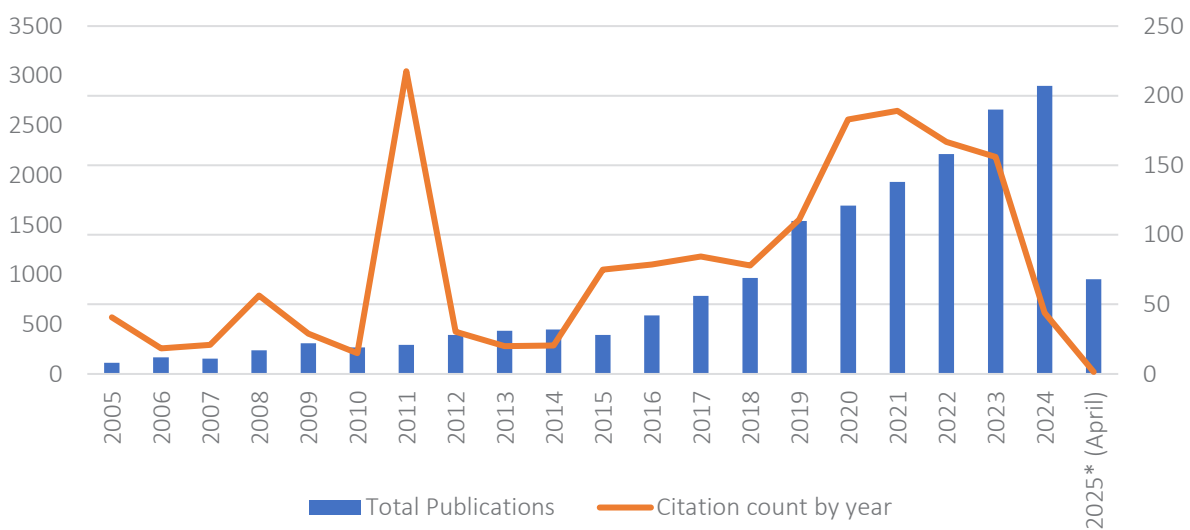
In the bibliometric analysis, we examined digital transformation by grouping elements such as academic journals, highly cited articles, authors, and keywords cited in research on urban development within the field of public administration. This process enhanced our ability to analyze the data

structure through visualization techniques that enabled a graphical representation of the findings (Zheng et al., 2020; Madzik et al., 2023). The applied methods mapped bibliometric networks and provided the means to address the research questions.

To present the emerging classifications and networks, the collected information was integrated into analytical methods (Janik et al., 2020). Accordingly, we conducted a network analysis using the VOSviewer software based on data retrieved from the Scopus database. This helped identify collaborations among key authors and scientific communities through keyword usage. Moreover, it served as one of the tools that support the accumulation and integration of research for scholars.

Our dataset consisted of 1,388 articles published in 687 journals, mainly covering the fields of social sciences, business, management, accounting, and decision sciences. The articles were authored by 3,848 researchers affiliated with 2,614 organizations across 99 countries, and a total of 62,740 citations were identified.

It is evident from Figure 2 that many researchers have studied the impact of digitalization on urban governance through a systematic review of the scholarly publications written between 2005 and April 2025. Over the stated duration, there



**Figure 2.** Number of publications and citation indicators of research on public administration of urban development in the context of digital transformation

has been an increase in the number of citations received by publications; however, the need for clarity regarding the research trend has become more prominent.

During 2005–2010, the volume of literature was rather low, as it represents the initial stage of this multidisciplinary research domain (Figure 2). Beginning in 2011, an insignificant increase in published works may be noted (21 publications); however, until 2014, there is some fluctuation in the number of works published each year. Nevertheless, from 2015 onward, the growth of publications became quite considerable. The growing trend of publications demonstrates an increased interest among scholars in this subject. Thus, by April 2025, 68 publications were registered, but this number is expected to increase by year-end.

Regarding citation dynamics, between 2005 and 2010, publications were cited 200–700 times on average per annum. The most pronounced increase is observed in 2011 when there were 3,046 citations recorded, likely as a result of one or several landmark publications. Since 2015, there has been a consistent increase (1,050 citations), peaking in 2020–2021. This indicates that publications of this period achieved widespread acknowledgment and implementation by members of the scholarly community. While the number of citations made in 2024–2025 seems lower due to the lack of complete information (through April 2025 only), the numbers are bound to grow further. Citation indicators typically increase over time as newer publications receive academic attention.

During our review of the literature on the digital transformation phenomenon in urban governance, we realized that some notable journals have published articles on this topic. Some of the journals with the highest number of publications in this field include “Sustainability (Switzerland)”, “Smart Innovation, Systems and Technologies”, “Cities”, “Journal of Cleaner Production”, “Public Administration”, “Lecture Notes in Business Information Processing”, and “Proceedings of the European Conference on E-Government (ECEG)” (see Table A1 in Appendix A). Based on the analyzed data presented in Table 1, we identified the most cited thematically relevant articles in the dataset.

Regarding the most cited articles, the paper “Smart cities in Europe” by Caragliu et al. (2011) published in the *Journal of Urban Technology* in 2011, received 2,516 citations. Another highly cited article is “Digital transformation in business and management research: An overview of the current status quo” by Kraus et al. (2022) published in 2022 in the *International Journal of Information Management*, which has accumulated 471 citations. These studies demonstrate a strong focus on digital transformation and certain aspects of urban governance. In our research, we note that the most cited articles usually take time to accumulate citations, as citation count is often considered an indicator of impact. At the same time, articles highlighted the relevance of incorporating technology into governance, as well as the inclusion of citizens in decision-making.

**Table 1.** Most cited thematically relevant articles in the literature on digital transformation, public administration, and urban development

No.	Authors (year)	Article Title	Journals, No.	Year	Citations
1	Caragliu et al. (2011)	Smart cities in Europe	<i>Journal of Urban Technology</i> , 18(2)	2011	2,516
2	Kraus et al. (2022)	Digital transformation in business and management research: An overview of the current status quo	<i>International Journal of Information Management</i> , 63	2022	471
3	Deng et al. (2021)	A systematic review of a digital twin city: A new pattern of urban governance toward smart cities	<i>Journal of Management Science And Engineering</i> , 6(2)	2021	377
4	Sintomer et al. (2008)	Participatory budgeting in Europe: Potentials and challenges	<i>International Journal of Urban And Regional Research</i> , 32(1)	2008	369
5	Perboli et al. (2011)	The two-echelon capacitated vehicle routing problem: Models and math-based heuristics	<i>Transportation Science</i> , 45(3)	2011	334
6	Cuda et al. (2015)	A survey on two-echelon routing problems	<i>Computers &amp; Operations Research</i> , 55	2015	312

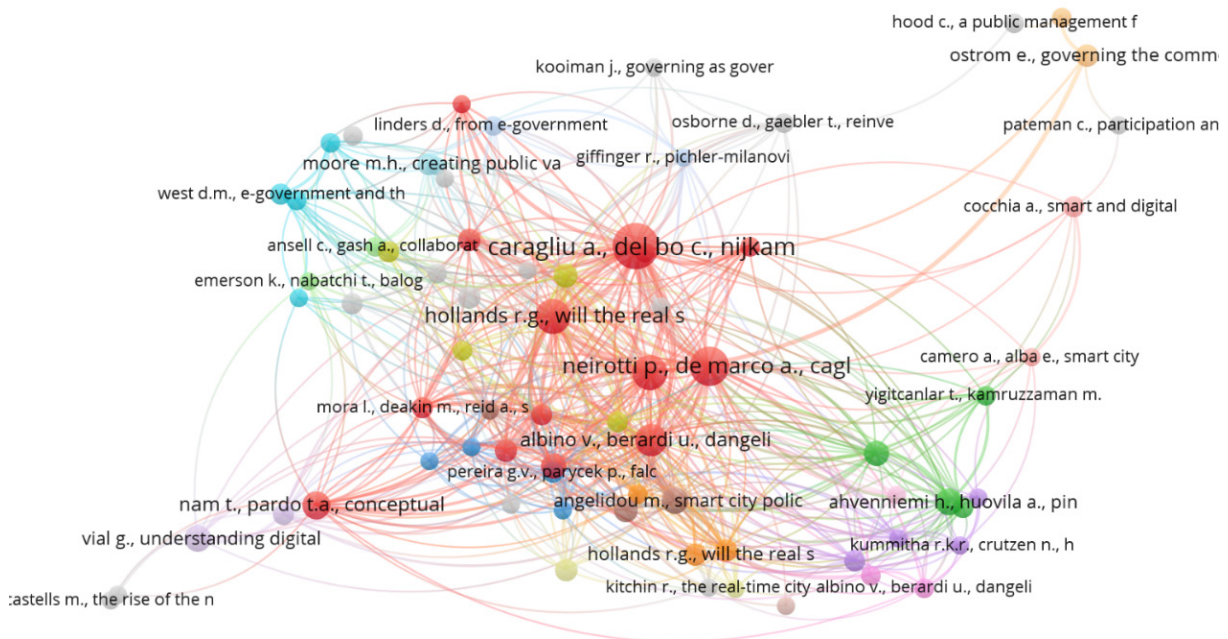
Co-citation analysis carried out through VOSviewer software allowed establishing a theoretical core in this research area and discovering core concepts and core literature that had a significant impact on this theoretical frame (Figure 3). The paper by Caragliu et al. (2011), which forms the core of this co-citation analysis, is best described as groundbreaking literature that laid the economic and governance basis for a conceptual premise of a smart city. The authors explore that using digital or information and communications technology along with innovation and human capital in urban development is an effective means to improve competitiveness and efficiency in governance. The theoretical basis is explored in more detail by Deng et al. (2021). The authors found that digitalization is not a conceptual or theoretical process; in fact, there is a real-world mechanism associated with digitalization.

Moreover, the co-citation analysis reveals the importance of the ideas of collaborative governance and participatory governance. Sintomer et al. (2008) confirm the importance of multi-stakeholder collaboration, citizen involvement in decision-making processes, and network governance in public administration practices. Existing literature in this field has found that new patterns

of citizen-state interactions, enabled by information technology in the form of digital platforms and electronic participation instruments, are developing.

Consequently, the analysis of the co-citation map reveals that the digital transformation of public administration for urban development has been developing at the nexus of several theoretical strands. Moreover, the smart city approach, digital governance, the concept of collaborative governance, and data-driven urbanism are interconnected in an integrated manner. This confirms that the digital transformation of public administration indeed represents an integrated system of change that goes beyond the limits of the mere technological process.

Figure 4 presents the international country co-authorship network for publications on digital transformation in public administration and urban development. In this network, node size reflects publication output, while links indicate co-authorship relations between countries. The countries with the highest number of publications are the United States ( $n = 187$ ), China ( $n = 161$ ), Italy ( $n = 119$ ), Spain ( $n = 110$ ), and Germany ( $n = 81$ ). However, publication volume should be distinguished from



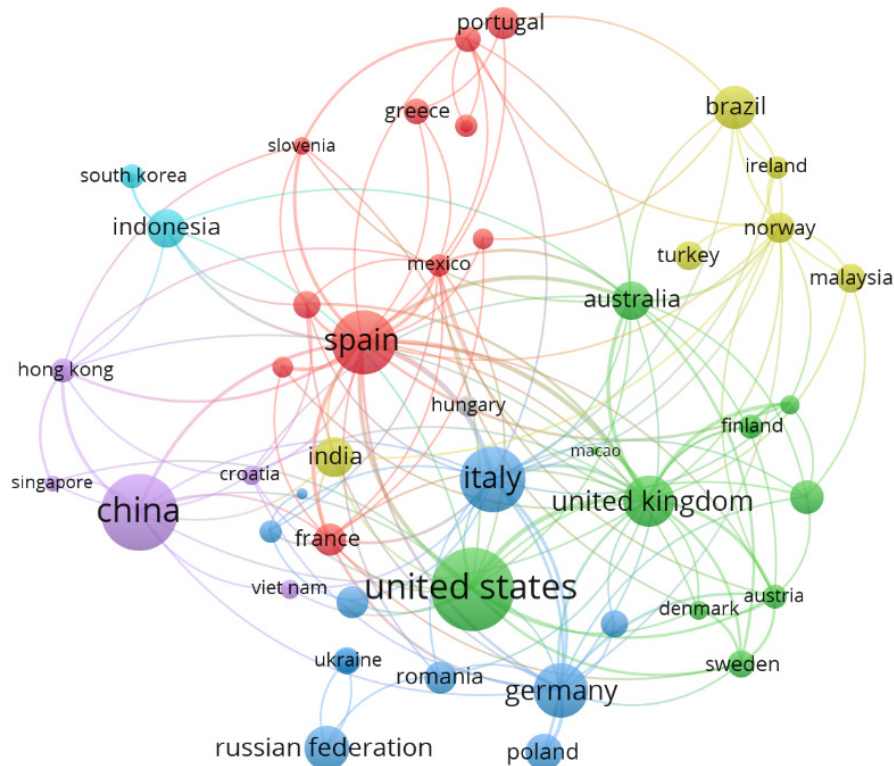
**Figure 3.** Co-citation network of cited references in the literature on digital transformation of public administration and urban development

network connectivity. As shown in Table A2, total link strength refers to the cumulative strength of a country's co-authorship ties with other countries in the VOSviewer network. From this perspective, China and Italy occupy particularly important positions as international collaboration hubs, whereas the United States leads primarily in publication output. The map also indicates dense collaboration patterns among European countries, alongside a rapidly developing Asian collaboration network centered on China. At the institutional level, the most productive affiliations in the dataset include Politecnico di Torino ( $n = 13$ ), Tsinghua University ( $n = 12$ ), Sapienza Università di Roma ( $n = 12$ ), Norges Teknisk-Naturvitenskapelige Universitet ( $n = 11$ ), Tampere University ( $n = 10$ ), and Xiamen University ( $n = 10$ ) (Table A3 in Appendix A).

Co-occurrence keyword analysis is a method used to study the content of publications. It involves examining the words that appear within the publications themselves. However, mapping co-occurring keywords is primarily used to identify research themes (Cao et al., 2021).

Figure 5 shows the network graph of author keyword co-occurrences, which allows an increased comprehension of the keywords applied in academic literature on digital transformation via urban governance. In consideration of the occurrence of keywords within each of the articles in our database, a total of 7,826 author keywords have been detected out of 1,388 articles. In order to be relevant and provide meaningful data analysis, we consider that keywords must appear five or more times, resulting in 512 keywords. The co-occurrence analysis revealed four main clusters of keywords. These clusters were used to identify, at a macroscopic level, the interdisciplinary nature of the research direction (Bin Sulaiman, 2023). The VOSviewer software was applied to analyze the Scopus dataset without altering any of the bibliographic information. A different threshold was used in the subsequent focused subset analysis.

According to the research direction, the most frequently used keyword, "public administration," appeared 545 times and was connected to 174 other keywords, indicating its strong rele-



**Figure 4.** International country co-authorship network in the literature on digital transformation of public administration and urban development

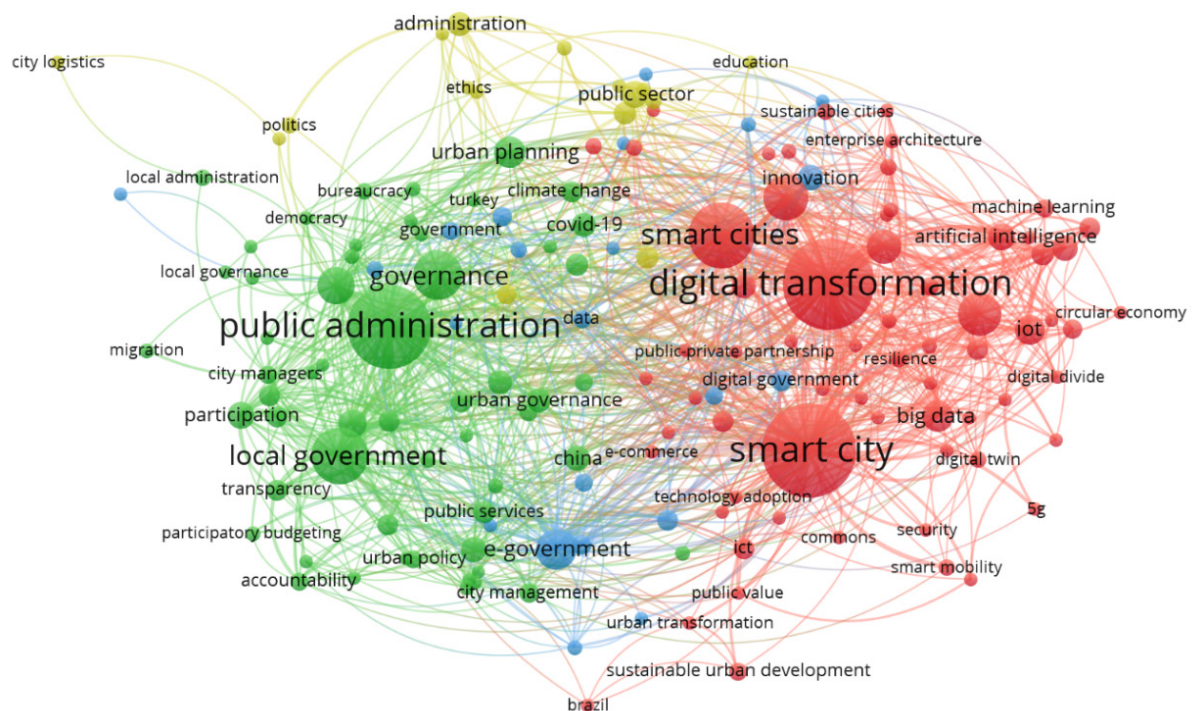
vance. Related to this influential keyword are various terms such as “smart city” ( $n = 415$ ), “digital transformation” ( $n = 327$ ), “local government” ( $n = 117$ ), “smart cities” ( $n = 127$ ), “sustainable urban development” ( $n = 108$ ), “urban planning” ( $n = 102$ ), and “sustainability” ( $n = 105$ ). These findings define the main directions of our study and reveal the appearance of changes in the field of digital transformation within the context of sustainable urban development through the lens perspective of public administration.

In the first cluster, marked green, the keyword “public administration” is surrounded by related terms such as “local government,” “governance,” “cities,” “public policy,” “urban planning,” and “participation.” This grouping represents the synergy achieved between citizens and local government in urban planning from a public administration point of view. In recent years, there has been a focus on the need for digital communication between citizens and the government to enable cities to cope with the digital age (Tomor et al., 2019). According to Trencher (2019), this approach is seen as “a search for a collaborative society that deals with urban issues using the engagement of citizens.” As far as management is concerned, the

increase in urban planning and citizen engagement is key to tackling these difficult situations.

The second set, which is indicated in red, revolves around the key term “smart city” and is surrounded by terms like “digital transformation,” “smart cities,” “sustainability,” “big data,” “sustainable urban development,” “IoT,” and “ICT.” This cluster highlights the relevance of ICT integration in the application of big data in promoting smart city development. Keywords like “big data” and “IoT” represent the main driving forces of transformative innovation in smart cities. Additionally, local governments’ commitment to open data principles encourages the continuous sharing of urban planning data with residents (Ma & Zhang, 2024; Căuniac et al., 2025). These factors act as transformative agents, enhancing urban efficiency and fostering citizen engagement in decision-making (Federici et al., 2015). Analyzing such data resources enables cities to advance sustainable development and long-term planning functions.

In the third cluster, represented in blue, the keyword “e-government” is linked to terms such as “urban governance,” “public value,” “smart governance,” “open innovation,” and “public service.”



**Figure 5.** Author keyword co-occurrence map for the literature on public administration, urban development, and digital transformation

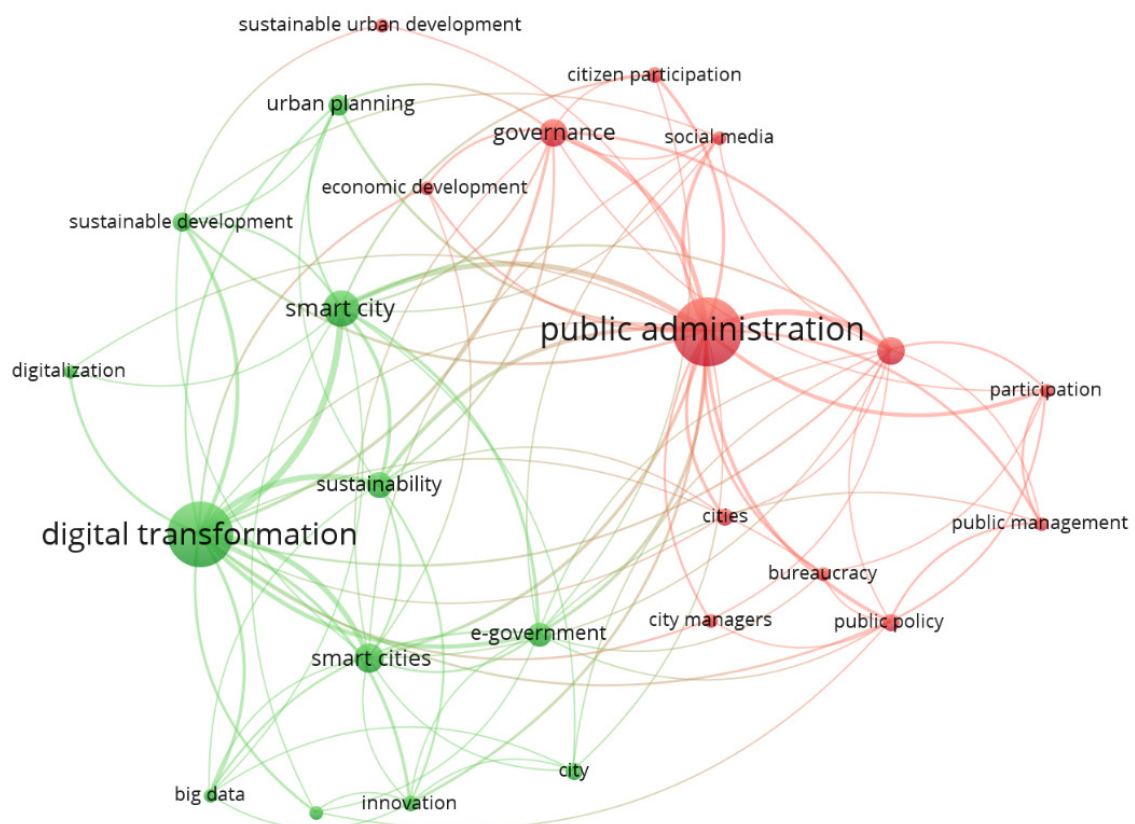
These keywords illustrate different aspects of digital transformation related to ensuring transparency and strengthening trust between citizens and governments as cities gradually achieve their goals. Recent studies emphasize the importance of user-centered e-services that focus on quality and accessibility (Gagliardi et al., 2017). On the other hand, to digitize public services, there are challenges that need to be overcome in terms of infrastructure, digital literacy, and cybersecurity (Al-Bari et al., 2025). Overall, the approach to e-government offers a comprehensive understanding of how collaboration between citizens and government impacts urban governance processes.

The fourth cluster, shown in yellow, revolves around the keyword “administration” which is associated with “public sector,” “planning,” “politics,” and “leadership.” These keywords draw attention to the challenges and opportunities tied to digital transformation in urban governance. This cluster highlights the need to strengthen leadership capacity within the public sector to ensure collaboration in urban planning and policymaking.

It has been revealed that the processes of politics and digitalization in the public sector are usually achieved in the formulation of particular plans for smart city development (Prateppornnarong, 2025; Carr & Hesse, 2020). Therefore, place-based policy tools can assist in addressing the issues arising from the implementation process of smart city projects.

Out of the 1,388 academic articles included in our database, only 566 are directly related to the topic of digital transformation in public administration. These studies examine issues such as enhancing government–citizen interaction through e-government, big data, innovation, and sustainable urban development, as well as concepts related to smart cities, digital transformation, and other interconnected areas.

In these articles, the topic of digital transformation is widely discussed, and the issues related to urban governance processes are addressed to some extent. These studies show that there is a sufficient amount of academic literature available on



**Figure 6.** Co-occurrence map of author keywords on the digital transformation of public administration

digital transformation in the field of public administration. Digital transformation is becoming more popular, which shows that studying public administration, especially digital transformation in the field of management, is essential.

In the light of this perspective, the analysis of the 566 papers' content was performed using bibliometrics, applying the use of the VOSviewer tool according to the co-occurrence of author keywords. With the minimum frequency limit set at six occurrences, such an approach helped construct the keyword network that consisted of 29 related keywords associations obtained from a pool of 2,019 keywords found in 566 papers. This set of keywords revolved around the notions of "digital transformation" and "public administration" resulting in two major clusters (Figure 6).

A co-occurrence map for the entire dataset using five mentions as the threshold was produced to reveal the general theme framework of the field. By contrast, the threshold of six occurrences was applied in the focused subset analysis to reduce noise and improve interpretability within the smaller corpus of 566 publications.

The green cluster centered around the concept of "digital transformation" includes keywords such as "smart city," "e-government," "big data," "innovation," "sustainability," and "sustainable development." This cluster reflects a focus on new forms of managing urban development through the implementation of digital technologies. Research indicates that a good "smart city" approach helps local authorities make appropriate decisions, which then impact the quality of living for residents and the infrastructure in cities. The local government takes steps in analysis and change processes through which economic development and sustainability are achieved (Kong et al., 2025). Moreover, the use of e-government initiatives helps optimize time, reduce costs, ensure transparency, strengthen accountability, and improve the efficiency of management processes. These initiatives are geared toward improving service delivery, promoting community participation, and creating opportunities for these groups (Ziyadin et al., 2020).

The second grouping focuses on the concept of "public administration," depicted in red, and en-

compasses terms such as "governance," "public policy," "participation," "bureaucracy," "citizen participation," and "sustainable urban development." This grouping presents the social, political, and management sides of public administration as a system as a whole. Specifically, mutual public administration efforts in conjunction with self-government bodies in urban management and the subsequent development of cities represent trust-building ties among the public. Such governance builds a civil society and represents a stimulus for public administration system improvement (Zayats et al., 2024). According to Romani et al. (2023), citizen participation improves management efficiency by contributing to the optimization of quality of life and urban processes through enhanced management decisions and practices.

Despite the presence of a link between the keywords "digital transformation" and "public administration" through co-occurrence, there exists a lack of intersection between these terms. This is important since it indicates that the integration process is not entirely accomplished yet. One potential reason for this is the existence of academic disciplines' boundaries. The discussion about digital transformation of urban areas is usually led in the field of smart cities, information systems, engineering, and innovations, where the main attention is devoted to technical infrastructure, data systems, digital platforms, and efficiency in the city. In public administration, attention is paid to design, capacity, accountability, bureaucracy, leadership, and civic engagement (Anttiroiko, 2016). Thus, even though the two disciplines may tackle the same topics in practice, their focus is different.

The second reason for such different co-citations is that smart cities and digital urbanism research tends to be organized according to technological solutions and innovation at the city level, while public administration research tends to focus on administrative reform, policymaking, organization change, and state-society relationships. Thus, the clustering of certain terms such as "smart city," "digital transformation," and "big data" is closer to technological concerns than to administrative or political ones, while such terms as "public administration," "governance," and "participation" tend to cluster closer to administrative and political concerns. Here again, the lack of overlap between

certain keywords may not imply a lack of connection between research traditions; rather, it points to an emerging field that still needs to integrate adjacent traditions.

Such an analysis is also in line with the more general findings of the review. Digital transformation of urban environments implies not only technical modernization but also administrative transformations. The research community is very interested in the use of digital solutions for urban governance and decision-making processes, while much less attention is paid to the changes within the public administration itself (organizational changes, institutional development, and innovations in the work of the state machinery) (Baldi et al., 2022; Mariani & Bianchi, 2023). Thus, the central problem highlighted by the paper at hand is not so much the spread of technology in urban environments but rather its theoretical underestimation.

With this in mind, any future studies on the topic might need to look into establishing more rigorous links between the studies on smart cities and those on public administration. The integration of these approaches will facilitate the analysis of the digital transformation process itself rather than its technologies alone, including the governance capability, institutional changes, and public value. It will also provide clearer insights into how digital transformation can help achieve sustainable urban development through institutional transformation.

For instance, “smart city” concepts need active participation from the residents and coordination from the local government and other interested parties regarding problems with transparency and involvement. Another potential that can be offered by digital transformation includes making decisions for city governance by integrating residents, data, city infrastructure, and technologies. Real-time data in public governance ensure more collaboration and transparency, leading to the attainment of set objectives. Moreover, classical research in digital governance and public management, which comprises the theoretical basis of public administration, also holds significant importance. This research work delineates the transformation from a traditional hierarchical system in public administration to network-driven and

flexible results-oriented governance structures. Research in digital society and data-driven cities focuses on the social and spatial transformations that emerge from digitalization. Data governance, platform economies, and digital infrastructure give rise to a paradigmatic transformation in urban governance.

In all, the analysis of such selected studies will be able to present the overall trends and implications of urban governance under digital transformation, as found through the network of co-occurring keywords. For the public sector, the adoption of innovative technologies that enhance citizen well-being clearly expands mechanisms of interaction within urban governance. These results offer valuable insights for researchers seeking to understand how trust between governments and citizens can be strengthened to ensure fair outcomes in smart city initiatives. In addition, it is necessary to reveal the criteria that guarantee “e-government” projects with a focus on citizens and to foster citizen interaction with government institutions (Aminah & Saksono, 2021; Malodia et al., 2021). In this way, within the context of digital transformation, citizen-centered approaches help governments better understand and respond to the governance needs of their people.

The greatest benefit of digital transformation for the management of cities lies in its capacity for informed decision-making regarding urban administration and planning, with emphasis on data. In such a light, the activities associated with addressing problems in cities and linking people to the public sector acquire a certain data-centric nature. The presence of data in public organizations provides a special chance for the development of citizen-centric strategies. Furthermore, in terms of interaction, digital urban platforms enhance their ability to operate in harmony with other systems through data exchange.

One of the important areas of digital change in the management of the city includes making decisions and engaging the public using data. This serves as an essential element in strengthening public trust in city governance. When public sector institutions ensure transparency in urban management, citizens become more willing to participate in governance processes. Hence, by speeding up the digital transition in urban governance, cities are able to promote the development of public value.

## CONCLUSION

This study aimed to explore the complex dimensions of urban development governance in the context of digital transformation and to conduct a bibliometric analysis of the existing scholarly literature in this field.

The research results indicate that the digital transformation of the public administration system involves a wide range of research directions and trends in the field of urban development. In this regard, it is necessary to highlight the fact that the number of scientific publications has been increasing rapidly since 2015. An evaluation of the citation dynamics shows that the citations increased remarkably in 2011, reaching 3,046 citations. Furthermore, the high level of citations recorded from 2020 to 2021 shows that the research articles published during the period were recognized and used within the academic community. In terms of the number of publications, the leading countries are the USA, China, Italy, Spain, and Germany. While the USA is the leader overall, the level of engagement of China and Italy is remarkable in terms of international cooperation. The results also show that the European Union countries are closely cooperating internally, while in Asia, a research network led by China is emerging rapidly.

Data collected from the Scopus database allow for the connection of essential concepts in public administration, thus increasing the relevance of scientific research in this field. Essential keywords, such as “public administration,” “smart city,” and “digital transformation,” demonstrate the shifts in the themes of this field of study. This has made it possible to determine the overall trends and implications of urban governance in the digital transformation process through the analysis of the keyword network. The use of peer-reviewed articles guarantees the quality of the research results, which can be used to clearly show the interdisciplinarity of different academic fields (Ogutu et al., 2023). On this basis, scholars can use this body of knowledge as a credible source when analyzing the interrelation between digital transformation in public administration and urban development.

Researchers in the field of public administration may also examine the specific characteristics of urban governance, focusing on the role digital transformation plays in promoting transparency and cooperation across sectors. The relationship between citizens and the local government in the context of urban governance underscores the role that data-driven decision-making plays in the improvement of the effectiveness of the urban planning and policy-making process. Through this, digital transformation shows its potential in facilitating well-informed and effective decisions in the governance of cities based on data. It also entails exploring strategies for developing inclusive cities by integrating digital technologies and e-government capabilities.

This bibliometric study highlights the significance of identifying the peculiarities of digital transformation in the public sector. By being familiar with these directions of research, scientists are able to estimate the benefits of urban development and conduct their analysis with due attention to the structure of public administration.

## AUTHOR CONTRIBUTIONS

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Methodology: Sultan Zhubanazarov.

Project administration: Rubén Camilo Lois González, Sairan Ulakov.

Resources: Sultan Zhubanazarov, Sairan Ulakov, Meiramkul Dulat, Bakitgul Zhakupova.

Software: Sultan Zhubanazarov.

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Writing – review & editing: Rubén Camilo Lois González.

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## APPENDIX A

**Table A1.** Key bibliometric indicators for leading academic journals publishing research on the digital transformation of public administration of urban development

Source	Paper	Citations
Sustainability (Switzerland)	95	1765
Smart Innovation, Systems and Technologies	19	94
Journal of Cleaner Production	16	938
Cities	16	636
Public Administration	16	454
Proceedings of the European Conference on e-government	15	62
Lecture notes in Business information Processing	15	39
Local Government Studies	13	376
Land Use Policy	13	333
Resources Policy	13	284
Urban Studies	12	345
Smart Cities	12	234
The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences	12	105
IFIP Advances in Information and	11	66
Sustainable Cities and Society	10	395
American Review of Public Administration	9	180
Public Administration and Information Technology	9	76
Public Policy and Administration	9	49
Studies in Systems, Decision and Control	9	6
Technological Forecasting and Social Change	8	639
Environmental Impact Assessment Review	8	368
International Review of Administrative Sciences	8	162
Public Administration and Development	8	152
International Journal of Public Administration	8	134
Urban Affairs Review	8	94
Theoretical and Empirical Researches in Urban Management	8	76
International Journal of Sustainable Development and Planning	8	43
Transylvanian Review of Administrative Sciences	8	25
Urban Book Series	8	16
Government Information Quarterly	7	431
Journal of Planning Education and Research	7	49
Lecture Notes in Information Systems and Organisation	7	8
Journal of Urban Technology	6	2633
Habitat International	6	147
Technology in Society	6	133
Environmental Science and Policy	6	72
International Journal of Electronic Government Research	6	54
Revista de Administracao Publica	6	48
Politics and Policy	6	29
International Journal of Urban and Regional Research	5	546
International Journal of E-planning Research	5	98
International Journal of Public Sector Management	5	74
Environment, Development and Sustainability	5	70
Urban Planning	5	57
5 <sup>th</sup> IEEE International Smart Cities Conference, ISC2 2019	5	50
Systems	5	31
Transportation Research Procedia	5	26
Proceedings of the European Conference on Knowledge Management, ECKM	5	25
WIT Transactions on the Built Environment	5	16
Journal of Infrastructure, Policy and Development	5	6
Smart Cities and Digital Transformation: Empowering Communities, Limitless Innovation, Sustainable Development and the Next Generation	5	5

**Table A2.** The most active countries conducting research on the digital transformation of public administration of urban development

Country/ Territory	Documents	Citations	Total link strength	Country/ Territory	Documents	Citations	Total link strength
United States	187	3215	29	Slovenia	10	216	9
China	161	3022	14	Taiwan	10	128	0
Italy	119	3149	31	Israel	8	223	0
Spain	110	3360	57	Singapore	7	276	5
Germany	81	1196	24	Lithuania	6	80	1
United Kingdom	72	1771	45	Morocco	6	9	0
India	60	133	5	Nigeria	6	25	0
Brazil	54	509	7	Iraq	5	9	0
Indonesia	46	418	8	Kazakhstan	5	15	0
Australia	43	909	24	Serbia	5	107	0
Poland	41	457	5	Cyprus	4	22	0
Netherlands	35	493	7	Iran	4	26	0
Romania	33	254	5	Kenya	4	42	2
Portugal	32	809	4	Lebanon	4	54	1
Canada	31	786	3	Peru	4	0	0
Turkey	31	138	1	Chile	3	14	0
France	30	776	17	Ecuador	3	2	0
Malaysia	27	641	4	New Zealand	3	117	2
Norway	25	636	15	Palestine	3	1	0
Czech Republic	22	151	1	Philippines	3	0	0
Slovakia	22	249	2	Tunisia	3	4	0
Sweden	22	331	12	Argentina	2	44	0
Belgium	21	459	10	Bosnia and Herzegovina	2	2	0
Greece	21	394	3	Egypt	2	12	0
Saudi Arabia	21	355	10	Ethiopia	2	0	0
Ukraine	20	63	1	Ghana	2	97	0
Austria	17	915	15	Jordan	2	12	0
Hong Kong	17	392	12	Latvia	2	15	0
Ireland	17	189	4	Macao	2	2	1
South Korea	17	237	2	Mongolia	2	5	0
Finland	16	342	2	Qatar	2	16	0
Japan	16	259	5	Albania	1	30	0
Mexico	15	152	15	Algeria	1	0	0
South Africa	15	100	1	Azerbaijan	1	0	0
Thailand	15	100	3	Bahrain	1	5	0
Switzerland	14	236	6	Bangladesh	1	0	0
Hungary	13	48	0	Belarus	1	1	0
Viet Nam	13	104	3	Laos	1	0	0
Colombia	11	120	0	Luxembourg	1	1	0
Pakistan	11	262	0	Malawi	1	22	0
United Arab Emirates	11	170	0	Greenland	1	1	0
Bulgaria	10	38	0	Uganda	1	18	0
Croatia	10	250	8	Benin	1	15	0
Denmark	10	227	7	Cameroon	1	0	0
Estonia	10	628	11	El Salvador	1	0	0

**Table A3.** List of institutions with a large number of publications on the digital transformation of public administration of urban development

Affiliation	Documents	Citations	Total link strength
Politecnico di Torino, Italy	13	241	153
Tsinghua University, China	12	98	99
Sapienza Università di Roma, Italy	12	183	195
Norges Teknisk-Naturvitenskapelige Universitet, Norway	11	187	14
Tampere University, Finland	10	17	12
Xiamen University, China	10	311	420
Universidad de Zaragoza, Spain	9	20	8
University of California, Berkeley, USA	9	346	512
Università di Bologna, Italy	9	228	117
Universidad Politécnica de Madrid, Spain	9	179	219
Florida State University, USA	3	93	123
University of Texas, USA	3	18	34
Universiti Teknologi Malaysia, Malaysia	2	321	413
Guangxi University, China	2	260	343
Letterkenny Institute of Technology, Ireland	2	0	242
Universidade Nove de Julho, Brazil	2	15	232
University of São Paulo, Brazil	2	15	232
Queensland University of technology, Australia	2	214	62
WU Vienna, Austria	2	128	12
Victoria University of Wellington, New Zealand	2	108	37
University of Kansas, United States	2	92	93
Edinburgh Napier University, United Kingdom	2	67	157
University of Amsterdam, Netherlands	2	63	0
Arizona State University, USA	2	61	2
University of Ljubljana, Slovenia	2	60	84
University of Naples Parthenope, Italy	2	50	0
Kasetsart University, Thailand	2	48	0
Zhengzhou University, China	2	47	4
Bocconi University, Italy	2	36	22
Aristotle University of Thessaloniki, Greece	2	32	35
University of International Business and Economics, China	2	26	98
Inha University, South Korea	2	22	13
Institute for Prospective technological studies, Spain	2	20	2
University of Barcelona, Spain	2	18	19
Max Plank Institute, Germany	2	15	1
German University of Administrative Sciences Speyer, Germany	2	13	52
Universitat Pompeu Fabra, Spain	2	13	4
Chongqing University, China	2	11	111
Silesian University, Czech Republic	2	8	64
Fae Business School, Brazil	2	7	120
University of Oslo, Norway	2	7	1
Boise State University, USA	2	6	33
Tallin University of Technology, Estonia	2	4	172
Michigan State University, USA	2	4	2
University of Aveiro, Portugal	2	3	3