

ORIGINAL ARTICLE

Public services in the digital age: A systematic review and bibliometric analysis of trends and challenges in digital governance

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Abstract

In the digital era, public services, governance, and civic engagement have undergone significant transformations driven by rapid technological advancements and evolving citizen expectations. To illustrate the emerging trends, challenges, and opportunities in digital governance, this study presents a comprehensive systematic literature review combined with quantitative bibliometric analysis. By integrating powerful bibliometric tools such as VOSviewer with rigorous systematic review methodology, this study identifies key issues and technological advancements shaping the evolving landscape of digital public administration. The findings reveal two sides of digitalization: while it significantly improves service efficiency, transparency, accountability, and citizen satisfaction, it simultaneously raises critical concerns related to cybersecurity threats, complex regulatory adaptation, digital inclusion gaps, and equity in access. To ensure a responsive, sustainable and inclusive digital transformation in public service delivery, this study emphasizes the urgent need for a coherent policy framework that supports robust digital infrastructure development, continuous capacity building of public officials, and enhanced multi-stakeholder collaboration among government, private sector, and civil society. The study also discusses practical implications and future research directions to support governments in navigating the complex digital governance environment effectively.

Keywords: Digital Governance, Public Services, E-Government, Systematic Review, Bibliometric Analysis.

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1 | INTRODUCTION

The development of digital technologies over the past decade has brought significant changes to governments and public sectors around the world. This digital transformation has increased the efficiency of public service delivery while improving accessibility and transparency (Alenezi, 2022). People now expect fast, responsive, accountable and customer-oriented services. With increasing globalization, digital transformation in the public sector has become crucial. This provides a strong basis for an in depth study of the changes and challenges involved in implementing digital governance (Li & Xu, 2024; Zhou et al., 2024; Güler & Büyüközkan, 2023).

Although the adoption of digital governance is expected to improve public service delivery, many challenges remain. Key issues include policy adaptation, organizational restructuring, and technical and social constraints that often hinder its implementation. Various studies have shown that ensuring the sustainability and effectiveness of public service digitization faces particular challenges arising from differences in the pace of technological innovation, policy readiness, and digital government infrastructure across countries (Tangi et al., 2021). For example, Li's research shows that the business environment and information search costs significantly affect the success of government digitization, underscoring the critical role of a supportive policy framework (Li & Xu, 2024).

In addition, digital transformation faces various challenges, including organizational resistance and a lack of understanding among government employees regarding new technologies. These factors can hinder the adoption of technologies needed to improve efficiency and transparency (Maulana & Dečman, 2023). Xiao's study highlights that to achieve effective results in digital transformation, governments need structural reforms in both administrative procedures and public service delivery mechanisms (Xiao et al., 2023). In addition, Alenezi's study shows that the digital transformation of government requires a shift in service delivery methods, particularly through the use of social media platforms to increase public engagement (Alenezi, 2022).

Therefore, understanding the global trends and challenges faced during this process is crucial. To determine how governments can overcome these barriers and improve public service delivery through digital technologies, more in-depth research is needed. By understanding these dynamics, policymakers and researchers can develop more effective strategies to support digital transformation in the public sector and strengthen public trust in government (Ravšelj et al., 2022; Mahmood et al., 2020).

One way to overcome service problems that have often complained about by the public is online service innovation. This type of service is slow, complicated, non-transparent, extortion, and discriminatory. The Palopo City Investment and One-Stop Integrated Service Office has recently implemented a new breakthrough that allows everyone to access services via the internet. This adoptive innovation is critical to changing the environment of government organizations and helping service providers and users. According to Mulgan and Albur, adaptive innovation is essential for public sector renewal because if it is applied consistently and in accordance with the needs of local communities, it will have an impact in the future. In addition, this online service innovation is part of the type of instructive innovation that follows the direction of government policies that demand electronic based services. KPK also encourages the implementation of payment systems through banks. In addition to bringing new elements, it also has a positive effect on the organization's current institutional structure (Ulfa, 2018).

The main objective of this research is to discover and study the trends and difficulties in implementing digital government in public services. This research is expected to provide a comprehensive picture of the dynamics of digital governance. This research will reveal the obstacles and opportunities that can be utilized by the government in the digital transformation process using bibliometric analysis methods and systematic literature reviews. This study is not only aimed at academics but also at policymakers and practitioners to provide evidence-based guidance to face challenges in the digital era.

However, the literature covering bibliometric analysis and systematic analysis of trends and challenges in public service is still relatively limited. This discrepancy suggests that a thorough analysis is needed to understand

research patterns. This will make it possible to explore social, policy and operational issues that have not been addressed in previous studies. To support the development of more contextualized and adaptive policies, this study aims to fill this void from both theoretical and empirical perspectives.

This research is a novel contribution to literature as it combines bibliometric analysis methods with systematic reviews to provide a thorough analysis of trends and issues in digital public services. As such, this research not only adds to the body of knowledge on digital government, but also serves as an important reference for research and policy recommendations that can improve the efficiency and effectiveness of public services.

Public services have undergone major changes in the digital era thanks to the adoption of digital technologies such as artificial intelligence, data analytics, and cloud-based management systems. These technologies have enabled the government to optimize various service functions, from data processing to providing public services online (Dzvinchuk et al., 2022). However, digitization requires not only improvements in technological infrastructure, but also major changes in organizational culture and ways of working, which include changes to regulations relating to data security and user privacy (Fischer et al., 2021). This means that the government must continuously change its policies and service delivery methods to remain relevant to the changing society.

Previous studies have shown that digitizing the public sector can improve service efficiency and transparency, especially with regard to data management and decision-making. According to Fischer et al. (2021) digital transformation allows governments to access and analyze large amounts of data. This can help them make evidence-based policies. Meanwhile, Dzvinchuk et al. (2022) emphasize that the use of these technologies speeds up the flow of information, enables faster completion of public services, and reduces inefficient bureaucratic practices. In terms of transparency, digital technologies enable more direct lines of communication between the government and its people. This increases accountability through more open access to information about the government and its performance.

While the digitization of government has many benefits, it also raises new issues, such as cybersecurity concerns, the digital divide, and the resistance of government human resources. Given the high likelihood of data breaches and data manipulation that can undermine public trust, Dzvinchuk et al., (2022) emphasize the importance of cybersecurity. In addition, the digital divide in society, where some people do not have access to technology and do not have the necessary skills to use it, has an impact on how effective digital public service delivery is (Mountasser & Abdellatif, 2023). This suggests that the government needs to address social issues and access gaps that may occur due to geographical, economic and educational differences in addition to focusing on technology. In addition to external factors, internal factors such as the readiness of human resources are also an obstacle to implementing digitalization of public services. Digital transformation requires new skills and work cultures that are not necessarily shared by all government employees, according to research conducted by Mountasser (2023). To achieve this, investment in training and human resource development is required. In addition, digital adaptation and implementation in the public sector has been slower because some employees are resistant to technological advancements. Therefore, a successful digitization plan should include elements of change management and training.

In addition, the literature emphasizes that adequate regulations are needed to use digital technologies in government. State that laws relating to data security, transparency and privacy protection should be made in accordance with technological advances (Fischer et al., 2021). The government should create policies that protect people's rights and ensure accountability in the use of public data. To address the increasing cybersecurity threats in the digital era, strong regulations are also needed. This is because cybercrime often utilizes personal data and sensitive information. Overall, the results show that while digitalization offers many opportunities to improve the quality and efficiency of public services, there are still many challenges that need special attention from the government. Digitalization does not only involve the adoption of technology, but also involves creating

infrastructure, training human resources, adjusting regulations, and ensuring everyone is included in the digital world. This suggests that the success of digital transformation, which is expected to bring public services to a more responsive, efficient and accountable level for the whole society, will be greatly influenced by the government's efforts in addressing these challenges.

Information and communication technology (ICT) is a key trend in digital government that aims to improve interaction and engagement between government and citizens. These technologies increase efficiency and encourage public participation in the policy-making process. Point out that the adoption of machine learning and artificial intelligence (AI) in the public sector is a major advance (Dzvinchuk et al., 2022). These technologies accelerate data processing and enable better decision-making at different levels of public management. Governments can respond to people's needs faster by using AI as analyzing complex and diverse data usually requires a lot of time and resources. In digital government, the use of AI improves the efficiency of administrative and operational processes. Machine learning helps the government plan public services proactively as it can more accurately predict trends and people's needs. Another study by Mountasser & Abdellatif (2023) emphasizes this point, showing that user relevance and satisfaction can be improved through the use of AI to tailor service interactions with the public. In addition, AI has the ability to spot anomalies and reduce the likelihood of human error, which is an important step towards improving the accuracy of public services in terms of risk management.

In the context of cooperation, the study by Scupola & Mergel (2021) offers evidence that government-community collaboration in the development of digital services has great potential to increase public value. Governments can create digital services that are more in line with users' needs and expectations by involving the public in the design and testing process. As public services are perceived as more relevant and responsive due to community involvement in this process, the level of user satisfaction with public services also increases. This approach also increases community ownership of the service outcomes, according to Scopola and Mergel.

This active collaboration demonstrates a global trend where communities no longer just receive services but also contribute to the process of shaping public services. This method strengthens public value by improving accessibility, transparency and quality of services. In addition, the government can also obtain useful direct feedback to improve the existing service system through active participation. In this sense, co-creation is more than just innovation, but rather a paradigm shift in public service delivery with a greater emphasis on the needs of the people.

While this trend is promising, implementation is difficult. Obstacles such as the digital divide, internal resistance, and limited resources often hinder cooperation. The government must ensure that everyone has adequate access and skills to use digital technology. In addition, regulations and organizational structures must be adjusted to support sustainable collaboration between government and communities. In this context, research shows that investment in digital education and equitable access to technology are key to successful co-creation in digital governance. Therefore, the use of ICTs and the application of co-creation in digital government are changing the interaction between government and society. This trend shows a shift towards more inclusive, effective and people-oriented public services. Governments can create service models that are more in line with the needs and expectations of citizens in the digital era through the integration of citizen engagement and advanced technology.

While the digitization of government has a lot of potential to improve the efficiency and responsiveness of public services, there are some issues that hinder its implementation. Tangi et al. (2020) found that public organizations often face various structural barriers when undertaking digital transformation. Rigid and hierarchical organizational culture is one of the main barriers, which hinders flexibility and rapid adaptation to new technologies. This culture also often increases resistance to change, especially when the shift to digital systems requires proactive reorganization.

Tangi et al. found that, in addition to organizational culture issues, government employees often lack sufficient digital skills, which impacts the effective use of digital technologies. The government has to face a huge

need for training and capacity building as many employees in the public sector do not have the knowledge or expertise needed to optimally use new technologies. This is compounded by the fact that training and developing digital skills requires significant resources, both in terms of time and cost, which may not be available in every public organization.

Similar findings were revealed by Kvashina et al. (2021), which showed that digital infrastructure deficiencies often hinder the digital transformation of the public sector. The technological infrastructure needed to support digitally enabled public services, such as stable internet networks, up-to-date hardware, and secure and efficient software, is still a problem in many regions, especially in remote or budget-constrained areas. This leads to digital disparities among regions, which will ultimately limit people's access to digital public services and widen the gap in digitalization implementation between central and local governments.

Kvashina et al. emphasize that, in addition to infrastructure issues, employee resistance to change continues to be one of the main obstacles in the transformation of public management systems. Fear of losing roles or losing control over work processes that are becoming more automated and defined is the main cause of this resistance. As a result, even when technology is available and usable, employees are often unprepared or feel threatened by these changes. Any digital transformation program in the public sector must consider psychological factors and cultural adaptation.

The literature suggests that changing organizational culture and developing employees' digital skills should be a priority in the digital transformation agenda to address these issues. The government should invest in the long term to build an inclusive and sustainable digital ecosystem, both through infrastructure and human resources training. In addition, effective change communication approaches can help employees overcome barriers and become more prepared for digital transformation. Overall, the literature shows that a holistic and sustainable strategy can be used to drive successful digital transformation, despite the many challenges faced in the process of government digitization. The government is expected to address these issues and harness the potential of digital technology to improve the quality of public services by considering elements of organizational culture, digital skills development, and infrastructure improvement.

In addition, a study conducted by Edelman & Virkar (2023) emphasized that the digital capabilities of stakeholders, both internal and external, are essential for the successful digital transformation of public administration. They emphasize that digital projects created by the government require support from the entire organization, including leaders and employees, as well as parties coming from outside, such as the private sector and the general public. Each party must have the necessary digital capabilities. These capabilities include not only technical skills, but also the analytical and management capabilities needed to handle the changes associated with digitizing an organization.

According to Edelman & Virkar (2023) potential digital initiatives fail if stakeholders do not have the right skills. This results in a lack of understanding and support required for successful implementation. This shows how important strategic planning is to find the necessary skills at every level of the organization. For example, front-line employees must have the basic ability to use digital devices. Organizational leaders must also understand the strategic implications of implementing such technologies in the broader context of public service. In addition, as Edelman et al.'s research shows, the involvement of external stakeholders-private partners and the service-using public-is critical to ensuring digital transformation works. They emphasize that when the public better understands the digital services available, they will be more prepared and motivated to use them. Conversely, partnerships with the private sector can help the government access technologies and expertise that public institutions do not yet have. This suggests that infrastructure support and cross-sector cooperation in skills development are crucial to building an inclusive digital ecosystem.

In the real world, Edelman & Virkar's findings suggest that skills development and training should be thoroughly incorporated into the government's digital transformation plan. Formal and informal training programs, access to digital learning resources, and mentorship programs that can help employees accelerate adaptation to technological change are all part of this approach. In addition, these skills development programs should be tailored to the unique needs of each department or field, so that all employees can maximize their role in assisting digital transformation.

Therefore, this research emphasizes that digital skills are not just an add-on, but also an important foundation that supports digital transformation in the public sector to run well. If digital initiatives are not well implemented, they risk facing challenges in execution, which could hinder the goal of improving the efficiency and quality of public services. Training and skills development are expected to be an important part of ongoing digitization efforts, and governments in various countries should be proactive in doing so. Overall, Edelman et al.'s research suggests that a comprehensive strategy to improve digital skills should be included with digital transformation in public administration. The right skills among stakeholders can help governments realize the vision of a digital government that is effective, inclusive and responsive to the needs of modern society.

Digitalization is the transformation of public services that includes the use of new technologies and the transformation of government culture and organizations and the way they interact with society. As expressed by Mountasser (2023), achieving greater transparency and accountability in public services requires the adoption of an inclusive approach that encourages community participation in every stage of digital service development. These participatory methods allow the public to be part of the service design process, which in turn will increase the legitimacy and relevance of public services.

Mountasser emphasized that digitalization allows governments to make data more open and provide wider access to the public, allowing people to view and evaluate government performance in real-time. This method encourages a government that is more adaptable and responsive to the changing demands of society. However, for digitization to succeed, governments must make a strong commitment to invest in technology infrastructure, provide employees with digital skills, and create policies that support public participation in the transformation process. These changes not only present structural and technical challenges; stakeholders in public administration must also change the way they think. Nadkarni & Prügl (2021), along with Kuoppakangas et al. (2019), show that rigid organizational culture is often a major obstacle in the digital transformation process. This means that digital transformation is not merely a technical process, but also a social process that demands broad support from all stakeholders, so leaders in the public sector must encourage cultural changes that are more open to innovation and cross-sector cooperation. Bondarenko et al. (2020) also emphasizes the importance of comprehensive and integrative policies to maximize the potential of digital technology. The government should create a digitalization plan that includes digital skills training for employees, adequate infrastructure, and regulatory changes to adapt to technological advances. They believe that only through this holistic approach can governments build a digital ecosystem that supports more efficient public services. Fischer et al. (2021) add that governments also face issues with digitizing public services, such as fear of change and uncertainty about its long-term effects. They point out that governments should create an evaluation framework that can measure the success and sustainability of digitalization programs. Therefore, real-time data collection and periodic evaluations can help determine which areas need improvement and ensure that digitalization truly benefits society.

Overall, digitalization offers many opportunities to improve public services, but to be implemented properly, it requires a comprehensive and organized approach. To ensure that digital transformation can sustainably improve the quality of public services, further research is needed. It is expected that the government can make public services more inclusive, transparent, and responsive to the needs of modern society by focusing on technical, social, and cultural aspects.

2 | RESEARCH METHODS

This research uses the Scopus database as a data source for research publication documents. Scopus was chosen because it allows researchers to monitor the development of global studies related to the development trend of public and digital service literature. The search process was conducted in 2019. No restrictions were applied regarding researchers or authors, geographical locations, article types, publication years, or specific journals in the search and screening of published documents. Filtering was done based on keywords that focused on (Public Service) and (digital) related literature. The results of this search yielded a total of 50 documents relevant to the research topic. The figure 1 shows the data analysis process focused on using research documents registered in the Scopus database. The Scopus database was chosen because of its popular and selective reputation. The database adheres to strict policies and a process of selecting research documents by a board of independent scientists to ensure the best quality before indexing. By using Scopus as a data source, researchers can access quality research documents. After going through the screening process, the collected data was then imported into the Vosviewer analysis tool. Vosviewer is a bibliometric analysis tool to identify literature published in the Scopus database (Hasan & Juhannis, 2024). With the help of Vosviewer, data can be visualized and analyzed in depth to answer the research questions posed.

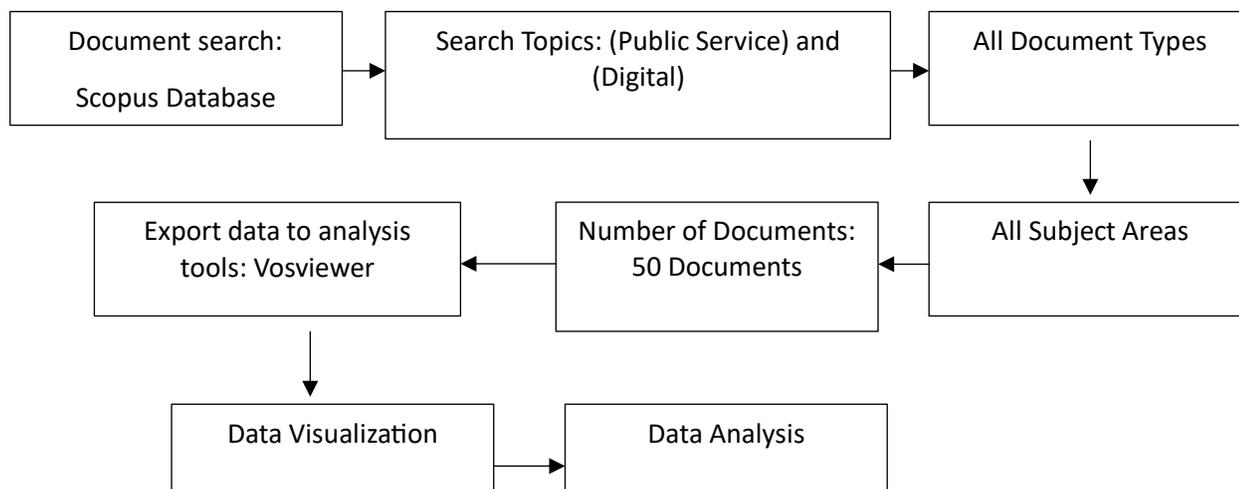


Fig. 1 Data analysis scheme.

3 | RESULTS AND DISCUSSION

Academic studies are increasingly paying attention to the digitization of government because of its potential to change the way public services are delivered by implementing digital technologies. The governments are expected to become more effective, more open, and more engaged with society. Advances in technologies such as artificial intelligence, big data, and digital platforms, the adoption of digital in the public sector has increased prompting researchers to study the impacts and issues that arise in different countries.

An interesting trend can be seen from the data on the number of research documents from 2019 to 2024. At the beginning of 2019, there was a significant increase in the number of publications with 17 research documents. The decrease in the number of documents published in recent years reflects the lack of interest and attention of researchers to the topic. The following is a graph generated from the research.

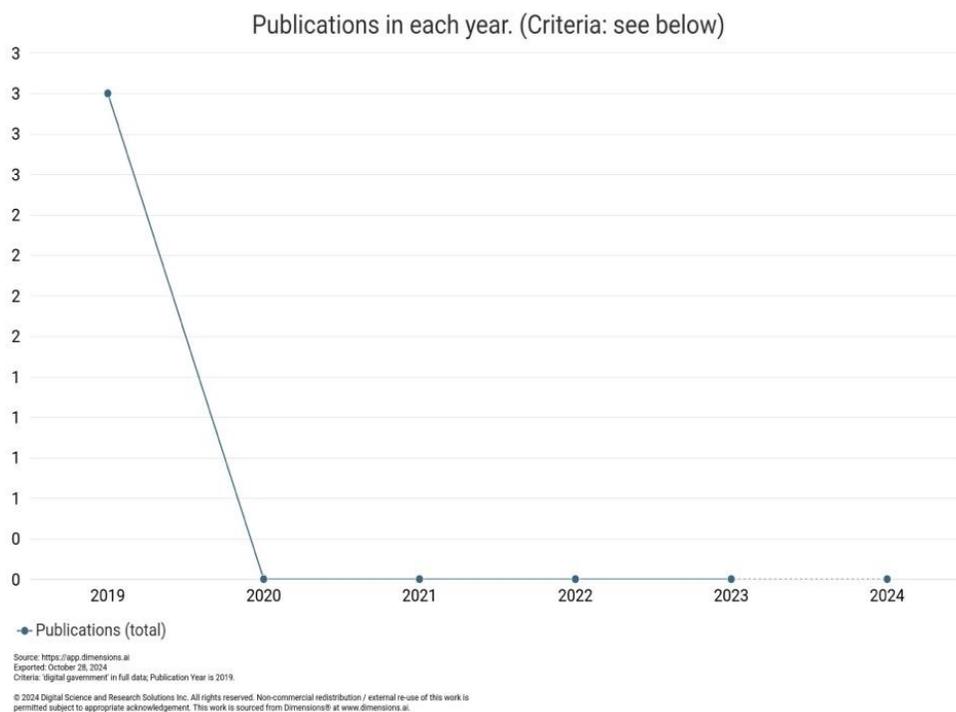


Fig. 2 Publication Data Graph

Based on the data collected, it shows that the graph above of academic publications relating to the number of publications published in 2019 can help us understand research trends on digital governance and its relationship with technological change in the public sector (Gil-Garcia et al., 2018).

Three publications in 2019 were written about digital governance. This indicates considerable initial interest in the use of digital technologies in government (Ravšelj et al., 2022). This year's publications were influenced by the increased adoption of information and communication technologies in the public sector, as well as an increased need to understand the impact and benefits of digitalization on the efficiency and effectiveness of public services. However, the graph shows a significant decline in the number of publications after 2019, even to zero in the following years. This decline is caused by several things. First, the focus of research changes towards more specific topics or approaches in the field of digital government, such as big data or artificial intelligence. Second, there are restrictions on data access or changes in research priorities that cause a decrease in the number of publications. The graph shows that in the years after 2019, namely from 2020 to 2024, there are almost no publications in the Scopus database that are directly related to these keywords. This happens for several reasons, one of which is that research now uses more specific terms, such as "smart government" or "digital government", which makes relevant publications undetectable in data analysis. This suggests that a more comprehensive method of selecting keywords for bibliometric analysis is needed so that more complete research trends can be found (Hassan & Duarte, 2024).

Bibliometric analysis is conducted to gain an understanding of publication trends and the relationships between related key concepts (Donthu et al., 2021). The purpose of this analysis is to shed light on subjects related to digital government, public administration, and government services evolving and connecting in academic literature. After finding relevant publications, the data was exported and processed using VOSviewer to map the relationships between keywords, this process enabled visualization of the concept network, which provided a better understanding of the direction and focus of research related to this topic. Patterns of keyword linkages that often co-occur in keyword-loaded research. In addition to identifying key trends in digital government research, this analysis also helps us understand how other subtopics, such as "digital government services" and "development", contribute to the broader conversation. Below is a graph of the analysis results:

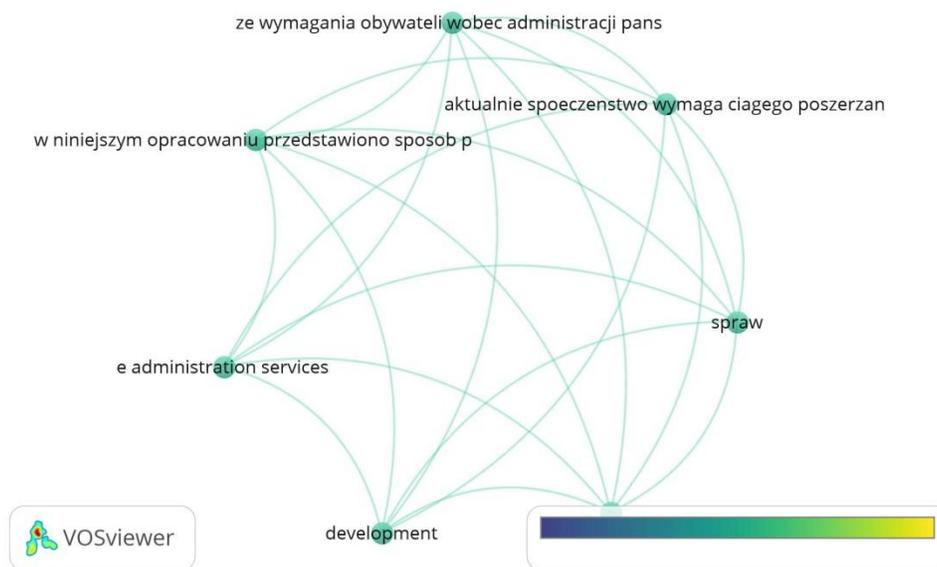


Fig. 3 Visualization of authors' collaboration networks in digital governance research using VOSviewer

The keyword network associated with the topic of "Government" in the extracted literature is shown in this image of the analysis results created using VOSviewer. In this graph, nodes are used to indicate specific words or phrases related to the idea of "Government". Lines showing the relationship between these ideas in the research connect them to each other. The more frequently the concepts co-occur in publications retrieved from the Scopus database, the thicker or brighter the line connecting the two nodes.

Some of the main keywords that dominate the network map are visible in the figure above, such as "electronic administrative services" and "development". In addition, there are also some terms in Polish, such as "ze wymagania obywateli wobec administracji państwowej" and "aktualnie społeczeństwo wymaga ciągłego poszerzania." This shows that research on "Government" at the global level can include multiple perspectives from different languages.

In the relevant research, the keyword "digital administrative services" seems to be closely related to several other keywords, indicating an interest in digital administrative services or electronic administration (Turovets et al., 2022). Given the rapid development of technology, this linkage suggests a great deal of interest in the modernization of digitally delivered government services. The concept is often associated with development efforts, which shows how important digital change is for improving the efficiency of public administration.

It also shows that there is a strong interest in understanding what people expect from public administration, which may include more effective, open and responsive services. Research typically focuses on governments that can meet public demands by undertaking administrative and technological reforms (Nguar, 2022).

Overall, the figure above shows research on "Government" or research related to the issues of digital administrative services, government capacity building, and public expectations (Abhayawansa et al., 2021). This mapping helps demonstrate the broad research landscape and shows the various topics that interact with each other in discussions about contemporary governance.

To gain a deeper understanding of the changes taking place in public administration as a result of the digital age, as information and communication technology advances more rapidly, this issue becomes increasingly

important as it impacts almost all aspects of people's lives, including governance. In the digital era, public administration aims to improve efficiency and effectiveness as well as increase transparency and accountability in the provision of public services (Birdayanthi et al., 2025).

Technologies such as big data, artificial intelligence, and e-government systems are part of the digital transformation in public administration (Sharmin & Chowdhury, 2025). These techniques enable faster and more accurate data collection and analysis, which contributes to more targeted decision-making. In addition, digital platforms speed up service delivery processes and increase public participation in government and community interactions. Not only does this concept have tangible benefits, but it also raises new expectations for the public towards better service standards and ease of obtaining information.

Digitalization of public administration not only changes services but also changes the internal processes of bureaucracy and organizational structure. Digital technology enables the reduction of previously complicated and time-consuming bureaucratic procedures (Marienfeldt, 2024). This makes government more responsive and flexible to the changing needs of society. It also challenges civil servants and government officials to continuously improve their skills to run digital systems and utilize them for the public good. However, the shift towards digitized public administration presents several challenges, especially relating to ready infrastructure, data security, and system integration between agencies. Given the potential cybersecurity threats that could threaten public data and the confidentiality of personal data, the government must pay close attention to these issues. Facing the current digital era requires investment in technological infrastructure and regulations that protect data (AllahRakha, 2024). Digitalization can cause instability and lower public trust in the government if not managed properly.

However, in the academic world, the increasing interest in public administration in the digital era is shown by the number of publications that continue to increase every year (Popova et al., 2023). Studies on this topic not only look at the technical aspects but also conduct in-depth analysis of the impact on culture, economy, and society. This shows that public administration in the digital age is changing more than just a tool but is changing as a whole and impacting the fundamentals of government. This can be seen in the figure below:

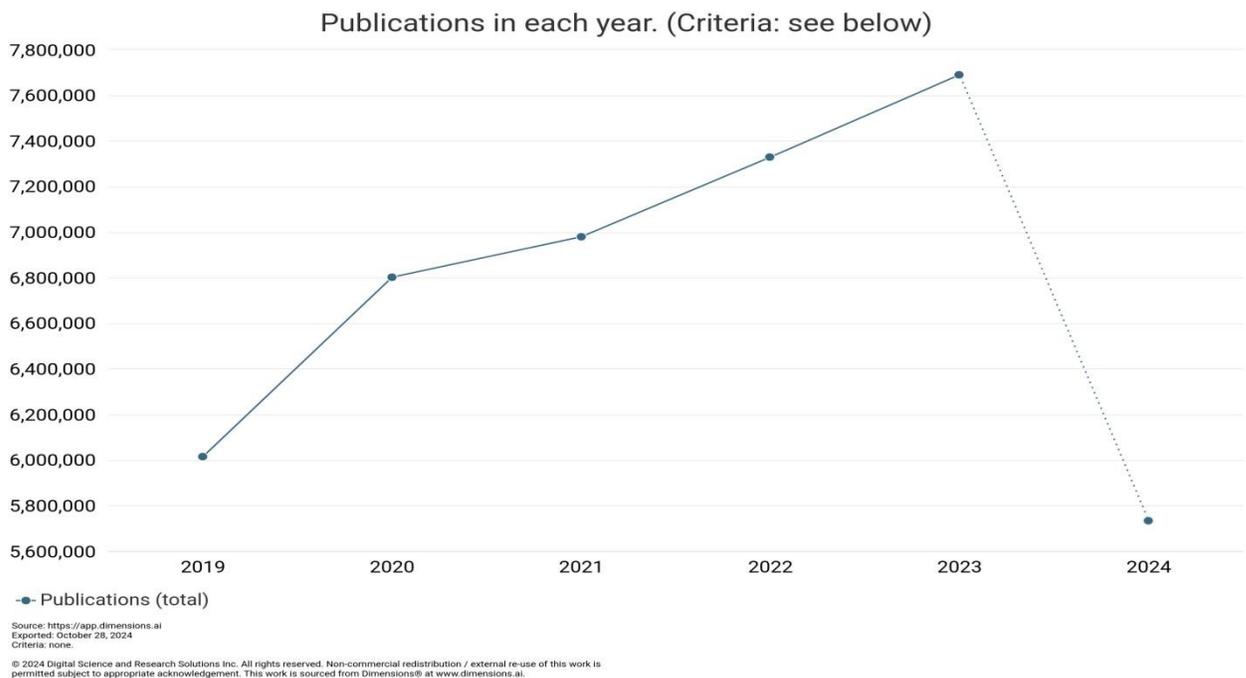


Fig. 4 Trend in the number of academic publications related to public administration in the digital era from year to year

Based on the search results on the scopus data base, the graph presented above shows the trend of annual publications on relevant topics (Borgohain et al., 2022). From 2019 to 2023, the number of publications increases consistently. Starting with around 6 million publications in 2019, the number of publications increased sharply to almost 7 million in 2020. The number of publications will continue to increase in the following years, and this trend may increase interest in digitalization in public administration, especially due to the impact of the Covid-19 pandemic that is accelerating digital transformation in various industries, including the government sector. By 2023, the number of publications will approach or even exceed 7.5 million publications. This suggests that, as advances in information technology increasingly affect governance practices and public services, attention and research on public administration is increasing in the digital era.

However, the number of publications decreases dramatically in 2024 because the data shown is still partial and not fully collected at the time the graph was made, this decrease does not yet reflect the final number of publications in 2024. Therefore, the decline should be further analyzed over time to determine the true downward trend or just an error in data collection (Finn et al., 2023).

One of these important terms "e-government" refers to the use of technology to deliver public services to citizens. Digital platforms make government services such as document registration and tax payment more accessible and reduce bureaucracy. In addition, citizen participation in governance is increasingly important as they can more actively engage in government processes, provide input, and participate in decision-making through digital platforms. As a result, this increases the legitimacy of the government and creates a better relationship with the people (Wuryan Andayani et al., 2024).

Conversely, the increased use of technology in public administration brings challenges, particularly regarding data security and privacy. These issues are gaining importance as governments become increasingly concerned with managing citizens' personal data. While digitization has many benefits, security issues must be addressed if we are to build public trust. Data-driven decision-making is essential for contemporary public administration (Choirunnisa et al., 2023).

An analytical map can show the various cooperative efforts taking place at different levels, which allows for a more holistic solution to the problem at hand (Ruiz-Rojas et al., 2024). Finally, public administration in the digital age requires innovation. With new technologies, governments can improve services in new ways. The use of artificial intelligence in public services, improved data management systems, and interactive approaches to engaging the public are some examples of efforts that can demonstrate innovation. Overall, the picture generated from this analysis provides an important overview of how public administration is changing in a digital environment, as well as the difficulties and opportunities that exist to improve public services in this digital era (Indriati Amirullah, 2023).

This study shows that the digitalization of government is receiving increasing attention in the academic literature, along with its potential to change the way public services are delivered through the application of digital technology. The government is expected to become more effective, transparent, and more interactive with the public. Technological advancements such as artificial intelligence, big data and digital platforms are further driving digital adoption in the public sector, which has attracted the attention of researchers to study the impacts and challenges that arise in different countries (MacLean & Titah, 2022).

An analysis of the data on the number of research documents from 2019 to 2024 shows an interesting trend. At the beginning of 2019, the number of publications increased significantly with 17 research documents, reflecting the great interest in the topic of digital governance. This increase was likely influenced by the rapid adoption of information and communication technology (ICT) in the public sector, as well as the need to understand the impact and benefits of digitalization in improving the efficiency and effectiveness of public services.

However, the significant decline in the number of publications after 2019, even to zero in subsequent years, suggests a change in research focus. This decline could be due to several factors. First, there may be a shift in research focus to more specific topics in digital governance, such as big data or artificial intelligence. Secondly, limited access to data or a change in research priorities could explain the decrease in the number of publications. It is also possible that the use of more specific terms, such as "smart government" or "digital government", were not detected in the analysis with the keyword "government". Therefore, a more comprehensive method of selecting keywords for bibliometric analysis is needed in order to explore more complete research trends (Gan et al., 2022).

Through bibliometric analysis using tools such as VOSviewer, we found patterns of keyword interrelationships that often co-occur in research containing the keyword "government". This analysis mapped the relationships between key concepts related to digital government, public administration and public services. The results show a network of concepts that illustrate the relationship between keywords such as "electronic administrative services", "development", and Polish terms that reflect an international perspective, such as "ze wymagania obywateli wobec administracji państwowej" and "aktualnie społeczeństwo wymaga ciągłego poszerzania". This shows that research related to "government" is not limited to one language or country, but includes a wide range of international perspectives.

The link between the keywords "digital administrative services" and "development" shows great attention to the modernization of digitally delivered government services, as well as efforts to improve the efficiency of public administration. Other related keywords, such as "people's expectations", point to the importance of understanding people's needs for more effective, open and responsive services (Saunders et al., 2023).

The digitization of government is having a significant impact on public administration. With the application of technologies such as big data, artificial intelligence, and e-government systems, governments can collect and analyze data more quickly and accurately, contributing to more targeted decision-making. Digital platforms also speed up the service delivery process and increase public participation in interactions between government and society. This increases the legitimacy of the government and creates a better relationship with the people.

However, while digitization has many benefits, challenges related to data security and privacy are a major concern. The management of citizens' personal data must be done carefully to maintain public trust. In addition, data-driven decision-making has become essential in contemporary public administration, allowing governments to act more in line with the needs of the people.

On the other hand, the digitization of public administration presents several challenges, especially with regard to adequate infrastructure, data security, and system integration between agencies. Potential cybersecurity threats that could threaten public data and the confidentiality of personal data require special attention from the government. Investments in technology infrastructure and regulations that protect data are essential to ensure the success of government digitization.

In addition, digitalization opens up great opportunities for innovation in public service delivery. The use of artificial intelligence, improved data management systems, and interactive approaches to engaging the public are some examples of innovations that can improve the efficiency and effectiveness of public services.

4 | CONCLUSION

From the analysis, it can be concluded that digital transformation in public administration has brought significant changes to public service delivery and governance. Digitalization has proven to enhance efficiency, transparency, accountability, and citizen satisfaction, while also strengthening the relationship between government and society. However, this transformation is not without major challenges, particularly concerning cybersecurity threats, gaps in digital literacy, complex regulatory adaptation, as well as issues of inclusion and equity in access to technology-based public services.

Therefore, a more coherent policy framework is required to ensure that digital transformation progresses in a responsive, sustainable, and inclusive manner. This includes the development of reliable digital infrastructure, continuous capacity building for public officials, and strengthened multi-stakeholder collaboration involving government, the private sector, and civil society. Furthermore, future research should be directed toward deepening the understanding of the impact of digitalization on governance and exploring strategies to address the challenges of implementing new technologies in the public sector. In this way, digital governance can evolve not merely as a technical instrument but also as a means to realize more inclusive, adaptive, and citizen-oriented governance.

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Data Availability Statement

The data used in this study come from the Scopus public database and can be accessed by other researchers with appropriate permissions and access accounts. The bibliometric analysis data have been processed using VOSviewer software and are available upon request to the corresponding author.

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