

Digitalization in Public Finance: A Bibliometric Analysis

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Abstract. *Using bibliometric analysis based on Web of Science data, this study explores the trends and limitations of research digitisation in public finance. Digitization has transformed public finance by leveraging technologies such as e-government platforms, blockchain, and artificial intelligence to modernise public sector operations, resulting in streamlined revenue collection and expenditure management, increased transparency to combat corruption, and real-time data analytics to improve decision making and resource allocation. The study aims to trace the evolution of research on digitisation in public finance, identify key contributors, journals and collaborative networks, analyse thematic clusters and trends, and highlight research gaps while proposing future directions. The study is based on a bibliometric analysis of 298 academic articles (2005-2024) indexed in the Web of Science database and uses VOSviewer software to visualise keyword co-occurrences and bibliometric patterns.*

Keywords: digitalization, public finance, bibliometric analysis

JEL Classification: O33, G28, H2

1. Introduction

Digitalization has emerged as a transformative force in public finance, reshaping traditional processes, enhancing efficiency, and promoting fiscal transparency. As governments worldwide adopt digital tools and technologies, the landscape of public finance is undergoing a paradigm shift. From the implementation of e-government platforms to the integration of blockchain and artificial intelligence in fiscal management, digitalization has become a cornerstone for modernizing public sector operations.

The significance of digitalization in public finance lies in its multifaceted impact. It not only streamlines revenue collection and expenditure management but also fosters accountability and combats corruption through increased transparency. Moreover, digital technologies enable real-time data analysis, improving decision-making processes and enhancing the allocation of public resources.

Despite its growing importance, research on digitalization in public finance remains fragmented, with diverse approaches and perspectives. To bridge this gap, a bibliometric analysis offers a systematic examination of the academic landscape, providing insights into publication trends, influential works, and emerging themes.

The primary objectives of this study are designed to systematically explore the landscape of existing literature on digitalization in public finance, providing insights into its evolution, key contributors, thematic developments, and future research opportunities

The research objectives are:

- To map the progression of research on digitalization in public finance and identify key developmental phases.

- To pinpoint influential authors, significant journals, and the structure of collaborative networks in the field.
- To analyse and categorize thematic clusters and emerging trends within the domain.
- To highlight existing research gaps and propose potential directions for future investigations.

By leveraging bibliometric tools and data visualization software such as VOSviewer, this study provides a comprehensive overview of the academic discourse on digitalization in public finance. Through this approach, the article not only evaluates the state of current research but also sets a foundation for future scholarly contributions.

2. Materials and methods

To synthesize and emphasize the primary theoretical frameworks and emerging research trends related to digitalization in public finance, a bibliometric analysis was conducted on recent scholarly studies. A total of 298 academic articles, published between 2005 and 2024 and indexed in the Web of Science database—renowned for its extensive collection of high-impact academic publications—were selected. The articles were identified using a range of keywords derived from a systematic literature review aligned with the study's objectives. Data extracted from Web of Science was processed using VOSviewer 1.6.20, enabling an in-depth analysis of keyword co-occurrences related to digitalization in public finance.

The following steps were taken to collect the data:

a. *Search Strategy*: A keyword search was conducted using terms such as “digitalization,” “public finance,” “e-government,” “financial technology,” and “digital public administration.” Boolean operators (AND, OR) were used to combine these terms and refine the search.

b. *Inclusion Criteria*: Articles and reviews published in peer-reviewed journals from 2005 to 2024 were considered. The timeframe was selected to capture the evolution of digitalization in public finance, including the emergence of transformative technologies.

c. *Exclusion Criteria*: Publications in languages other than English were excluded to ensure the academic rigor of the dataset.

d. *Data Export*: Relevant metadata, including titles, abstracts, authors, publication years, journal names, and citation counts, were exported in a standardized format compatible with bibliometric analysis software.

The study's methodology integrates bibliometric techniques to systematically investigate the body of research surrounding digitalization in public finance. This approach seeks to uncover key patterns, influential contributors, foundational studies, and collaborative networks that define the field.

The analysis was performed in three stages:

⇒ *Descriptive Analysis*: Quantitative assessment of the dataset, including publication trends over time, top journals, most prolific authors, and geographic distribution of research.

⇒ *Network Analysis*: Mapping co-citation relationships to identify influential works; Keyword co-occurrence analysis to highlight prevailing research topics and emerging themes; Collaboration analysis to uncover partnerships between authors, institutions, and countries.

⇒ *Thematic Evolution*: tracking the progression of research themes over time by analyzing the temporal distribution of keywords and topics. Identifying shifts in focus

from early studies on digitization to contemporary explorations of artificial intelligence, blockchain, and other advanced technologies in public finance.

3. Results

The evolution of publications on digitisation in public finance shows a clear trajectory of increasing academic interest (Figure 1). Between 2005 and 2017, research activity was minimal, indicating the nascent stage of the field. However, from 2018 onwards, there is a significant increase in publications, peaking between 2021 and 2024, likely driven by the global push for digital transformation, particularly accelerated by the challenges posed by the COVID-19 pandemic. This trend underscores the growing recognition of digitisation as a critical component of public financial management and governance.

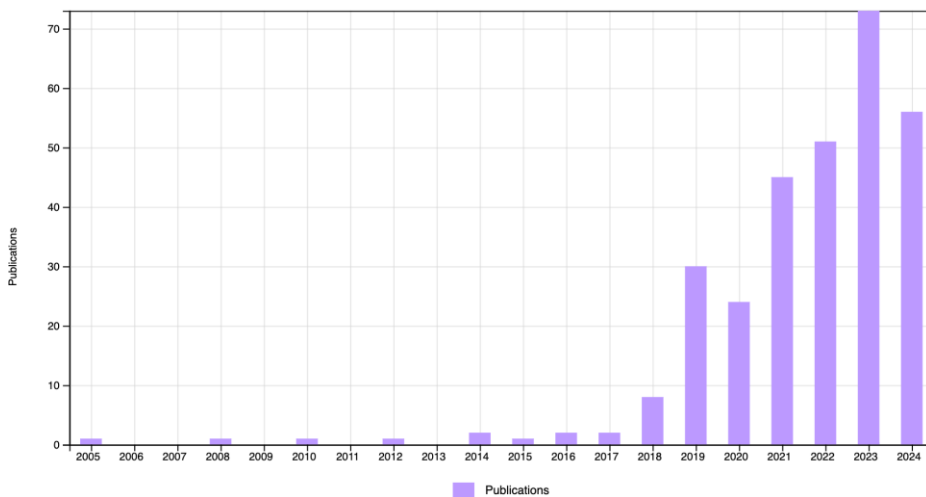


Figure 1. Publications on digitalization in public finance

Source: Web of Science, 2024

The most significant increase occurs between 2021 and 2024, with the number of publications reaching its highest level in 2022 and maintaining a high level of activity until 2024. This rapid growth may reflect the accelerated adoption of digital solutions in response to global challenges such as the COVID-19 pandemic, which highlighted the need for efficient, transparent and technology-enabled financial systems.

Data (Figure 2) on the types of documents published on the topic of digitalisation in public finance show a wide range of knowledge sources. The majority of publications are journal articles, underlining the importance of original research in this area. Book chapters contribute to the interdisciplinary exploration of the impact of digitalisation on public finance systems, while conference papers capture emerging trends and the rapidly evolving nature of the topic. In addition, reviews and systematic analyses provide a critical assessment of the existing body of work, highlighting the current state of research and identifying potential gaps. This diversity reflects the multifaceted nature of digitalisation in public finance and its growing importance in academic and professional discourse.

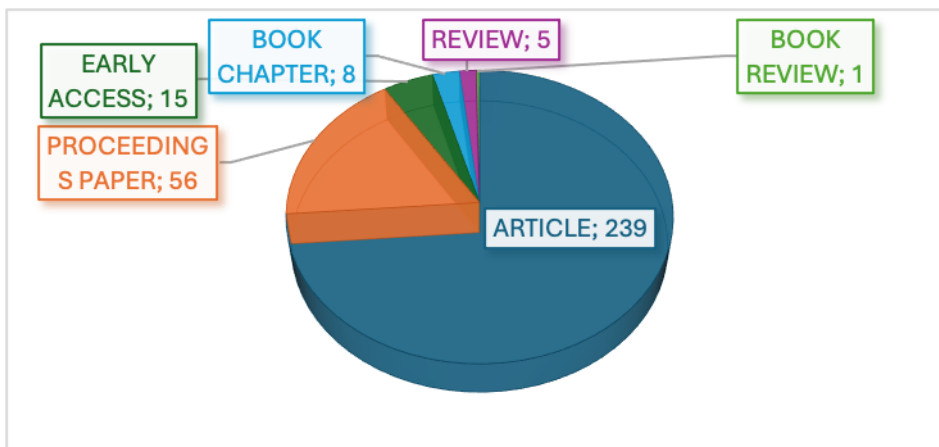


Figure 2. Documents by type

Source: Web of Science, 2024

3.1. Identification of the Author Co-Citation Network

Co-citation analysis is a highly effective technique for mapping knowledge within a specific domain. This method focuses on the co-citation of authors, which is inherently qualitative, and acts as an initial step in identifying the most frequently cited researchers. Author co-citation analysis operates under a dual premise, which involves a network of the most influential and frequently referenced authors. The objective of this analysis is to identify the leading authors, reveal the clusters they form, and offer a visual representation of the findings. Figure 3 showcases the author co-citation network, emphasizing the co-citation analysis based on cited authors, using data from the Web of Science database.

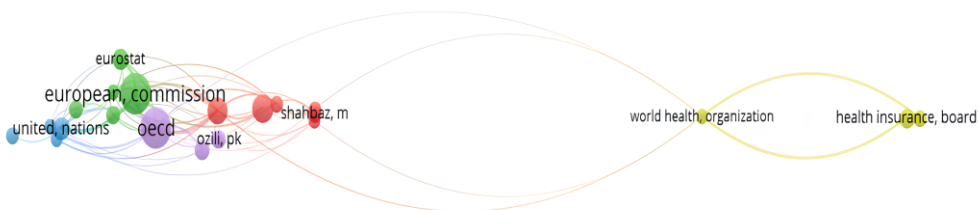


Figure 3. Author Co-Citation Network

Source: Author's processing in VOSviewer

For this analysis, a threshold of 10 citations per author was established, ensuring that only authors who received at least 10 citations during the study period were included. In the first phase of the research, a total of 11,074 authors were cited, with only 23 authors surpassing the 10-citation threshold. The scientific map shows these 23 authors organized into five distinct clusters: Cluster 1 (red) with 6 authors; Cluster 2 (green) with 5 authors; Cluster 3 (blue) containing 4 authors; Cluster 4 (yellow) with 3 authors; and Cluster 5 (purple), also with 3 authors. These authors were

grouped based on their collaboration patterns, which reflect the strength of their interactions, as well as their overall connections, which represent the number of relationships with other cited authors and their co-citations.

3.2. Scientific Mapping of the Most Cited Works

To explore gaps and potential future research avenues in the intersection of digitalization in public finance, we conducted a comprehensive review of key studies in this field. For this purpose, we utilized the same article database as in the previous bibliometric analysis, covering the period from 2005 to 2024. The selection criteria included a minimum of 15 citations per paper, which led to an initial pool of 33 articles.

The key findings from this analysis are summarized in Table 1, where the articles are ranked in descending order according to their citation count. The paper with the highest citation count (196 citations) is “Close encounters of the digital kind: A research agenda for the digitalization of public services” by Lindgren, published in 2019. This article provides an analysis and critical reflection on how the digitalization of public services has impacted the interaction between citizens and governments. The authors propose a conceptualization and examination of the fundamental interactions between citizens and public officials—termed “public encounters”—that digital public services are designed to support. The study employs a qualitative and hermeneutic approach to illustrate how digitalization transforms these interactions regarding when, where, and how they occur, the roles of each actor, and the skills required.

By linking these changes to emerging technologies such as data mining, machine learning, sensor technology, and service automation, the authors demonstrate that while these innovations have the potential to advance digital service provision and achieve the democratic goals of digital government, they can also be used by authorities to restrict, control, or surveil citizens. The article raises ethical and societal concerns, including issues of accountability and the need for reskilling citizens and public officials in a context where public service delivery increasingly shifts to self-service for citizens. Finally, the authors outline a research agenda to further explore this phenomenon and its implications for society.

Table 1. Analysis of the Top 10 Most Cited Works

Authors	Nr. citations	Title	Journal/Year	Link
Lindgren, I., Madsen, C. Ø., Hofmann, S., & Melin, U.	196	Close encounters of the digital kind: A research agenda for the digitalization of public services	<i>Government information quarterly</i> /2019	https://doi.org/10.1016/j.giq.2019.03.002
Akram, U.; Fülöp, M.T.; Tiron-Tudor, A.; Topor, D.I.; Căpușneanu, S.	76	Impact of Digitalization on Customers' Well-Being in the Pandemic Period: Challenges and Opportunities for the Retail Industry.	<i>J. Environ. Res. Public Health</i> /2021	https://doi.org/10.3390/ijerp18147533
Begum, H., Abbas, K., Alam, A. F., Song, H., Chowdhury, M. T., & Ghani, A. B. A.	57	Impact of the COVID-19 pandemic on the environment and socioeconomic viability: a sustainable production chain alternative	<i>Foresight</i> /2022	https://doi.org/10.1108/FS-02-2021-0053
J. Qin, Y. Luo, X. Xiang, Y. Tan and H. Huang,	53	Coverless Image Steganography: A Survey	<i>IEEE Access</i> , vol. 7/2019	http://doi.org/10.1109/ACCESS.2019.2955452

Ali Uyar, Khalil Nimer, Cemil Kuzey, Muhammad Shahbaz, Friedrich Schneider,	85	Can e-government initiatives alleviate tax evasion? The moderation effect of ICT,	<i>Technological Forecasting and Social Change/2021</i>	https://doi.org/10.1016/j.techfore.2021.120597
Pomeranz, D; Belda, V.J.	48	Taking State-Capacity Research to the Field: Insights from Collaborations with Tax Authorities	<i>Annual Review of Economics/2019</i>	https://doi.org/10.1146/annurev-economics-080218-030312
He, Z., Kuai, L., & Wang, J.	39	Driving mechanism model of enterprise green strategy evolution under digital technology empowerment: A case study based on Zhejiang Enterprises	<i>Business Strategy and the Environment/2023</i>	https://doi.org/10.1002/bse.3138
Adler, M.W., Peer, S., Sinozic, T	37	Autonomous, connected, electric shared vehicles (ACES) and public finance: An explorative analysis	<i>Transportation Research Interdisciplinary Perspectives/2019</i>	https://doi.org/10.1016/j.trip.2019.100038
Ranerup, A; Henriksen, H.Z., Hedman, J.	35	An analysis of business models in Public Service Platform	Government Information Quarterly/2016	https://doi.org/10.1016/j.giq.2016.01.010
Vasile V, Panait M, Apostu S-A..	31	Financial Inclusion Paradigm Shift in the Postpandemic Period. Digital-Divide and Gender Gap	<i>International Journal of Environmental Research and Public Health/2021</i>	https://doi.org/10.3390/ijerph18201938

Source: Author's processing, using data provided by WOSviewer

Analysing the data from Table 1 and the arrangement of the studies, a noticeable trend emerges, with most research concentrating on the integration of digital tools in public finance, emphasizing their impact on efficiency, transparency, and policy implementation. This highlights the importance of reducing inefficiencies and fostering innovations that enhance fiscal management and accountability. The research spans from regional case studies in Europe to broader national or multi-country analyses, offering a diverse perspective on the adoption of digital technologies in public financial systems. These studies provide a comprehensive framework for understanding the challenges and opportunities in digitalizing public finance, offering valuable insights into how governments can leverage technology to improve fiscal outcomes and service delivery.

It is essential for future research to continue addressing these themes, particularly in light of rapid technological advancements and the increasing demand for more transparent and responsive public finance systems. This underscores the relevance and necessity of the proposed doctoral research topic, which aims to

examine the integration of digitalization in public finance and its economic, administrative, and societal impacts in a holistic and forward-looking manner.

Figure 4 presents the map of the most frequently cited papers, which also includes information about their publication year. After applying a minimum criterion of 15 citations per article, out of the 298 papers analysed, only 33 managed to exceed this threshold.

The majority of the most cited papers on the researched topic were published between 2019 and 2023. This trend can be attributed to several factors. One reason is the increased focus on digital transformation in public administration and finance during this period, fueled by the growing adoption of digital technologies such as e-governance platforms, data analytics, and automation. These technologies have gained attention as essential tools for improving public service efficiency and transparency.

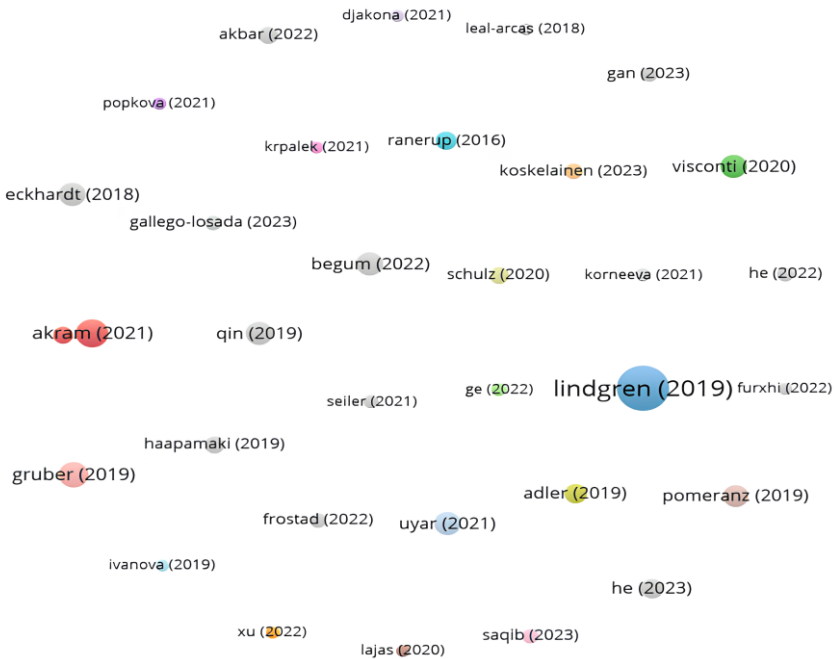


Figure 4. The most cited papers
Source: Author's processing in VOSviewer

Another significant driver was the impact of global challenges, including the COVID-19 pandemic, which accelerated the need for digital solutions in public finance management to ensure continuity and resilience. This period also saw the introduction of advanced policy frameworks and reforms aimed at integrating digitalization into financial systems, promoting accountability, and addressing issues such as tax evasion and financial inclusion. Consequently, researchers were motivated to analyze and propose strategies for optimizing digitalization's role in achieving sustainability, improving fiscal governance, and fostering public trust.

3.3. The Topography of Journals in the Study of the Digitalization in Public Finance

Examining the journals that have published the most papers in our area of interest offers valuable insights into how research in this field is distributed and recognized within the academic community. This analysis is crucial for identifying

potential collaborations, establishing networks of researchers for future projects, and pinpointing key sources of specialized literature required for comprehensive study. Figure 5 highlights these journals, applying a minimum threshold of at least three articles per journal. The number of publications varies, and the diagram allows us to rank the journals contributing to research on digitalization in public finance.

Based on the bibliometric map generated using the VOSviewer application, out of 200 journals, only 15 meet the threshold of three published articles. This indicates that the research comes from a diverse array of publications, demonstrating strong interconnections among referenced articles. In bibliometric analysis, identifying journals with linked publications on the VOSviewer map provides a clear view of the diversity and interdisciplinary nature of this research field, showcasing its complexity and broad scope.

The journal with the highest number of articles published in this area is *Sustainability* with 11 articles. It boasts a 2023 impact factor of 3,3 and is ranked in Q2. The second most prominent journal is *International Journal of Environmental Research and Public Health*, publishing 8 articles, with a 2021 impact factor of 4,61 and a Q2 ranking. This is followed by *Public Finance Quarterly-Hungary*, which published 8 articles and holds a 2023 impact factor of 0,4, ranked in Q4.

Other notable journals include *Energies* and *Frontiers In Public Health*, ranked in Q3 and respective Q2, with 6 publications each in the analyzed field. Their 2023 impact factors are 3, further highlighting their relevance and influence within this research domain.

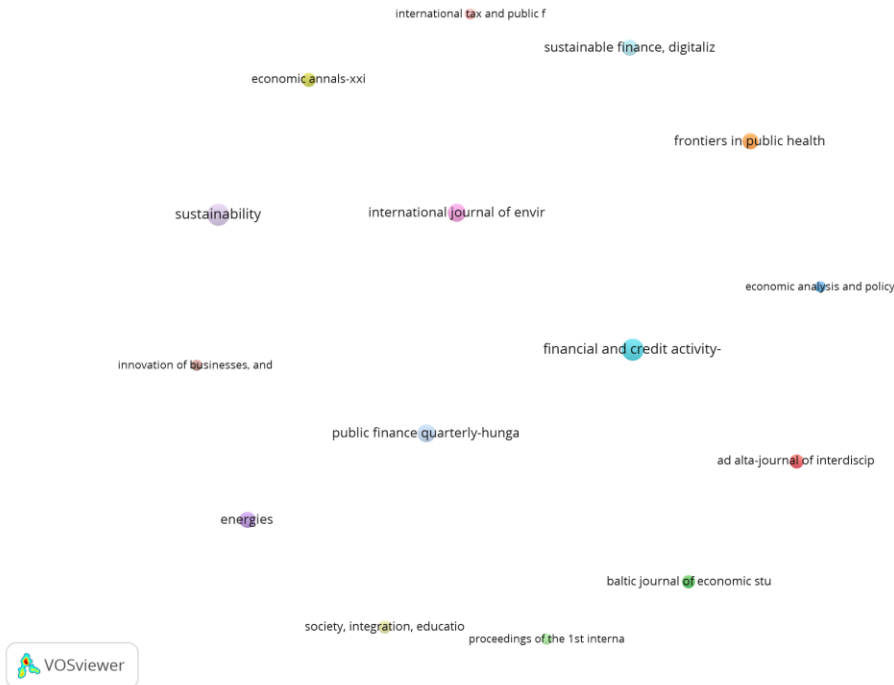


Figure 5. Citation of the source (journals)
Source: Author's processing in VOSviewer

3.4. Mapping of Keyword Co-occurrence

This analysis aims to identify the most frequently occurring keywords by examining their co-occurrence within the same article. It is important to note that only keywords mentioned by the authors in the abstracts of the articles are considered for this analysis. Through this graphical representation, we can observe which keywords are most commonly used in research related to digitalization in public finance. The method employed not only reveals the frequency of keyword usage but also highlights the relationships between them.

The map (Figure 6) illustrates the connections between the primary keywords found in the academic literature on digitalization in public finance, organized into five distinct thematic clusters. The most central keywords are "digitalization," "public finance," and "e-government", "digital economy" underscoring their centrality within the field. The dense connections between these keywords suggest a highly interconnected body of literature, where various sub-themes are closely related.

The bibliometric analysis identified five clusters that group keywords based on their shared thematic focus, providing a clear overview of the key research directions in the field of digitalization and its impact on public finance.

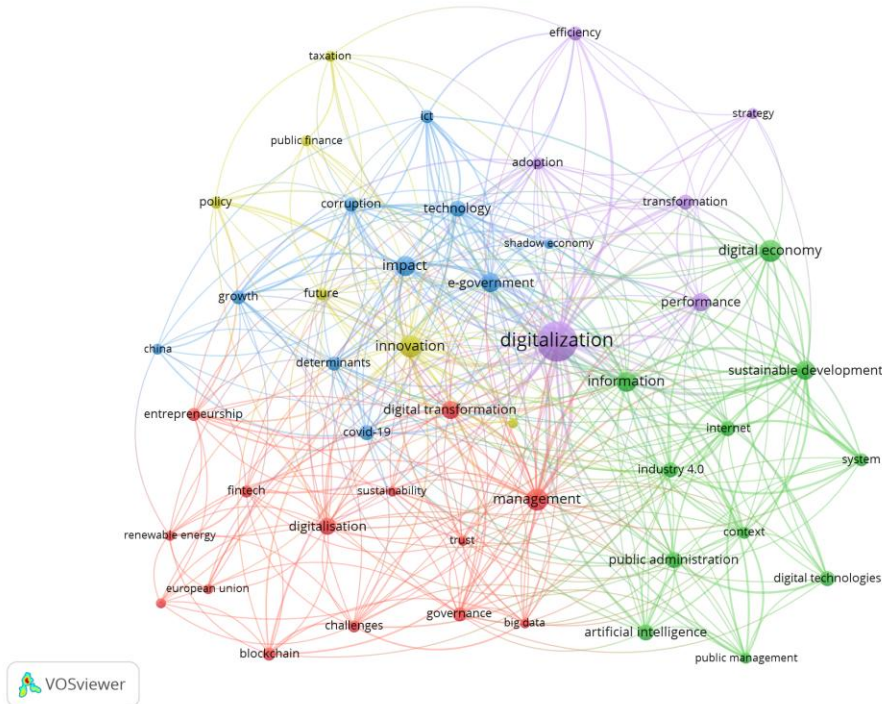


Figure 6. Co-occurrence network of keywords

Source: own processing in VOSviewer

A first set of clusters reflects concerns related to digitalisation, digital transformation and fintech (red). Terms such as blockchain, governance, management and e-government highlight how digitalization is being integrated into public finance strategies, with an emphasis on the impact of technology on financial systems, governance and policy implementation. These concepts highlight the role of digital technologies in enhancing transparency, improving efficiency and supporting the overall functioning of public financial management, particularly in the context of the evolving digital landscape of the European Union.

In a different vein, research on artificial intelligence, the digital economy, Industry 4.0, e-government and digital finance (green) underline the integration of technological advances in public financial management. Terms such as digital transformation, public administration and e-government emphasise the role of digitalisation in improving government efficiency and transparency in financial operations. The analysis also highlights the growing importance of sustainability in public finance, with concepts such as green finance and sustainable finance focusing on the integration of environmental and climate-related risks into financial strategies. Particular attention is given to the integration of ESG principles in public finance, especially in the context of digital tools and technologies that support fiscal governance and sustainability.

Another key issue highlighted in the literature is the relationship between e-government, ICT, digital technologies, financial stability and risk management in public finance, particularly in the context of the COVID-19 pandemic (blue). Concepts such as risk management, financial stability and climate transition risks underline the importance of addressing ESG-related risks to ensure the stability of public financial systems. This issue is particularly relevant for both public institutions and regulators as they work to incorporate these risks into fiscal policies, especially in the context of climate change and its impact on public finance management.

Terms such as education, public finance, taxation, and innovation underscore the effects of recent crises on the stability of public financial systems, highlighting the necessity of integrating digital tools into public strategies. Additionally, there is a strong focus on the need for educating the population and businesses on digitalization and the effective use of digital instruments, ensuring a broad understanding and adoption of these tools for enhanced financial management.

This analysis not only identifies the most frequently used keywords but also reveals emerging trends that point to future research directions. We observe that while key terms like "public finance" and "digitalization" remain central, there is a growing focus on concepts such as "digital transformation" and "climate-related risks," underscoring the importance of integrated approaches to public finance in the context of sustainability. This shift in terminology reflects the dynamic nature of the field, as research adapts to current challenges and the need for a more resilient and sustainable public finance system in the digital age.

3.5. Mapping of Main Countries of Origin

The examination of countries' roles and their impact within the domain of digital public finance, as mapped through VOSviewer, sheds light on their contributions to international research. This analysis reveals the influence of individual nations based on their publication output and collaborative efforts, highlighting the primary contributors driving advancements in the field. By exploring the connections between countries, we can uncover significant partnerships and the pathways through which knowledge and expertise circulate globally. This illustrates how international scientific communities work together to address challenges and foster innovation in digital public finance (Beaver, 2001).

Based on Figure 7, the network illustrates collaboration among 18 countries in terms of co-authorship, emphasizing the connections between the authors' countries of origin. Each circle's size reflects the volume of publications originating from that country, with larger circles indicating a higher number of published works. The connections between circles signify co-authorship relationships between institutions from the respective countries.

Key collaborative relationships can be observed between Romania and Hungary, as well as Romania and China, indicating strong ties in research partnerships. Additionally, Romania appears prominently, forming a central node with

diverse international connections, particularly within the green cluster. Countries like Russia, Germany, and the Netherlands are part of the red cluster, which showcases dense collaboration within Western and Eastern European countries.

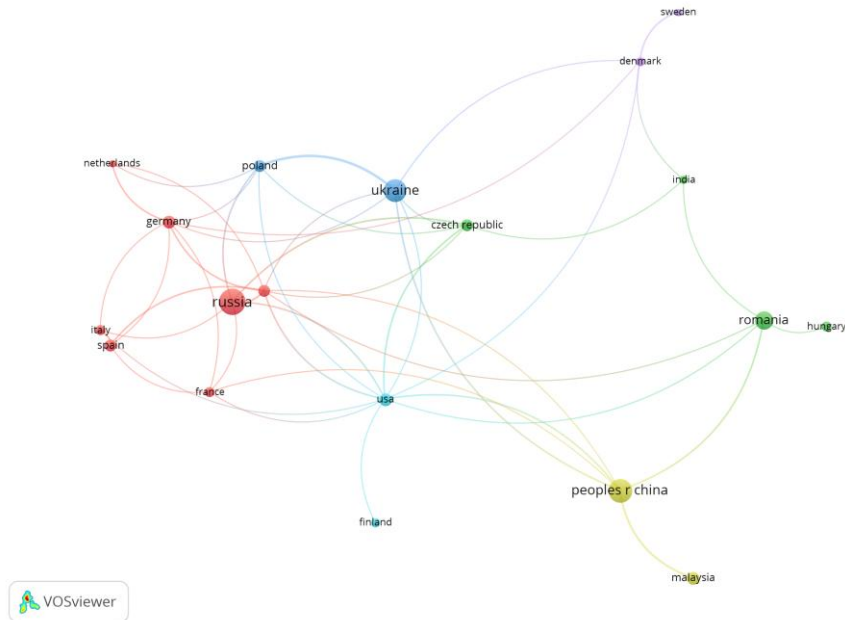


Figure 7. Citation network analysis based on country of origin for various authors

Source: Author's processing in VOSviewer

The map also highlights notable transcontinental partnerships, with strong links connecting Europe to Asia, such as Romania's collaborations with India and China. These relationships underline the growing internationalization of research in digital public finance, as well as the importance of cross-border cooperation in addressing global challenges within this domain.

4. Conclusions

The digitization of public finance has led to significant improvements in efficiency, transparency, and accountability within government operations. Technologies such as e-government platforms, blockchain, and artificial intelligence have modernized the sector, offering streamlined processes for revenue collection and expenditure management, and providing real-time data analysis for better decision-making and resource allocation.

The bibliometric analysis reveals a steady growth in the number of publications on digitization in public finance, with a clear increase in research output in recent years. While the study identifies key contributors and influential journals, there are emerging themes that have not yet been explored comprehensively. The research highlights the need for more studies on the practical applications of digital tools, their impact on public sector efficiency, and the challenges faced by governments in adopting these technologies.

The study identifies a strong network of academic collaboration within the field of

digitization in public finance, with prominent scholars and institutions driving the discourse. However, it also indicates that there is room for increased collaboration across countries, especially in regions with less research activity in this area. Expanding international collaboration could lead to more global perspectives on best practices for digitization in the public sector.

To address the gaps and challenges identified, future research should focus on understanding the social, political, and organizational barriers to implementing digital solutions in public finance. Additionally, more attention should be given to the impact of emerging technologies such as blockchain and artificial intelligence in public financial management. Future studies could also explore the long-term effects of digitization on public sector performance and its potential to enhance democratic processes and citizen engagement.

These conclusions suggest that while significant progress has been made in digitizing public finance, there is a need for continued research and collaboration to fully harness the potential of digital technologies and address the challenges that remain.

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