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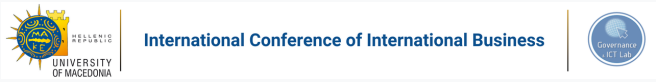

e-Government and Education: Review of Current Research and Trends

Chrysanthi Oraiopoulou, Aristidis Bitzenis, Sofia Boutsiouki, Nikos Koutsoupias, Athanasios Bozinis, Christos Banioras, Georgia Papadopoulou, Epameinondas-Christos Tsartsalis, Sokratis Tsachouridis, Theocharis Chatzimladis

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e-Government and Education: Review of Current Research and Trends

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ABSTRACT

In the digital era, governments are using ICT to improve policy efficiency and public services. Digital governance has significant effects on society, as e-government initiatives increase access to government information and citizen engagement. Furthermore, they have the potential to enhance government accountability, transparency, and trustworthiness. The intersection of e-government and education creates a convergence that can enhance governance in education systems globally. Up until now, no bibliometric study has been conducted on the subjects of e-government and education. To fill this research gap, we undertook a comprehensive bibliometric analysis to assess the impact of published studies within the scientific community. For our analysis, we examined 215 articles related to e-government and educational research fields that were indexed in Scopus and authored by 527 researchers between 2001 and 2022. To carry out this analysis, we employed the R data analysis package, bibliometrix. Our study yielded valuable findings, including identifying the most influential authors and journals and uncovering prominent themes and current research trends. Moreover, we identify potential directions for future research.

KEYWORDS: e-Government, Education, Bibliometric data analysis, Scopus

1 INTRODUCTION

The implementation of e-government is aimed at enhancing government services, as there is a growing demand for improved, transparent, and open services that encompass both the accessibility of information and the transparency of government operations (Basu, 2004; Horsburgh, Goldfinch & Gauld, 2011). Governments in the digitalization era, incorporate information and communication technology (ICT) into their structures to increase the efficiency of policies and offer improved and high-quality public services (Dunleavy, Margetts, Bastow, & Tinkler, 2006). The advancement of digital governance has significant consequences for governments, people, and society. The implementation of e-government initiatives has the potential to improve the accessibility of government information and foster citizens engagement. (Margetts & Dunleavy, 2013; Guillamón, Ríos, Gesuele, & Metallo, 2016; Naranjo-Zolotov, Oliveira, & Casteleyn, 2019). So, among other benefits, e-government is advantageous for enhancing accountability, transparency, and trust in government (Tolbert & Mossberger, 2006). Other areas that are changing, utilizing technology, are related to, and influenced by both policy factors and educational systems. For example, the development of e-commerce in a country is associated with national policies, education, and IT literacy (Gibbs, Kraemer & Dedrick, 2003).

Kim & Layne (2001) in their research seek to establish the connection between e-government and public administration education. It delves into the emerging issues in public management in the era of e-government, examines the literature regarding the necessary transformation in public administration, and proposes modifications to the current Master of Public Administration curriculum. These modifications are aimed at bridging the gap between e-government and public administration education.

Nimer et al. (2022) investigates the potential of technological advancements, particularly e-government services, in addressing societal issues like tax evasion. The research specifically focused on the interplay between e-government services, the quality of education, and internet accessibility in schools as potential factors in reducing tax evasion. The study's findings substantiate the significant role played by e-government services in curbing tax evasion, with the added insight that the quality of education and internet connectivity in educational institutions can modulate this effect. Moreover, the research underscores the potential impact on educational systems, emphasizing the need for curriculum adjustments to incorporate tax-related subjects and ensure equitable and dependable internet access in schools.

Higher degrees of formal education are thought to relate to higher levels of digital and government literacy, which refers to knowledge of how technology and government work as well as use of e-government services (Jaeger et al., 2012; Jaeger and Thompson, 2004; Powell et al., 2010). However, Mensah and Mi (2018) stated in their study that education is not a predictor of e-government adoption; rather, age appears to be a more significant predictor. Indeed, Sanmukhiya (2019) revealed in his research that residents of rural areas with lower levels of education were more likely to use e-government services than urban ones.

The intersection of e-government and education creates a convergence that can enhance governance in education systems globally. Up until now, no bibliometric study has been conducted about e-government and education.

In our research, we used bibliometric data analysis software to map the international scientific literature on issues of e-Government and education, and to explore bibliometric data such as key authors, countries with most publications, keywords, articles with most citations, and other information that map scientifically the field. Our goal was to analyze the dominant trends that appear in the international literature and their variation over time. Bibliographical data analysis tools support this study by exploring the prevalent patterns in the scientific space.

2 METHODOLOGY

In this paper, Bibliometric analysis of 215 papers has been incorporated and analyzed from the Scopus database. Bibliometrix is an open-source tool that is mainly used for quantitative research in bibliometrics (Aria & Cuccurullo, 2017). Similar approach was followed by Bitzenis et al. (2023) in the study of Digital Economy in Business and Economics journals. To show the analysis of research clearly, this paper adopts the visual knowledge of analysis through Biblioshiny.

3 RESULTS

The present exploratory study analyzes the fields of e-government and education using bibliometric methods. The exploration was conducted on the Scopus database, searching for information based on the term "e-government and education." The years of investigation ranged from 2001 to 2022, resulting in 122 sources published in journals and newspapers. The generated search keywords were 477, which led to the appearance of articles totaling 215. Additionally, among other findings, 527 authors participating in the investigation of this research field were identified, exhibiting an annual growth rate of 14.76%. This specific study provides a comprehensive overview of the various trends that have emerged in the research throughout the years.

Table 1 Dataset description

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2001:2022
Sources (Journals, Books, etc)	122
Documents	215
Annual Growth Rate %	14.76
Document Average Age	8.2

Average citations per doc	25.03
References	1
DOCUMENT CONTENTS	
Keywords Plus (ID)	477
Author's Keywords (DE)	736
AUTHORS	
Authors	527
Authors of single-authored docs	43
AUTHORS COLLABORATION	
Single-authored docs	47
Co-Authors per Doc	2.62
International co-authorships %	17.67
DOCUMENT TYPES	
article	215

As shown in Figure 1 the production of articles in the field of e-Government and Education from 2003, shows an upward trend starting from 5 articles, reaching 25 articles in 2021. After 2021, there seems to be a decrease, which we will be able to assess over the years, by studying whether the upward trend will continue, whether there will be a decrease in interest, or whether there will be stability in the publication of relevant surveys.

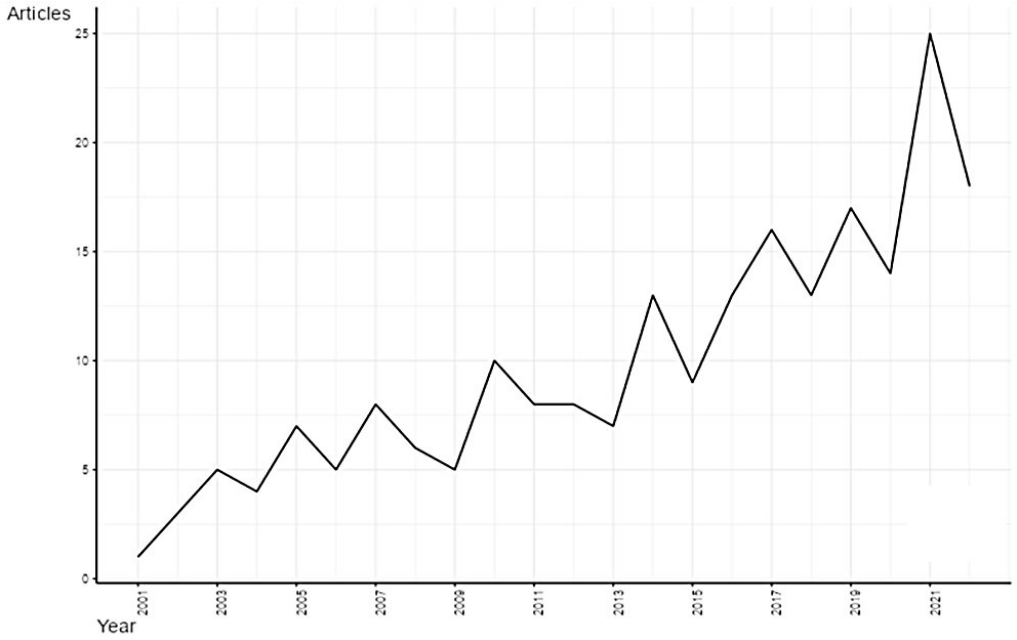


Figure 1: Annual Scientific Production

The 215 articles were published in a total of 122 journals, 3 of which have more than 10 articles on e-government and education. The Journal "Electronic Government" publishes the most articles on the field.

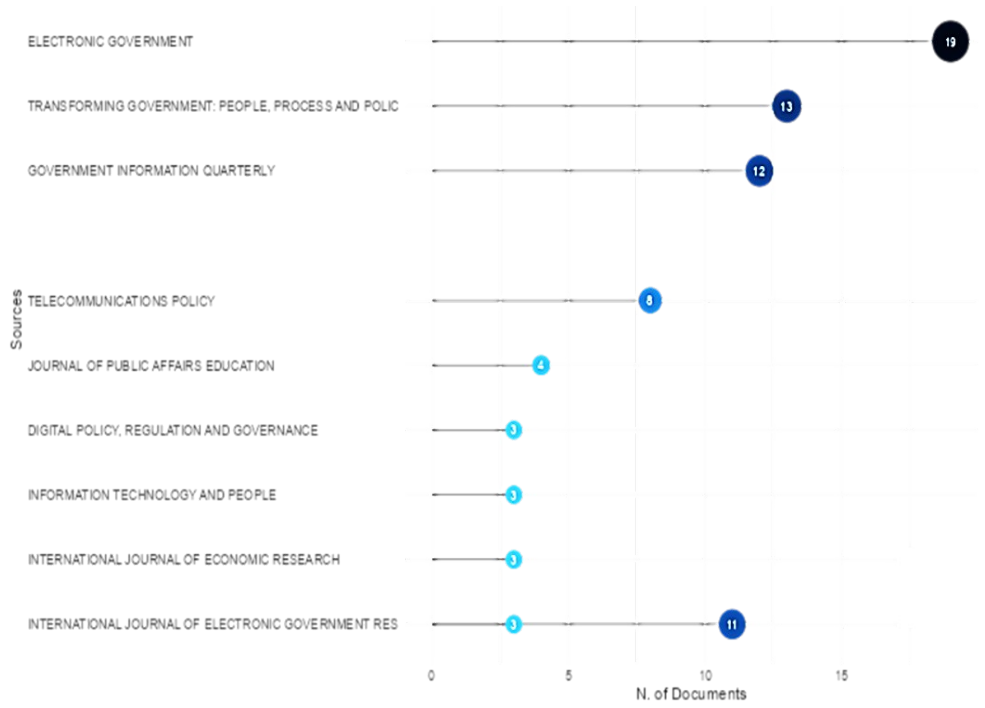


Figure 2: Most Relevant Sources

Figure 3 shows the 10 most important journals, ordered by H index. The H index is also used as a predictor for future research. Therefore, our results show that journals with the most citations are the "Government Information Quarterly" and "Electronic Government". The rates of the citations on the issue in the relevant journals are expected to remain high in the years ahead.

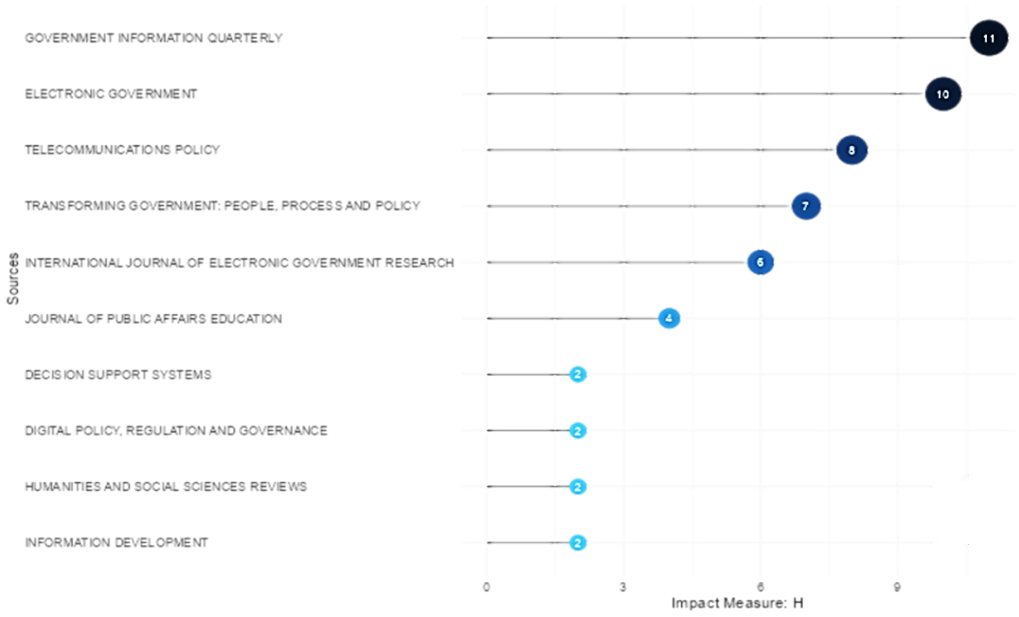


Figure 3: Sources' Local Impact by H index

The relevance of the authors to the reference topic is now being examined. First on the list is Isaac Kofi Mensah, a PHD author with the most articles on this subject and a total of 25 citations. He is an associate professor at Fujian Jiangxia University and is involved in research on e-government, e-commerce, e-voting and e-business issues in various countries such as China, Russia and Ghana.

In second, third and fourth place are the following Jaeger, Jannsen and Sanmukhiya with three articles each on the subject.

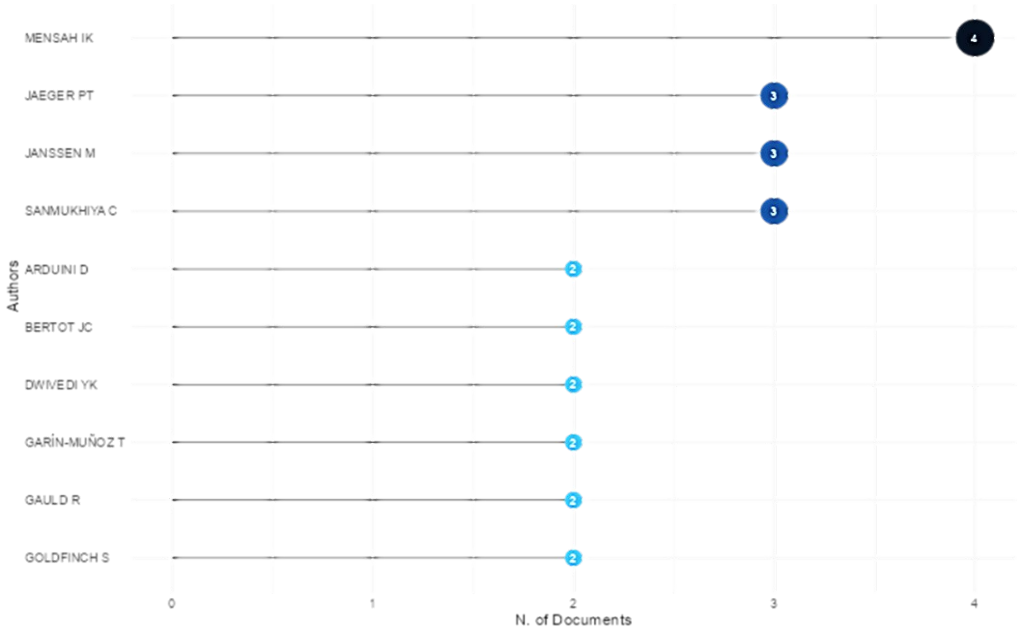


Figure 4: Most Relevant Authors

Figure 5 illustrates the main authors, i.e., the authors with the highest H-index (or Hirsch index) were we see that the top three remain the same also having the highest number of articles. Although in a different order, e.g., Jaeger PT, Janssen M, Mensah IK.

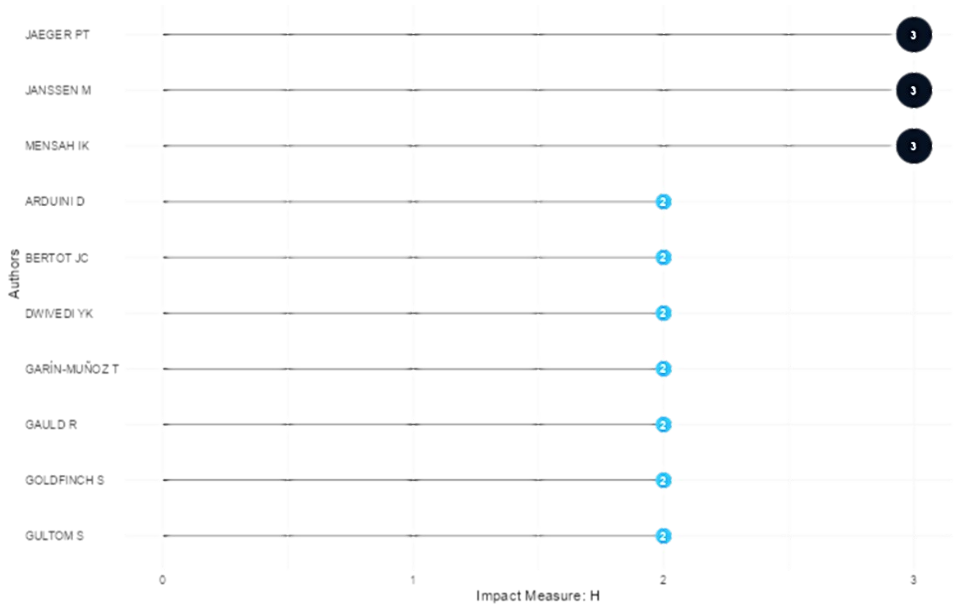
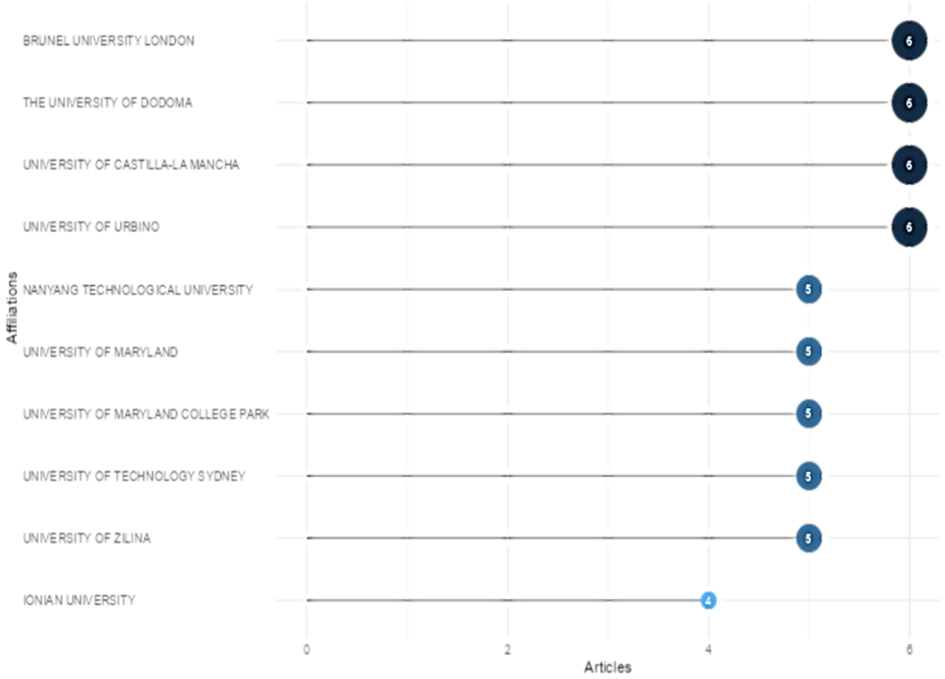


Figure 5: Authors Local Impact

While the USA and the UK and SPAIN are the most heavily annotated countries, we see that in the four top affiliations the University of Dodoma in Tanzania (not even appearing in the list of author's countries, and University of Urbino, Italy (14th place in list of author's country's) have an extensive set of articles closely competing University of London, UK and University of Castilla-la Mancha, Spain and leaving USA and other UK institutes with lower article numbers in the list, indicating that these two have dedicated scientist working on these subjects while the country's overall representation may not be as high (Figure 6).

Figure 6: Most Relevant Affiliations



Corresponding author's country list shows the country of the corresponding authors. The corresponding author is the author who sends the article to the journal editor and channels all correspondence with him. The countries with the largest authorial contribution to the subject's content are the United States and the United Kingdom, with Spain being the third most popular country. Greece is in 5th place in the ranking list.

The following figure's (Figure 7) horizontal bars are colored in blue for articles with writers from the same nation and red for publications with authors from several countries. The US and the UK are the countries with the most collaborations between authors. Within the top-3 countries we find in the 1st place USA, which has published a total of 28 papers, followed in 2nd position by the UK with 15 published papers and in 3rd position the Spain with 25 papers. The ones with the highest rates of international collaboration are the USA, UK, Spain, and Malaysia. However, Indonesia being the first country in volume of correspondence authors, strangely does not have many international collaborations; the same happens with Turkey, with a lot of scientific production and no intra-collaboration.

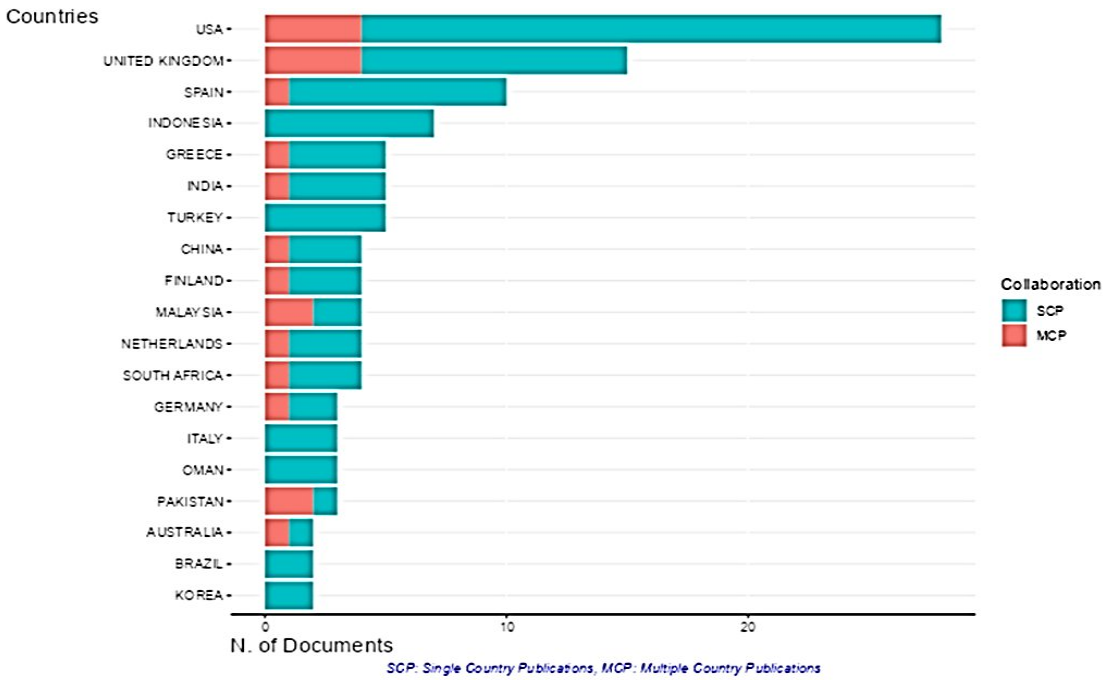


Figure 7: Corresponding Authors Countries

Our analysis also showed the articles with the most citations. First in citations is the article titled *"Recommender system application developments: A survey"* which focuses on recommender systems, which are tools that offer personalized online recommendations to users. These recommendations help users deal with the overwhelming amount of information on the internet. The authors emphasize the importance of conducting a comprehensive review of current trends, particularly practical developments in recommender systems. They cover the latest application developments, grouping them into eight categories, including e-government, e-business, and e-learning. They also discuss the recommendation techniques used in each category and systematically assess recommender systems based on four dimensions: recommendation methods, recommender system software, application domains, and platforms (Lu et al., 2015).

The second article with more than 250 citations, highlights the dynamic nature of innovation in e-government policies over time. It emphasizes the importance of institutional capacity, government reform efforts, and socio-economic factors like wealth and education in driving innovation in this policy area. It also suggests that modernizing state institutions may have broader implications for innovation beyond just e-government (Tolbert, Mossberger, & McNeal, 2008).

The next study, with 256 global citations, is the *Environment and Policy Factors Shaping Global E-Commerce Diffusion: A Cross-Country Comparison* (Gibbs, Kraemer, & Dedrick, 2003).

The following article is titled "E-Government: A global view and an empirical evaluation of some attributes of citizens" (Akman, Yazici, Mishra, & Arifoglu, 2005).

The fifth article delves into the level of demand and support for e-government services. It highlights a reluctance to use more advanced online government services, a digital divide linked to age and education, and the limited impact of income and gender on e-government attitudes (Gauld, Goldfinch, & Horsburgh, 2010).

So, it turns out that researchers are particularly interested in these directions. That is, recommender systems, innovation, and the use of e-government by citizens.

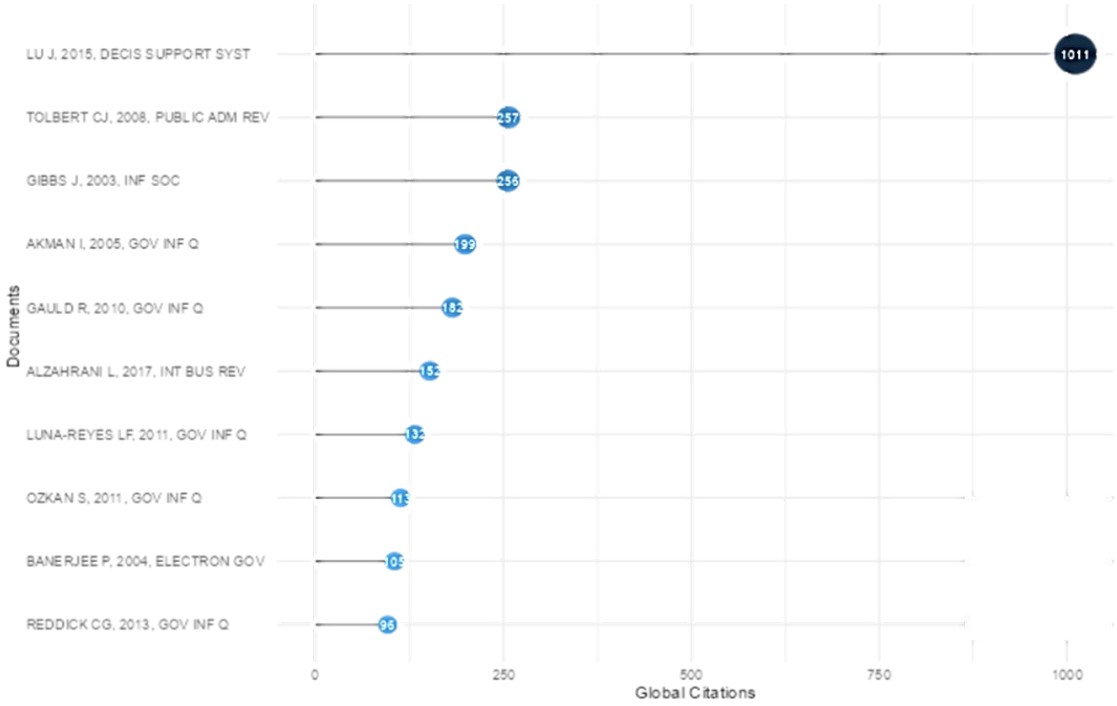


Figure 8: Most Global Cited Documents

A total of 496 keywords were analyzed. The 10 most frequent of them are shown in this Figure. There are over 110 occurrences of the keyword “e-government", while there are more than 20 occurrences of the word “digital divide” and 14 occurrences of the word “education”. Other important keywords are “adoption”, “electronic government”, “ict” and “trust” (Figure 9).

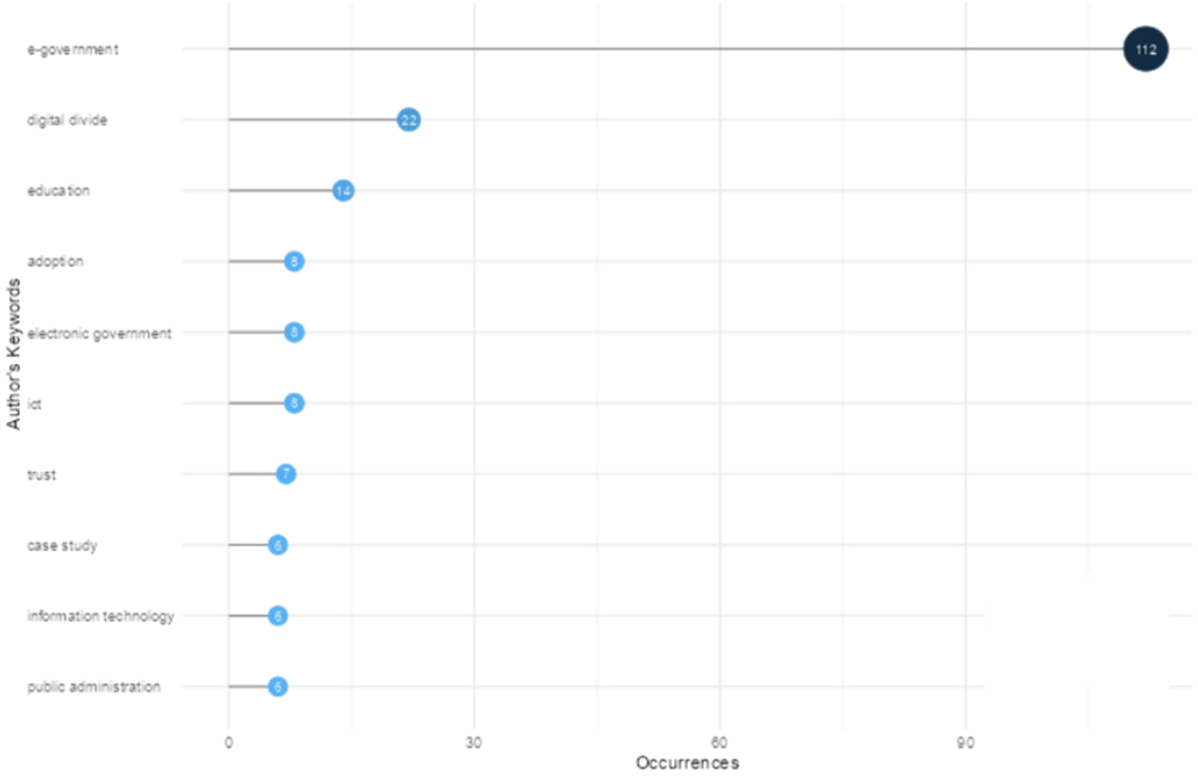


Figure 9: Most Relevant Words

With the visual representation capability provided by the software that was used, we can present our findings through a word cloud visualization. Keywords that appear in a larger font mean higher frequency. We point out words related to government that appear more pronounced, while we can

distinguish the frequency of words like technology, adoption, trust, corruption, education and higher education. We observe that the term e-government is used in different domains and in different contexts in the identified articles and is dominant in the world cloud created from the relevant word frequencies.

Figure 10: Word Cloud

Next, the terms with the highest search frequency were explored, which are as follows: "e-government" with 112 searches between 2011 and 2020, peaking in 2016; "digital divide" with 22 searches between 2011 and 2021, reaching its peak in 2018; "education" with 14 searches between 2010 and 2021, peaking in 2018; "electronic government" with 8 searches between 2009 and 2017, peaking in 2012; "adoption" with 8 searches between 2012 and 2018, peaking in 2016; "ICT" with 8 searches between 2014 and 2021, peaking in 2018; "trust" with 7 searches between 2016 and 2022, peaking in 2020; "public administration" with 6 searches between 2010 and 2018, peaking in 2013; "information technology" between 2011 and 2017, peaking in 2016; and "case study" between 2014 and 2019, peaking in 2017. So, initially, the focus was on the “internet”, “electronic government” and “public administration”, but in recent years, emphasis is placed on “corruption”, “technology acceptance model” and “technology adoption”. The trend topics are visualized in a diagram that illustrates the variation of these terms throughout the years (Figure 11).

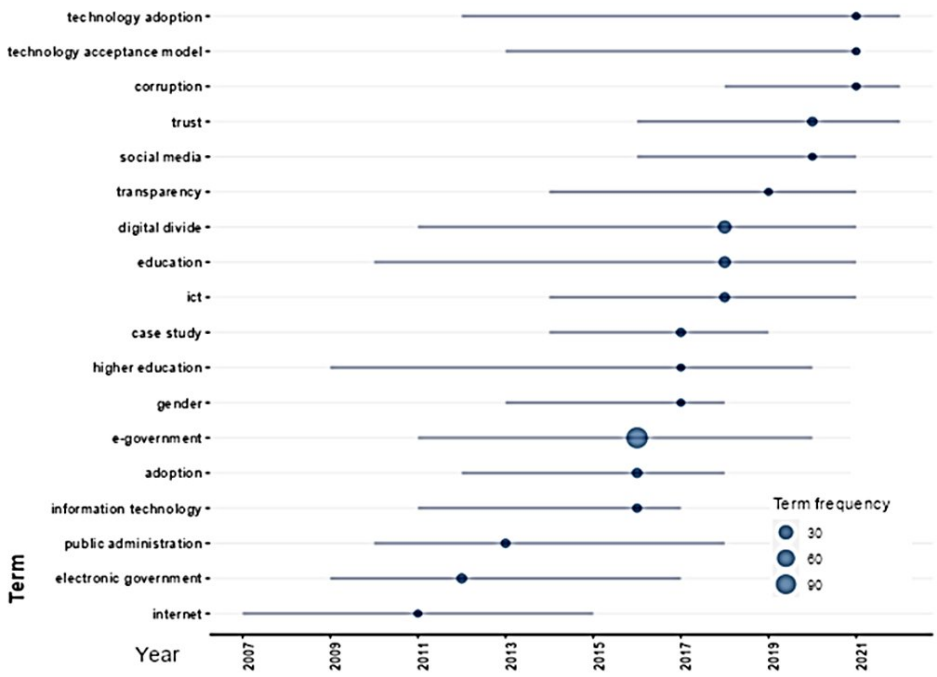


Figure 11: Trend Topics

Among the authors appearing in this diagram Garín-muñoz, López, Pérez-amaral and Valarezo have the highest collaboration rate. These authors come from Spain. Two distinguished groups of three authors that collaborate include researchers from UK, Canada and the Netherlands and US and Bahrain. All other collaborations took place between only two authors (Figure 12). Therefore, it is observed that

the level of collaboration between countries is quite low and could potentially be increased. Consequently, it would be beneficial to enhance collaboration among researchers in this field, as global collaborations can contribute to the development of research, broaden, and deepen the body of knowledge related to e-government and education on a global scale.

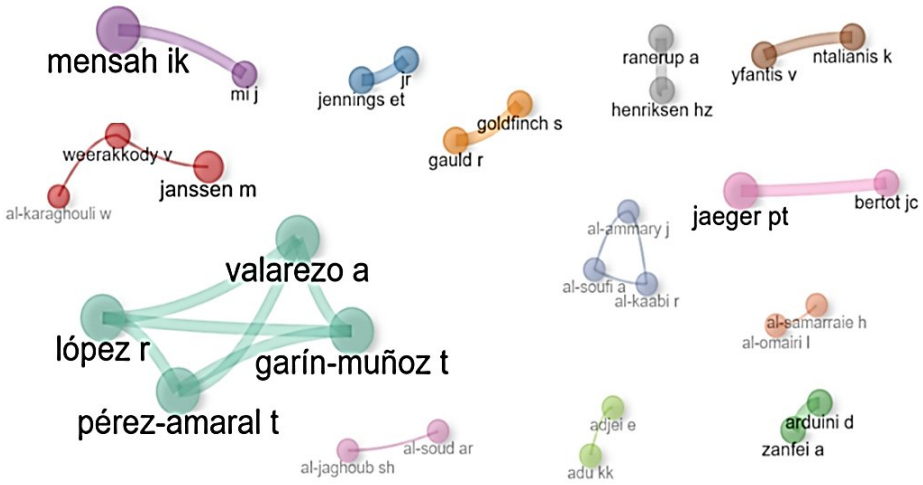


Figure 12: Author Collaboration Network

4 CONCLUSION

The analysis of bibliometric data, therefore, led to the extraction of conclusions regarding the scope of e-government in education, as well as the depiction of dominant research trends and their evolution over time.

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In conclusion, this specific analysis provides valuable information for researchers and specialists interested in studying e-government and education topics, enabling them to embark on new investigations in the field, starting with the examination of prevailing trends.

The limitations of our research concern the language, as only English-language research was studied. Also, the time frame was established starting from 2001. Our data source was only the Scopus database, and the key words selected were restricted. To address these limitations, we can supplement our study by future research that will be focused on the Web of Science, extending the examined period.

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