Epistemology of e-democracy and e-governance through scientific mapping

Epistemología de la e-democracia y la e-gobernanza a través del mapeo científico

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Abstract

This paper aims to address the current limitations in knowledge about e-democracy by establishing the conceptual, intellectual, and social structure of scientific literature. Hence, this paper offers an in-depth bibliometric analysis of the literature that has addressed this reality since its first publication in 1983. The most important scientific databases currently used in the academic field were consulted to achieve this objective: Web of Science (WoS) and Scopus. In the case of WoS, 540 articles were identified, 572 in the case of Scopus. The results were harmonised to obtain a final 773 articles under study. This harmonisation of results from different databases is a differential element concerning other studies in which the analysis was carried out on a single database, thus reducing a global and homogeneous vision of the possible connections and interrelationships of the realities analysed. The information collected has been processed using the Bibliometrix tool, which provides information on annual scientific production, authors, journals, topics, keywords, etc. The processing and analysis of the results has made it possible to identify research trends in the area, establish relationships between them and detect future research opportunities for the e-democracy phenomenon.

Keywords: : E-democracy; E-participation; E-governance; Participation of citizens; Public administrations.

Resumen

Este artículo aborda las limitaciones actuales en el conocimiento de la democracia electrónica estableciendo la estructura conceptual, intelectual y social de la literatura científica. Se realiza un análisis bibliométrico en profundidad desde la primera publicación en 1983. Se consultaron las bases científicas más importantes en la académica: Web of Science (WoS) y Scopus. En el caso de WoS, se identificaron 540 artículos, 572 en el caso de Scopus que cumplían los criterios de inclusión. Los resultados se armonizaron obteniendo un total de 773 artículos objeto de estudio. Esta armonización es un elemento diferencial respecto a otros estudios en los que el análisis se ha realizado sobre una única base de datos, reduciendo así una visión global y homogénea de las posibles conexiones e interrelaciones de las realidades analizadas. La información recogida se ha procesado utilizando la herramienta Bibliometrix, que proporciona información sobre producción científica anual, autores, revistas, temas, palabras clave, etc. El tratamiento y análisis de los resultados ha permitido identificar tendencias de investigación en el área, establecer relaciones entre ellas y detectar futuras oportunidades de investigación para el fenómeno de la e-democracia.

Palabras clave: E-democracia; E-participación; E-gobernanza; Participación de la ciudadanía; Administraciones públicas.

1. Introduction

As a consequence of the global expansion of digital media and its benefits for political communication and government processes (Kneuer, 2016; Roztocki et al., 2023), it is increasingly evident how Information and Communication Technologies (ICTs) influence and will continue to influence political institutions (at different levels) and their relationship with citizens (Lidén, 2015; Sendag et al., 2022) in turbulent environments (Antón-Maraña et al., 2023).

In recent years, the reality of electronic democracy (e-democracy) has been generating a growing interest, both from the public sector as well as from the citizenry and academia (Colina-Vargas & Espinoza-Mina, 2022; Hujran et al., 2020). This phenomenon represents a revolution in terms of how citizens can participate in the democratic activities of a public administration (Naccari-Carlizzi et al., 2023; Prastya et al., 2021), including electronic practices that enable interaction between the various actors involved: parliaments, governments, local authorities, and citizens (Hujran et al., 2020; Sundberg, 2019).

Despite the increasing development of options around e-democracy (Bindu et al., 2019; Voican, 2023), it is still a reality in continuous evolution. This is a consequence of its close relationship and connection with the development of ICTs (Sirma & Kihara, 2023). In this paper, using the Bibliometrix tool, a deep bibliometric and literature analysis of the related scientific literature addressing the reality of e-democracy is carried out (Buhmann et al., 2019).

To achieve this objective, the two leading scientific databases currently used, Web of Science (WoS) and Scopus, were consulted. This fact is a differential element concerning other bibliometric studies (Caputo & Kargina, 2022) since the analysis is based on the results of a single database, thus diminishing a global and homogeneous vision of the possible connections and interrelationships of the realities under study (Palos-Sánchez et al., 2022).

The analysis was conducted to address this study and to provide answers to the research questions posed in the study. The graphical material was obtained from the unified results of the two databases used for four different level metrics: sources, authors, documents, and clustering. In addition, the total number of selected papers in terms of their conceptual, intellectual, and social

structures has been analysed. According to Mukherjee et al. (2022), bibliometric research favours the generation of unique opportunities for the advancement of knowledge in an area in general and of theory and practice in particular; hence, in recent years, work of this type has experienced a significant boom. In this work, applying the bibliometric technique has made it possible to provide high-impact information thanks to studying the evolutionary nuances and establishing emerging trends in e-democracy.

Due to the relative novelty of this resource that aims to promote citizen participation, there have been many advances and implementations in recent years from different approaches, mainly in e-government and e-participation (Kneuer, 2016). On the other hand, in most cases, the final evaluation of many of these actions has only been carried out, as Ambrosino et al. (2023) highlight in their work on e-democracy in the case of young people, so academic research in this field is limited. Thus, this paper aims to address the current limitations in knowledge about e-democracy by establishing the conceptual, intellectual, and social structure of the scientific literature on e-democracy. It also addresses recent works which, among their recommendations, demonstrate the need to continue researching and deepening the reality of e-democracy. e.g. Ghazinoory et al. (2024) and Staykova (2023).

The results obtained will also have important theoretical and practical implications. First, they will serve the research community as a starting point for future research work related to e-democracy. Second, they will have important implications for the public administrations responsible for designing and implementing public and active policies in e-democracy so that they can have up-to-date access to relevant and valuable information.

After this introduction, the rest of the document is organised as follows. Section two presents the theoretical framework for the topic addressed. Section three presents the methodology followed to achieve the objectives of this work. Section four illustrates the results. Section five discusses the main findings and draws the results' main practical and theoretical implications, limitations, and future research. Finally, Section Six presents the most relevant conclusions of this work.

2. Literature review

Given the current reality of e-democracy, definitions of the phenomenon are diverse and, in some cases, biased. However, despite the recent nature of the phenomenon, it can be considered directly linked to and almost as an extension of the concept of e-government, which has been around for several decades (Roztocki et al., 2023). Proof of this is that in the literature, you can find several terms to refer to this reality, such as e-democracy, e-government, e-participation, cyberpolitics, etc. (Kneuer, 2016; Sendag et al., 2022).

In the case of e-government (Shareef et al., 2014; Voican, 2023), unlike e-democracy, this was characterised because although it provided citizens with different resources and e-services (Garcia-Rio et al., 2023), it kept the decision-making capacity in the hands of the government authority and did not involve the participation of the citizens.

The relevance of e-democracy lies in its potential for the design and implementation of procedures of a political and democratic nature that favour the inclusion and participation of citizens in decision-making processes in their different aspects, thanks to the use of ICTs (Gupta & Biswas, 2021; Sendag et al., 2022). In this way, the concept of participation acquires a capital value within e-democracy (Molnár & Urbanovics, 2020) since open debates, voting, etc., can form it and any other action aimed at promoting interaction between citizens and the competent and legitimate administrations (Prastya et al., 2021; Sirma & Kihara, 2023).

Citizens can make regular contributions to the policies and actions implemented by public administrations. Even local communities, traditionally marginalised in decision-making processes, can participate through different technological and digital channels in such a way that favours more legitimate decision-making by governments and more sustainable implementation (Voican, 2023). According to Chairunnisa et al. (2023) and Norris & Reddick (2013), e-democracy comprises six main elements: equal access by citizens to information, the possibility for citizens to contact public administrations, quality online access by citizens to governments, active participation of citizens in decision making, and finally the possibility and choice to vote.

The dissemination of verifiable information favours this active and reciprocal connection between public administrations and citizens, the coordination of response elements, so that e-democracy can help to create more involved and committed communities (Hossain, 2023).

In any case, although the connections of e-democracy are varied and sometimes intentional, the fundamental element of this reality lies in the participation of the people and other actors involved. E-democracy consists of articulating and creating the appropriate context from the institutions and public administrations to transition from representative democracy to participatory democracy (Sendag et al., 2022; Sirma & Kihara, 2023).

From the review of the literature related to the reality of e-democracy, the following research questions will be answered:

RQ1.1: Which countries lead in scientific production in this area?

RQ1.2: What are the most frequently used keywords?

RQ2: How have research trends in e-democracy evolved when addressing this reality in the scientific literature?

3. Methodology

Bibliometric analyses have become an essential part of modern assessment of academic productivity (Estevão et al., 2017). This methodology is increasingly used to evaluate research performance; it is also helpful for deciphering and mapping the accumulated scientific knowledge and nuances of the evolution of research areas that present large volumes of unstructured data rigorously (Donthu et al., 2021).

Although bibliometric methods are quantitative, they state qualitative characteristics, transforming something intangible (scientific quality) into a manageable entity (Wallin, 2005). Bibliometric studies can form the basis for advancing a field of research in a novel and meaningful way, providing a comprehensive overview (Donthu et al., 2021) and necessary for mapping the structure and development of scientific disciplines.

Through this technique, it is possible to represent the structure of a research area divided into elements, subsequently creating a visual graphical representation (Zupic & Čater, 2015). Visualising bibliometric networks has proven to be a valuable approach to analysing a wide variety of scientific information (citation between journals, authors, or co-occurrence of keywords) (Gökalp et al., 2020; Iden & Eikebrokk, 2013).

The data for this work were obtained from two central databases commonly used by researchers: Scopus and Web of Science (WoS) (Parris & Peachey, 2013). The databases were searched by first determining the terms and Boolean operators (Baena-Luna & García-Río, 2021). The specific search terms were "electronic democracy" or its abbreviation "e-democracy". Already in this initial search, the first exclusion criteria were introduced, including the filters document type "article" and language of publication "English". (Table 1).

**Table 1 - Search criteria used in WoS and Scopus**

WoS	Scopus
"e-democracy" (Topic) or electronic democracy (Topic) and Article (Document Types) and English (Languages)	(TITLE-ABS-KEY (e-democracy) OR TITLE-ABS-KEY ("electronic democracy")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English"))

Source: Author´s elaboration.

In the second stage, the results of the two databases were unified, and duplicates were eliminated (see Figure 1). The R Studio software was used for the unification and cleaning process (Guleria & Kaur, 2021). R Studio allows for the unitisation of the results obtained in the two databases and the detection of duplicate articles for their elimination from the final collection. For this purpose, it was necessary to use different R packages, downloading and running the R Studio libraries "tidyverse" and "tosr". The subsequent bibliometric analysis was performed using the Bibliometrix R package Aria & Cuccurullo (2017) developed with its Biblioshiny interface. It facilitates the analysis using specific bibliometric and scientometrics quantitative research tools and their graphical representation. In the third stage, the global information of the data set is presented together with an analysis of the total annual production to subsequently structure the analysis on three levels (sources, authors, and documents) and with three types of analysis relating to the conceptual structure (terms), intellectual structure (people) and social structure (social relations or scientific collaboration). The list of the ten most cited sources and their indicators h_index, g_index, and m_index and the evolution of their production over time are presented for analysis. The intellectual structure related to the sources is offered using a co-citation map. For the authors' study, the ten authors with the highest scientific production, their evolution over time and the collaboration network with the relations referring to the co-signing of publications between authors and countries are related. The most cited documents are considered relevant, and then a cluster map is presented graphically as a technique that explores the groups occurring naturally within a dataset.

Figure 1 - Data collection and flow diagram
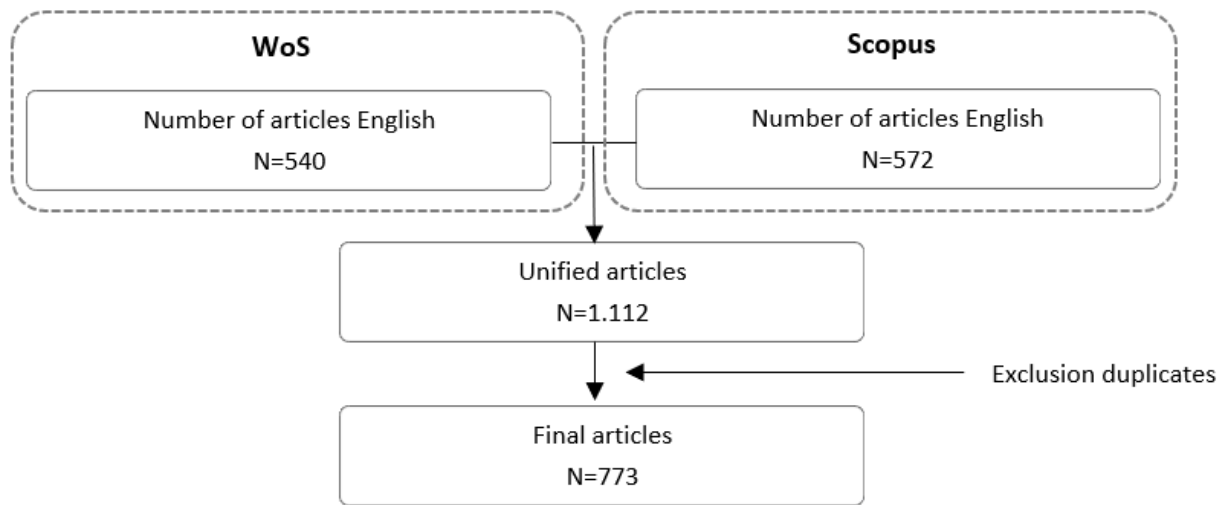
Source: own elaboration.

4. Results

After collecting and unifying the data derived from the consultation of the WoS and Scopus databases, they were processed. Table 2 summarises the primary information of these documents after unifying the databases, harmonising them, applying the inclusion and exclusion criteria, eliminating duplicates, and cleaning the dataset. Table 2 presents the main information from the two databases concerning the 773 publications detected between 1983 and 2023. The study period covers 40 years of scientific production. These articles appeared in 400 publications. The documents have an average age of 11 years, and the average number of citations per document is 22.03. Keywords plus is the total number of keywords that appear frequently in the article's title, 1,058, and the author keywords amount to 1,765. The total number of authors is 1,322, with 256 authors publishing under single authorship. Of the total number of articles, 309 had a single author. Each article is written by two authors on average (2.09). The percentage of international co-authorship of the papers is 3.75% of the total number of articles.

Table 2 - Main Information about Data

Description	Results
Timespan	1983:2023
Sources (Journals, Books, etc)	400
Documents	773
Document Average Age	11
Average citations per doc	22.03
References	8035
Keywords Plus (ID)	1058
Author's Keywords (DE)	1765
Authors	1322
Authors of single-authored docs	256
Single-authored docs	309
Co-Authors per Doc	2.09
International co-authorships %	3.752

Source: Author´s elaboration.

4.1 Scientific production

Concerning scientific production, the first document dealing with the reality of e-democracy dates to 1983. This year, A. Lloyd examines and makes the first approach to e-democracy in the European case, being a pioneering document in its field. However, it was not until

1990 that an article referring to the research topic of political culture in Western countries was published again. It is from this year when a discrete growth trend begins until 2003, in which a significant increase is presented, which starts at its peak in 2012 with a total of 54 articles (see Figure 2). As for the current situation of research and papers published on e-democracy, up to September 2023, there have been 28 papers in 2023.

Figure 2 - Data collection and flow diagram

$y = 1.0611x - 4.4088$
$R^2 = 0.545$
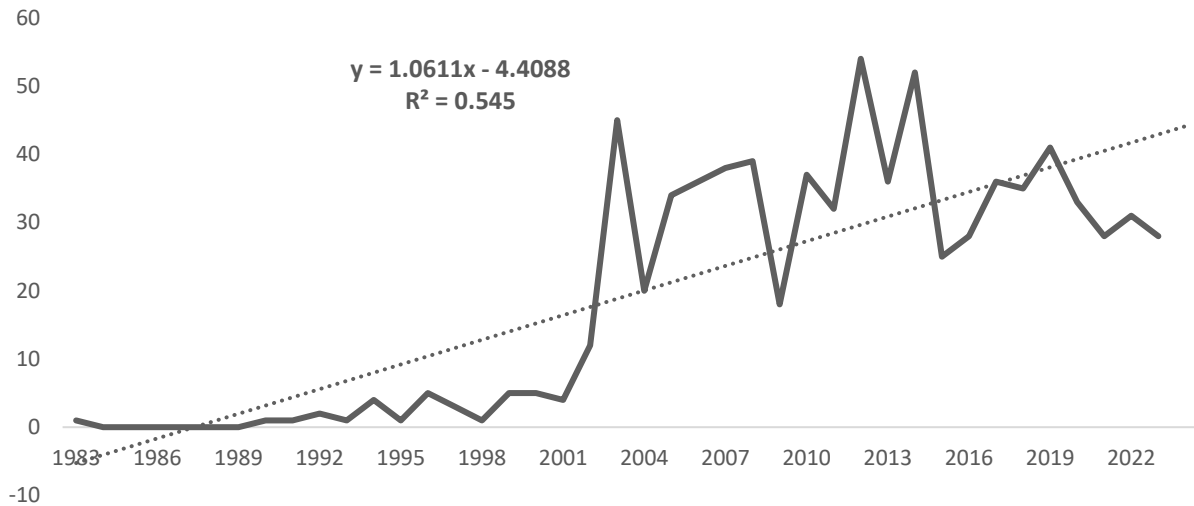
Source: Author´s elaboration.

4.2 Sources

About sources, the results of the ten most productive journals on the subject under study are shown in Table 3, together with other bibliometric indicators of production and impact. The total number of sources is 400. Information Communication and Society has the most significant number of publications, with 26 articles published in the study area. In second place is the International Journal of Electronic Governance, which has 23 publications. But if we look at the h_index, g_index, and m_index indicators, Government Information Quarterly is in first place with a m_index of 1,154, 18 publications, and 1019 citations.

Table 3 - Sources

| Source	h_index	g_index	m_index	TC	NP	PY_start
Information Communication and Society	15	26	0.833	1370	26	2006
International Journal of Electronic Governance	8	15	0.471	238	23	2007
Journal Of E-democracy and Open Government	7	12	0.467	177	22	2009
Government Information Quarterly	15	18	1.154	1019	18	2011
Information Polity	13	17	0.619	557	17	2003
Journal of Information Technology and Politics	12	16	0.750	537	16	2008
Journal of Multi-Criteria Decision Analysis	9	13	0.429	230	13	2003
International Journal of Electronic Government Research	7	12	0.368	336	12	2005
Electronic Government	7	10	0.350	192	10	2004
Social Science Computer Review	8	9	0.333	389	9	2000

Notes: h_index: number of articles with some citations greater than or equal to h; g_index: the (unique) most significant number such that the top g articles received (together) at least g2 citations; m_index: Shows the h-index per year since first publication; TC: Times Cited; NP: Number Publications; PY_start: Year start

Source: Author´s elaboration.

According to the dynamics of the sources, which indicates the evolution of the sources according to their publications, the leading journals are shown in Figure 3. Although all sources show a real growth trend over the years, the highest growth is again concentrated in Information Communication and Society. It is noteworthy how Information Polity, which was in the lead in the accumulated number of publications in recent years for an extended period, has finally fallen to fifth place.

Figure 3 - Sources' Production over Time
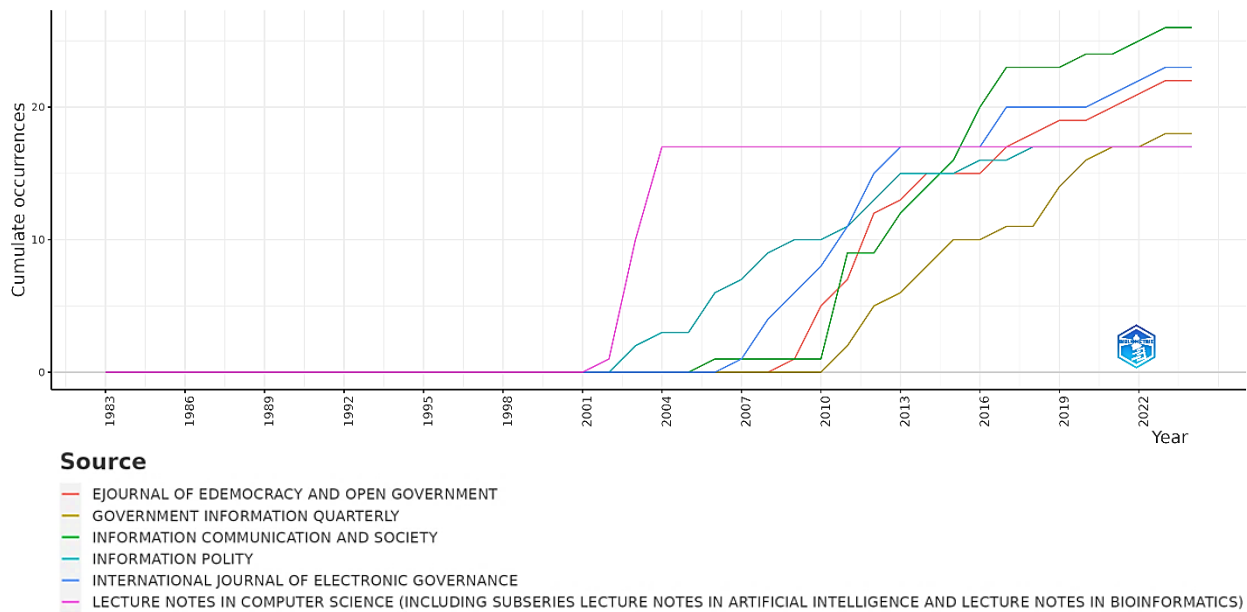
Source: Author´s elaboration.

Concerning the source co-citation network (see Figure 4), two groups were obtained, with the journals with the most negligible relationship with the other being located at the extremes of each cluster and the size of the nodes indicating the level of interaction (Rodríguez-Soler et al., 2020). It should be noted that the Government Information Quarterly is located centred in the red cluster but close to the blue cluster. As we can see, this journal has many citations and publications. Its position would indicate a relationship with journals focused on different topics, but mainly with the journals characterised in the red cluster. Similarly, New Media & Society, which belongs to the blue cluster, also shows essential interactions with the red cluster. It should also be noted that the most productive journals belong to the red cluster. According to information from the journal co-citation network study, the red cluster comprises related journals that generally address the topic of government and the public sector in a way linked to the use of ICTs.

Figure 4 - Co-citation Network
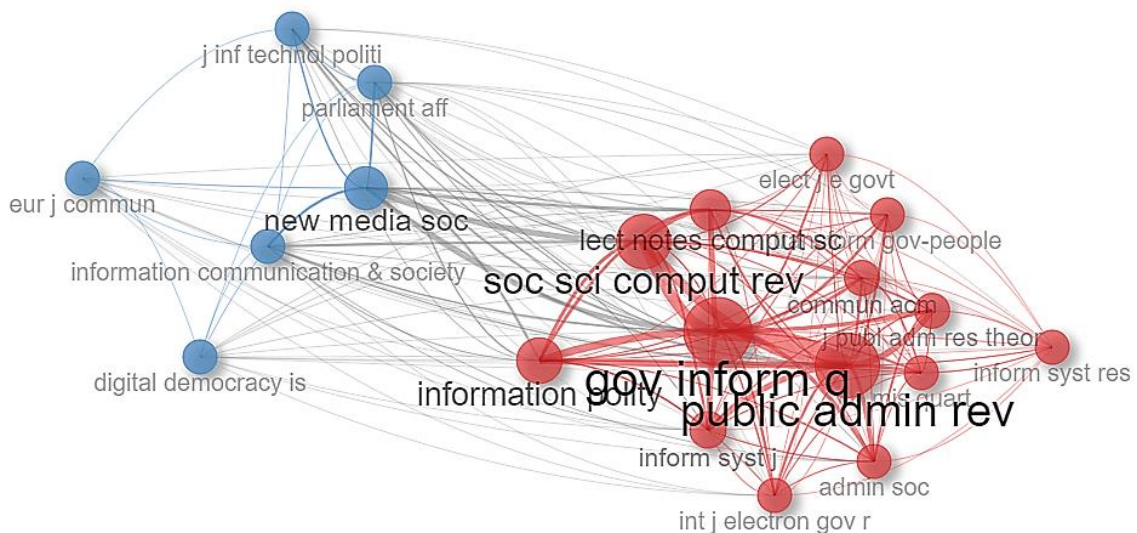
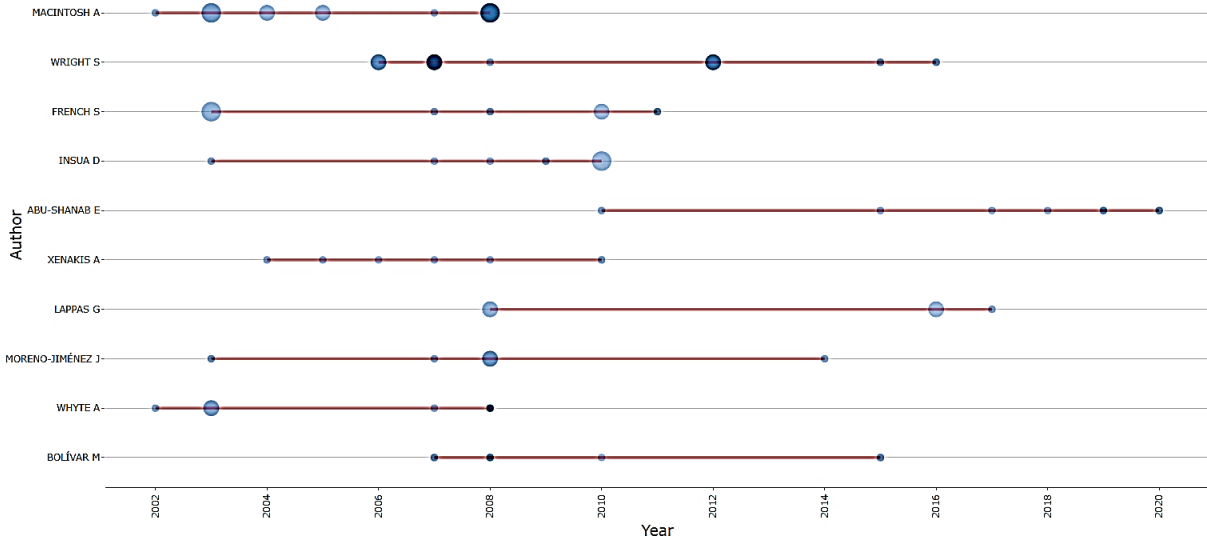**Source:** Author´s elaboration.

4.3 Authors

The study of the authors who have addressed the reality of e-democracy in their works yields a series of relevant data. This has been analysed over the years; the most pertinent period concerning the total number of annual publications is between 2002 and 2020 when authors who published different works related to the subject under study were observed. Concerning the analysis at

the author level, the most relevant authors, their production over time, the authors' collaboration network, and the intellectual structure of the co-citation network are shown.

Although the first paper dates from 1983, it was not until 2002 that the most productive authors began to publish their work. Figure 5 shows the ten authors with the highest productivity of 1,322 detected and their production over time.

Figure 5 - Authors' Production over Time

Source: Author´s elaboration.

The author with the highest productivity is Macintosh A., who has 12 articles. His first publication dates back to 2002, when he published papers in the same study area almost annually until 2008, when he published three articles with the highest relevance. Wright S. follows him with nine articles published from 2006 to 2016, and French S. has eight papers published from 2003 to 2011. Of the authors with the highest production and publishing in recent years are Abu-Shanab E., with six papers published until 2020, and Lappas G., with five papers published until 2017. Regarding trajectories, the longest time is those of Wright S., Abu-Shanab E., and Moreno-Jiménez J., although with different periods of inactivity. The collaboration network between authors is represented in Figure 6, where multiple closed collaboration groups of between 2 and three authors are identified.

Figure 6 - Collaboration Network
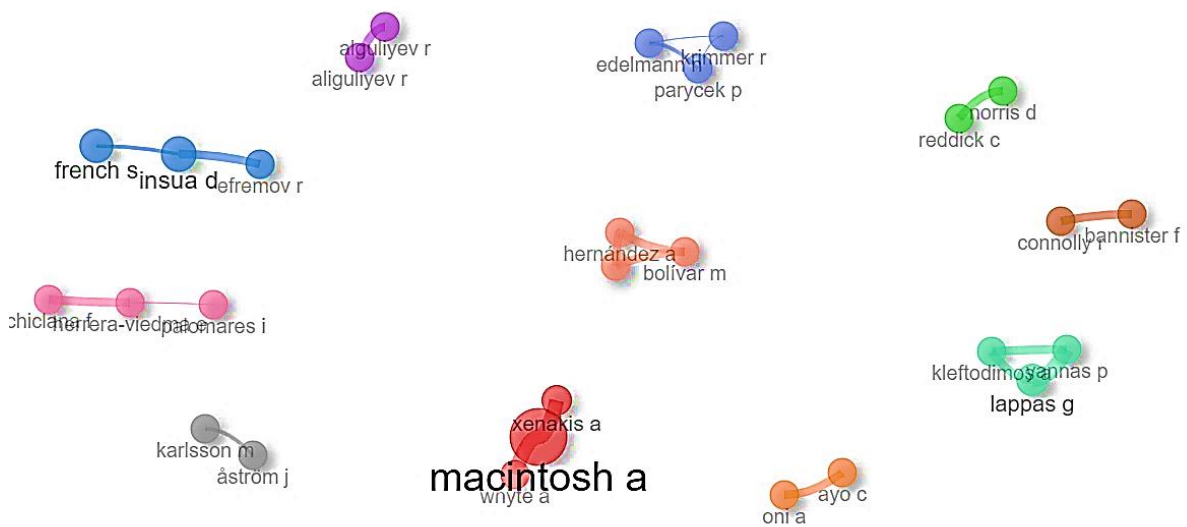
Source: Author´s elaboration.

For the analysis of the most productive countries through the national affiliation of the authors, the social networks of collaboration between countries are represented, together with productivity and citation. In the representation of collaboration between authors from

different countries (Figure 7), the nodes corresponding to each country are presented, and the links indicate the presence and frequency of collaborations. In a central position, the USA collaborates with several countries, such as the United Kingdom, China, Spain, and Italy, but without a high frequency, forming the green cluster. However, they also present a lesser intensity of collaboration with other countries in other clusters. Of the total number of publications from the USA, around 4% are multinational publications (MCP), where MCP indicates that at least one of the co-authors is from a different country. In the red cluster, the United Kingdom collaborates with four countries, highly collaborating with countries such as Spain and Greece. In the case of the United Kingdom, 3% of its total publications correspond to multinational publications (MCP), with Norway presenting the highest percentage with 22%.

Figure 7 - Countries' Collaboration
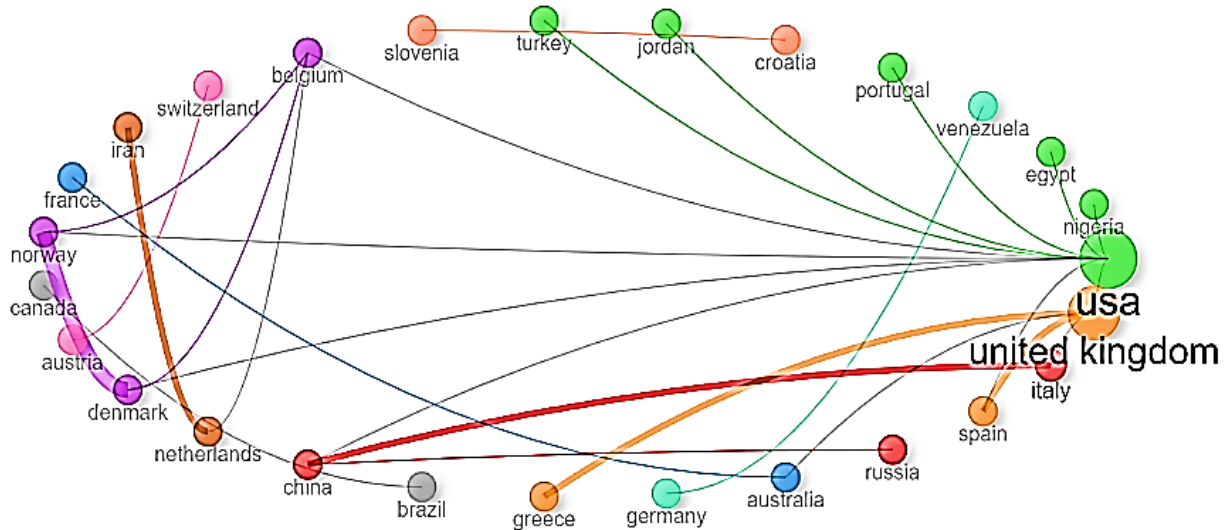
Source: Author´s elaboration.

Regarding productivity by country, the USA is in the lead with 125 articles, followed by the United Kingdom with 101, Ukraine with 51, and Italy with 49. The country with the highest number of citations is the United Kingdom, with 2864, followed by the USA, with 2833. The third and fourth places do not coincide with those with the most increased production, China and Sweden, with 735 and 673 citations corresponding to 21 and 20 articles, which indicates a high citation ratio.

4.4 Documents

Analysing the citation levels per document, Bingham et al.'s (2005) research stands out with 518 cites. In this work, its authors evaluate the existing legal infrastructure that allows public administrators to use new governance processes, analysing them in international, federal, state, and local public institutions. The second paper with the second highest citation level is Palomares et al. (2014), with 398 citations, which presents a consensus model for managing large scales of decision-makers with a fuzzy clustering-based scheme to detect and manage individual and subgroup non-cooperative behaviours. In addition, they develop a visual analysis tool of the overall consensus-building process based on self-organising maps, which facilitates tracking process performance over time.

Differences are observed if the results of global citations are compared with those of local citations. The paper of Bingham et al. (2005) goes to the tenth position, and Palomares et al. (2014) disappear from the first position, indicating that their research goes beyond e-democracy, perhaps having a strong relationship with other concepts. In the first position in local citation is the work of Chadwick (2003), with 17 citations, where he states that contemporary digital ICTs facilitate new forms of public sector policymaking based on e-government that glorify some of the essential norms and practices of e-democracy converging in four main areas: online consultations integrating civil society groups with bureaucracies and legislatures, the internal democratisation of the public sector itself, user participation in the design and delivery of public services, and the spread of open source collaboration in public organisations. This is followed by the article of Kampen & Snijkers (2003), with nine citations, which examines the possibilities of information and communication technology and e-government for improving democracy, summarising the problems of representative democracy and direct democracy, and analysing the solutions offered by e-government. The cluster analysis (see Figure 8) presents three main clusters. The core papers of these groups represent their influence on the body of research. Specifically, Chadwick (2003) has already been mentioned as dealing with the democratisation of democracy and e-government, Mahrer (2005) develops the term "middleman paradox" as a new dimension to existing theories on the evolution of e-democracy, and the paper by Benjamin (1984) which develops his theory of "strong Democracy." This paper also shows meaningful co-citation relationships with the documents in the green group and, to a lesser extent, with those in the red group, which does establish relationships with the green one.

Figure 8 - Cluster analysis
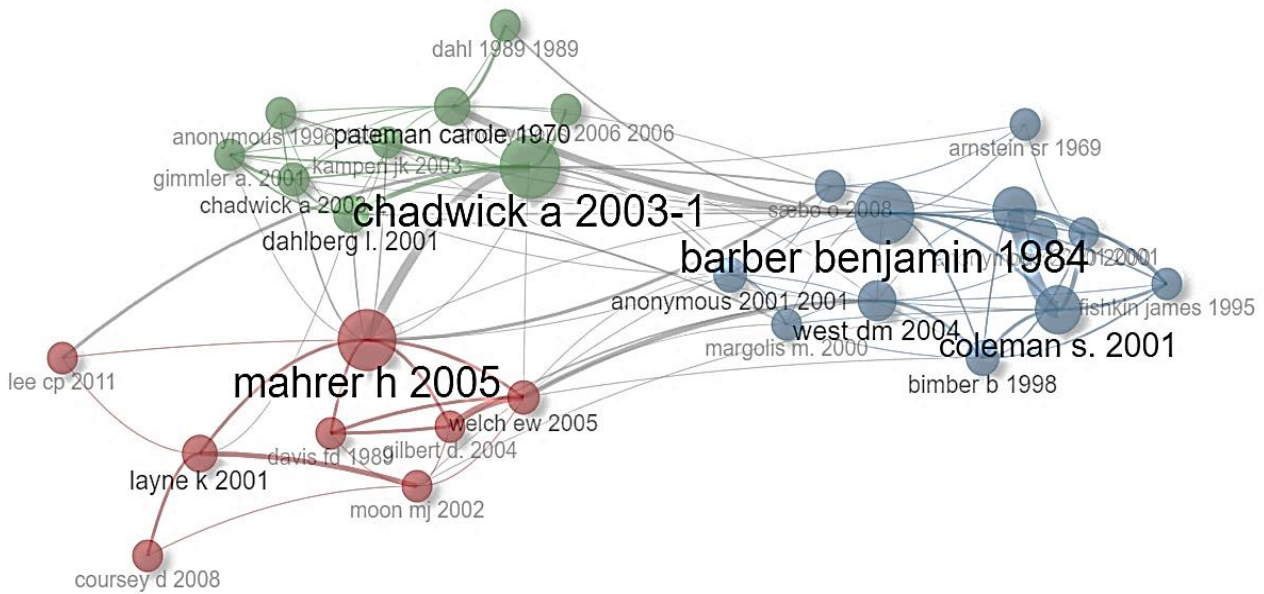
Source: Author´s elaboration.

The keywords have been considered for the analysis. The keyword most repeated by the authors was e-democracy (see Figure 9), followed by e-government and e-participation, all related to the use of ICTs in the current reality of governmental policies.

Figure 9 - Word Cloud

Source: Author´s elaboration.

The cumulative frequency is plotted to understand the evolution of keywords over time (see Figure 10). Figure 10 shows the take-off of e-democracy since 2002, growing much faster than the rest of the author keywords. This fact shows the importance that the term e-democracy has acquired, how its use has spread and consolidated, and how it has captured the interest of academics. Furthermore, it is possible to affirm the authors' preference for using the abbreviation *e-democracy* over the extended term *electronic democracy*. The map of thematic evolution (see Figure 11) has been divided into three sub-periods due to the broad timeline taken as a reference. This analysis aims to show how the terms used in this area of research have evolved. The first period is born from the birth of the term until the year 2000, in which the research has yet to be extended, and the term e-democracy has yet to be taken, which appears in the following period together with the use of words such as *e-participation*. The most general topics related to the Internet and information technology were developed in the first period. In the second period, we can see how the themes developed to become more specific about electronic democracy and citizen participation. It is also interesting to note the beginning of the use of words such as *e-voting* and *e-petition* in the third period of the study. It is interesting how the term *electronic democracy* gradually gave way to its abbreviation and how, in the last period, relationships appeared with terms such as *privacy* and *society*.
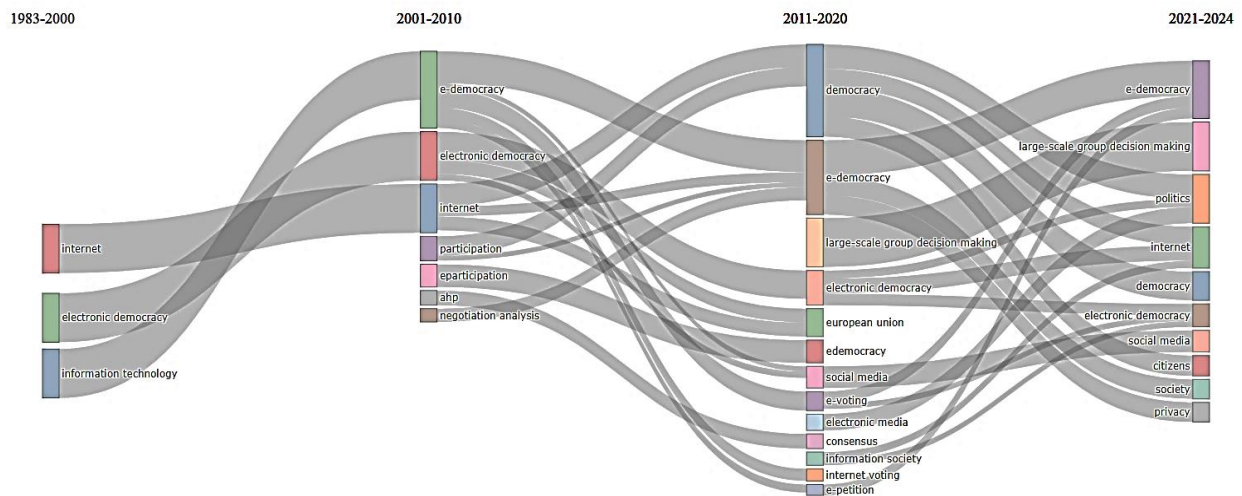
Figure 10 - Keyword evolution
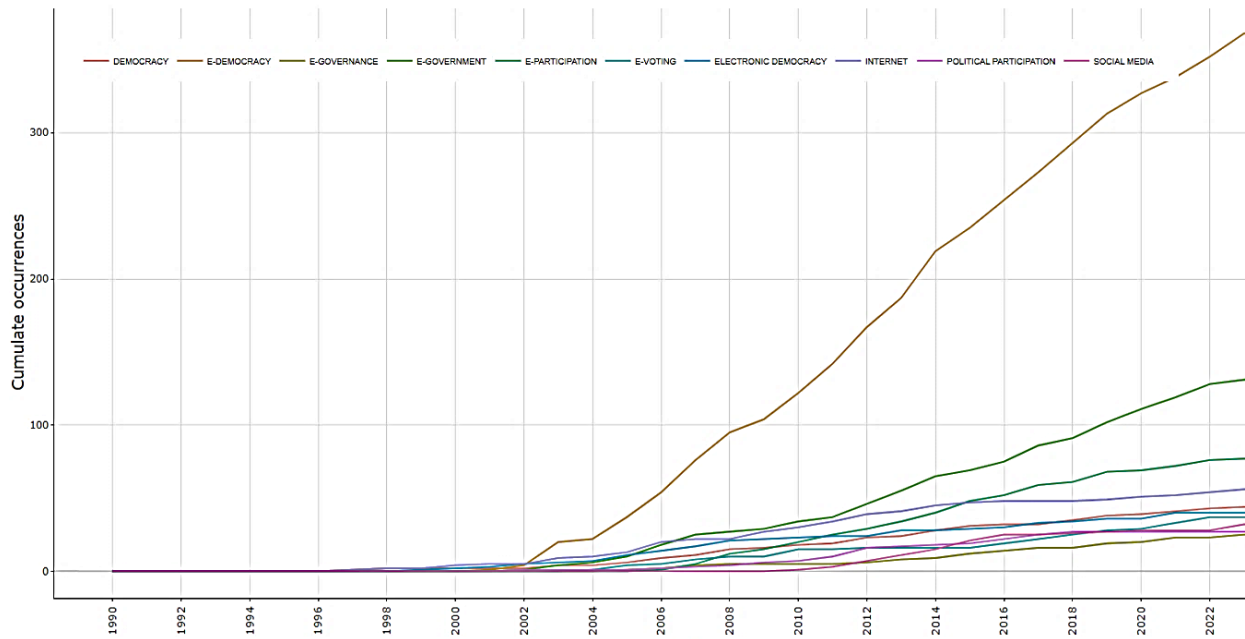
Source: Author´s elaboration.

**Figure 11 - Map of thematic evolution**

Source: Author´s elaboration.

A thematic map or strategic diagram has been used to structure the status of the topics corresponding to the keywords, in which four zones or quadrants can be distinguished (see Figure 12). These zones can be defined as driving themes, developed and isolated themes, essential and cross-cutting themes, and themes related to external concepts, depending on the quadrant in which they are located. The themes in the upper right quadrant, which had a high centrality and density, are likely to be carried out regularly and over a long period by a well-defined group of researchers. Clusters in the upper left quadrant may signal the emergence within a network of a research question that could become a driving theme in the future or a point of transfer between different but connected networks. Clusters in the lower right quadrant are those whose development occurred long ago and were driving topics but have since been 10arginalized (Rodríguez-Soler et al., 2020). In the lower left quadrant are emerging or declining themes.

Figure 12 - Thematic Map
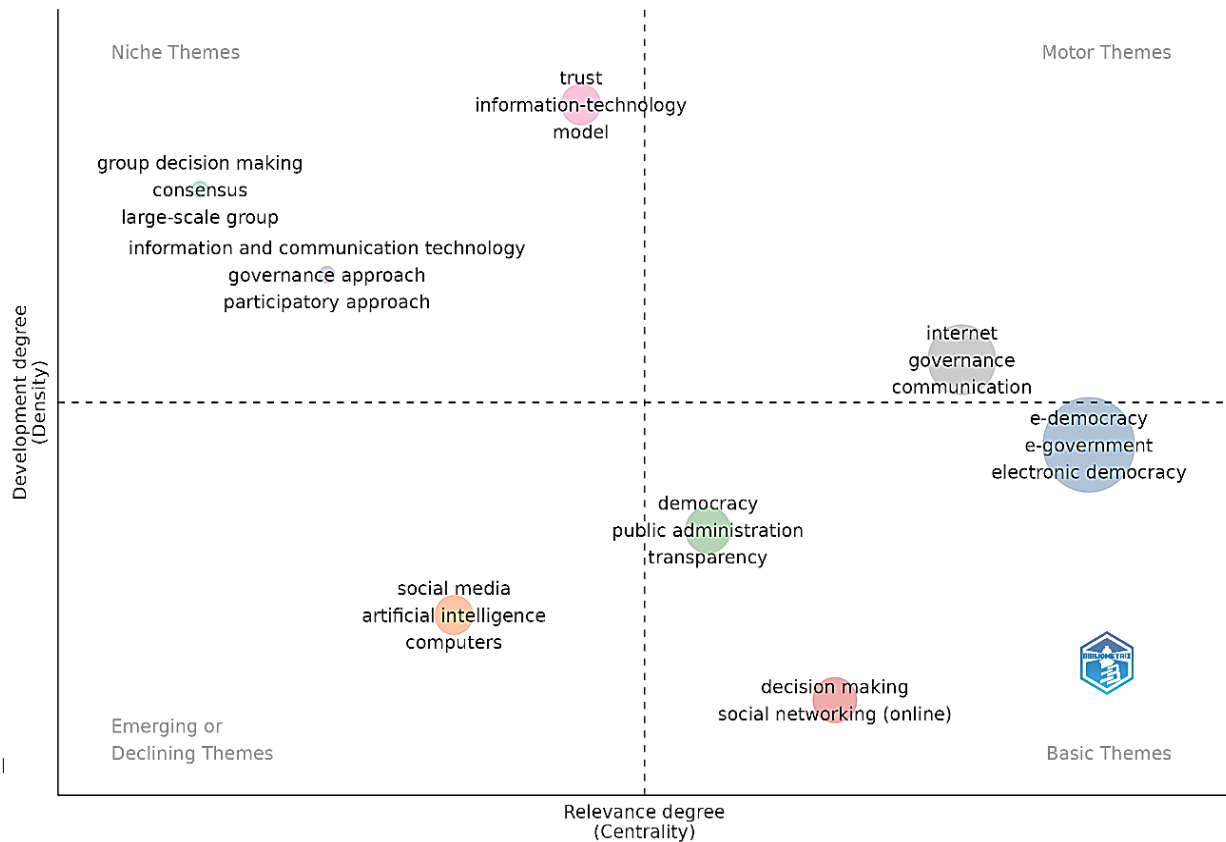
Source: Author´s elaboration.

The size of a group is proportional to the words it contains, and the tag group corresponds to the most used word in the group. In motor topics, only one group is included, which is made up of the following terms: governance, internet, and communication. The essential issues comprise three groups, with the largest group comprising *e-democracy*, *e-government*, and *electronic democracy*. The niche topics contain terms related to ICTs and participation, decision-making and consensus processes. Emerging or declining topics include *social media*, *computers,* and *artificial intelligence*.

5. Discussion

From the review of the entire scientific literature (Peláez-Verdet & Ferrera-Blasco, 2017) dealing with the phenomenon of e-democracy and after the treatment and analysis of the results obtained, we can answer the research questions proposed in this work:

RQ1.1: Which countries lead in scientific production in this area? RQ1.2: What are the most frequently used keywords?

Published articles related to the study of e-democracy since its birth in 1983 follow a growth trend that shows an apogee since the beginning of the millennium. Publications related to e-democracy are becoming a trend in the authorship of scientific articles. The changes and developments that continue to occur in adopting e-democracy have become something interesting to study in the development of science (Chairunnisa et al., 2023). In recent years, there has been a consolidation with continued growth in publication levels. Research on the topic of e-democracy in the last ten years has been very dynamic and developing (Prastya et al., 2021). This development in the scientific literature has led to the emergence of some small research networks at the author, source, and country levels. In response to the first research question, it has been observed that collaboration between authors and multiple closed collaboration groups of between two and three authors have been identified. Colina-Vargas & Espinoza-Mina (2022) indicate that multi-author cooperation is rare in e-democracy.

Macintosh A. is the most prolific author on the reality of e-democracy, with 12 articles dealing with this topic. This author also forms his collaborative group's backbone, so he is the most important of the identified collaborative groups. The research network between countries shows a varied number of interactions. The country with the most international relations is the USA, which

collaborates with different countries and has moderate international collaboration, far surpassed by Norway, with a substantially lower production level but a higher percentage of MCP.

As for the keyword most repeated by the authors in their work, the word *e-democracy* stands out, followed by *e-government* and *e-participation*, all of them words related to the use of ICTs in the current reality of the design and implementation of government policies that favour interaction with citizens. These results are in line with the findings of Prastya et al. (2021). The first position is occupied by the term "e-democracy" with a high frequency of appearance in the articles analysed (Chairunnisa et al., 2023; Colina-Vargas & Espinoza-Mina, 2022; Prastya et al., 2021).

RQ2: How have research trends in e-democracy evolved when addressing this reality in the scientific literature?

The trajectory of e-democracy research trends, divided into three temporal phases, indicates the milestones of the evolution of the research topic as a roadmap. The general terms *internet*, *electronic democracy*, and *information technology* are used as the basis or beginning of this field of research. Thus, in 2000, the term *e-democracy* was born, displacing the term *electronic democracy*, which had been commonly used until then and is accompanied by words such as *e-participation.* As time passed, the topics developed became more specific regarding electronic democracy and citizen participation*, e-voting*, *e-petition*, and *social media*. The issues marked at the end of the roadmap show future research trends (Bindu et al., 2019) coinciding with e-democracy, e-participation or social media.

6. Conclusions

This work has conducted a thorough bibliometric analysis of the scientific literature dealing with e-democracy. The most relevant conclusions derived from the results obtained and their analyses are:

Firstly, it has been found that the reality of e-democracy, despite its topicality, is directly linked to realities and concepts, such as the e-government case, which has already had some decades of attention from the research community. Secondly, the literature analysed has shown the capital value of participation in e-democracy. Thanks to this participation, citizens can make regular contributions to the policies and actions implemented by public administrations. A third noteworthy conclusion is the imperative need for governments to distribute accurate and verifiable information to citizens to encourage their interest and active participation.

No less important are also the conclusions of a bibliometric nature that can be drawn from the results obtained and their treatment and analysis. Although it was in 1983 when a paper first appeared that spoke of the reality of e-democracy, it was not until 2003 that we found a real boom around this reality in academia. As for the source with the most significant number of works published on the related topic, the journal Information Communication and Society stands out. Similarly, the most prolific author in terms of research work related to e-democracy is Macintosh A. The USA and the UK are the most prolific countries in terms of academic work and research collaboration networks. Finally, emerging or declining topics include social media, computers, and artificial intelligence.

6.1. Theoretical Implications

From the results obtained and the application of the methodology of bibliometric analysis and systematic review of the literature, it has been possible to confirm the increasing attention of the academy to the reality of e-democracy, which is increasingly linked to new topics related to e-governance. The work results show how this boom in related research addresses different areas and issues, so this work can be its first starting point. This will help future researchers as a reference point to expand and develop the content of this study.

6.2 Practical Implications

The potential practical implications of the results derived from this work are also important, mainly for the people and public administrations responsible for designing and implementing actions for citizens within the framework of e-democracy. The results provide some ideas that may be of great use to those responsible and experts related to the area to understand the main behaviours and trends in the solutions associated with e-democracy globally.

6.3 Limitations and Research Agenda

This work, like all research work, also needs some limitations. Among these, the main limitation is that the information is widely dispersed and connected with different and diverse realities, which may have hindered obtaining a clear and connected general vision of the issues.

E-democracy is an interdisciplinary and relatively emerging field of research, and this reality means that differences can be detected in its treatment depending on the field of study to which the researchers belong. This diversity of areas offers an eclectic use of research methods and theories that open a wide range of possibilities for future research, as presented in Table 4.

Table 4 - Future research agenda

Future line research	Research questions	Supporting source
Regulatory Agenda	How can the objectives and goals of e-participation initiatives be better understood?	(Muhammad, 2023) (Al Khawatreh et al., 2023)
Descriptive agenda	Is there adequate knowledge of the different subjects or stakeholders involved (knowledge of citizens, the roles of other stakeholders, the role of e-participation in the political decision-making process)?	(Storozhenko et al., 2023) (Muhammad, 2023)
Evaluative agenda	Are the qualitative and quantitative evaluations and indicators for interpreting the results being carried out correctly? What factors affect the quality of the process?	(Muhammad, 2023)
Technological agenda	How can innovative e-participation tools be developed?	(Al Khawatreh et al., 2023) (Zhu & Xu, 2024)

Source: Author´s elaboration.

Credit author statement

All authors contributed equally. All authors read and agreed to the published version of the manuscript. You can also mention each author's exact participation in the research.

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