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BROADCASTING IN THE DIGITAL AGE : A BIBLIOMETRIC REVIEW OF ONLINE RADIO

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Abstract

The rise of online radio in the last twenty years has revolutionized the broadcasting industry, integrating conventional audio media with digital advancements. As audiences increasingly utilize streaming platforms and mobile devices for radio consumption, the function of online radio has markedly grown, providing global accessibility and transforming listener experiences. This bibliometric evaluation aims to deliver a thorough overview of internet radio research from 2000 to 2023, utilizing Scopus and WOS as the data source. The research utilizes ScientoPy and VOSviewer to monitor academic advancements, identify significant publications, and illustrate research patterns. This bibliometric analysis aims to examine the evolution of internet radio research, identify main topics, and delineate cooperation networks within academia and as it illustrates the media industry's adjustment to digitalization and uncovers the evolving dynamics in audience interaction, content delivery, and media convergence. By conducting a thorough study of 202 peer-reviewed articles, this article delineate key research domains like the convergence of radio and social media, the technological obstacles of digital broadcasting, and the impact of mobile applications on audience growth. The investigation indicates an increasing focus on audience engagement and personalization in internet radio content. The results highlight the swift expansion of online radio research, marked by substantial contributions from both academic institutions and industry collaborations. Principal research clusters encompass technology breakthroughs, media policy, and the influence of artificial intelligence on content curationThis study offers significant insights for media experts, broadcasters, and politicians seeking to comprehend the future direction of radio in the digital age.

Keywords: [Online Radio, Digital Broadcasting, Radio research trends, Bibliometric Analysis, ScientoPy, VOSviewer]

I. Introduction

The swift progression of digital technology has profoundly altered the conventional broadcasting sector, leading to the emergence of new media formats like online radio. In contrast to terrestrial radio, which is confined by geographical limitations and frequency regulations, online radio utilizes internet connectivity to access worldwide audiences without physical restrictions. This transition has resulted in an increase in content diversity and radio accessibility, allowing listeners to obtain audio material from various sources, including independent creators, niche broadcasters, and overseas stations, all through digital platforms (Hallett & Hintz, 2010). The expansion of mobile devices and broadband internet enhances this tendency, rendering online radio a universally accessible medium that can be enjoyed at any time and in any location (Michalis, 2016; Oliphant, 1999) . Research indicates that the increasing demand for personalized and on-demand material has directed listeners, especially younger demographics, towards online platforms that offer greater customization and interactivity (Alimi et al., 2021; Gazi & Bonini, 2018; Igboke, 2019; Punnett, 2016). This transition has prompted conventional broadcasters to implement digital tactics, while new digital-native broadcasters have arisen to serve niche audiences, including customized music streaming, podcasts, and live broadcasts (Wijnants et al., 2021). The evolution of radio transmission in the digital era is of considerable scholarly significance, since it overlaps with multiple disciplines, including media studies, communication, and technology adoption (Alraih et al., 2022; Renzo et al., 2019). A bibliometric examination of the academic literature on internet radio elucidates the progression of research issues, main contributors, and nascent trends in this field (Rejeb et al., 2020). This study seeks to delineate the intellectual environment of internet radio research and pinpoint avenues for further investigation by analyzing citation patterns, co-authorship networks, and theme clusters (Zrelli & Rejeb, 2024). As digital broadcasting gains prominence, comprehending the ramifications of this transformation is essential for both practitioners and scholars (Kroon & Eriksson, 2019; Schrøder, 2019). This study enhances the existing literature by providing a systematic analysis of academic research on internet radio, emphasizing the technological, social, and economic elements influencing its adoption and development (Sahran et al., 2024). Additionally, the study examines how online radio has transformed conventional broadcasting patterns, created novel methods of audience interaction, and redefined the global media landscape (Napoli, 2008, 2012).

I.1 Research Objective

Publication trends on online radio by addresses the following RQs

I.1.1 Researh Qestions :

Research questions guiding the analysis.

1. What is the evolution of online radio?
2. Which source titles publish the most research on Online radio?
3. Which countries are the most active in publishing research on Online radio?

2. Literature Review

The expansion of digital technology has transformed the broadcasting sector, with online radio becoming a significant format that contests conventional radio broadcasting. Online radio utilizes internet access to provide diverse audio content, including live streaming and podcasts, transforming listener consumption and interaction with radio material (Laor, 2022). Research on online radio has considerably grown in the past two decades, encompassing technology adoption, audience participation, legal challenges, and economic strategies (Darwish & Lakhtaria, 2011). There is a necessity to carefully catalog and examine the academic literature on online radio to discern principal themes, research trends, and prospective directions in this developing domain. Bibliometric analysis tools, such ScientoPy and VOSviewer, provide robust methods for visualizing and evaluating the framework of research on online radio, thereby improving comprehension of its evolution in the digital era (Abdullah et al., 2024). ScientoPy is a bibliometric analysis program that facilitates trend analysis and keyword co-occurrence mapping in scientific literature, offering insights into publication growth over time and discovering nascent study domains. ScientoPy enables the categorization of studies on internet radio according to essential themes, including technological innovation, audience behavior, digital marketing techniques, and regulatory frameworks, thereby emphasizing changes in research focus and the development of new subfields (Abdullah & Sofyan, 2023; Vazquez et al., 2021). The swift embrace of streaming technologies and podcasting platforms has led to a rise in research focused on audience preferences, content customisation, and user engagement with digital audio platforms. Moreover, studies have concentrated on the obstacles encountered by conventional radio stations in their adoption of digital technology, encompassing the financial and technological impediments linked to digital broadcasting (Soep, 2012). VOSviewer facilitates the visualization of citation networks and co-authorship patterns, hence enabling the identification of prominent publications, authors, and institutions in the domain of online radio research. VOSviewer facilitates the identification of clusters of connected subjects, including the technological convergence of radio and the internet, the influence of social media in advancing online radio programming, and the economic ramifications of digital audio advertising (Enrique et al., 2022; Manzoor et al., 2021). Citation analysis can identify pivotal studies that have influenced the area, including research on the shift from analog to digital broadcasting and the effects of digital platforms on conventional media consumption (van Eck & Waltman, 2010). The bibliometric maps produced by VOSviewer offer an extensive overview of the intellectual terrain of internet radio research, highlighting well-explored domains and those necessitating more inquiry. The integration of ScientoPy and VOSviewer for a bibliometric analysis of online radio research provides a detailed insight into the evolution of academic interest in this domain due to digital transformations. This analysis reveals prevailing research themes and significant publications while identifying gaps in the literature for future investigation. This study seeks to enhance the structured and systematic

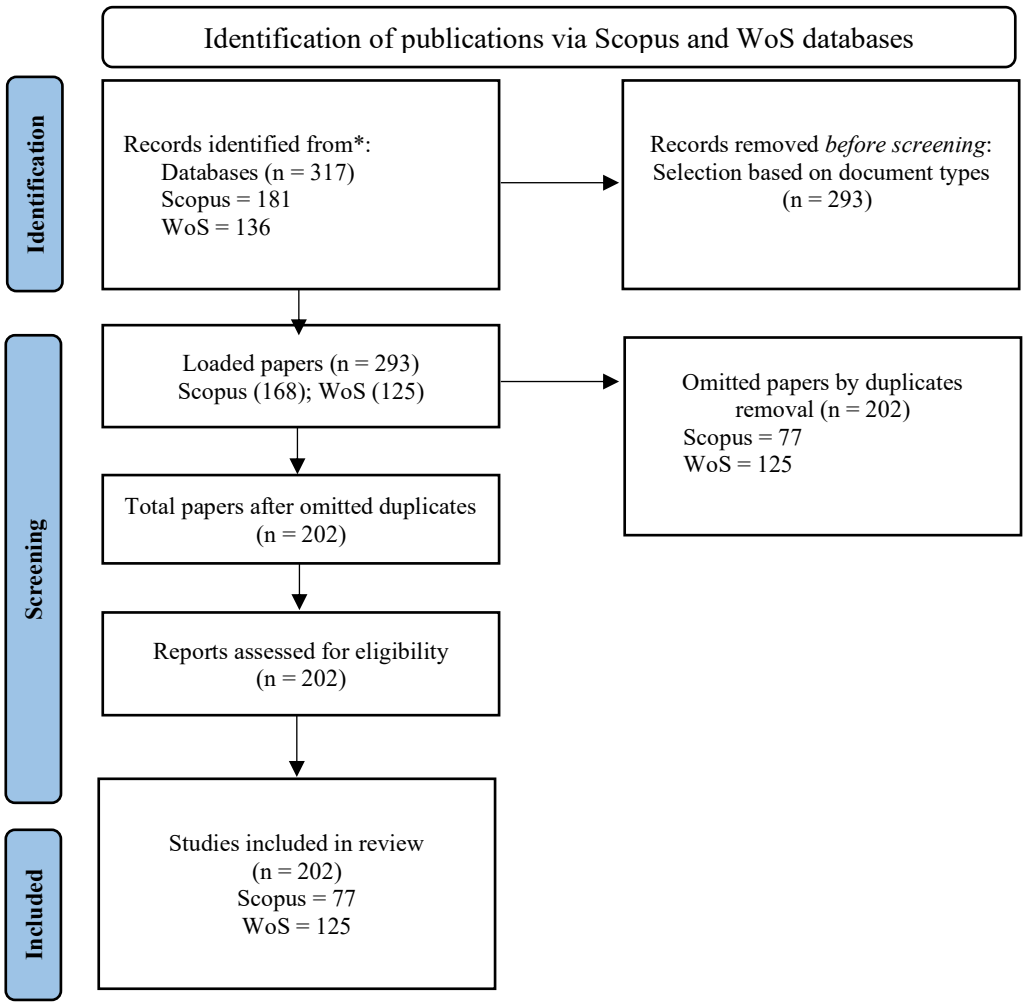
comprehension of online radio within the digital age by utilizing bibliometric (Shahrier et al., 2024; van Eck & Waltman, 2010).

3. Methodology

Bibliometric evaluation is a studies technique characterized through its quantitative nature, which involves inspecting and decoding styles and tendencies inside medical guides (Donthu et al., 2021; Klarin, 2024). This method offers treasured insights and knowledge of a particular studies area that comprehensively assesses the contemporary frame of literature and its development over time (Aziz et al., 2022; Jangid et al., 2024). Bibliometric evaluation enables pupils and policymakers make knowledgeable selections approximately destiny studies instructions and investment priorities through figuring out key themes, influential authors, and collaboration networks (Claudi et al., 2024; Sofian et al., 2023). The contemporary bibliometric evaluation used the Scopus and Web of Science (WoS) databases. The datasets had been received on July 1, 2024, and a seek approach become applied to examine the listing of ebook on radio online. These databases are selected for his or her full-size coverage, stringent best manage measures, and dependable quotation evaluation capabilities (Abdullah et al., 2023; Pranckutė, 2021). The databases permit researchers to get entry to a extensive variety of scholarly literature, facilitating complete analyses and the identity of influential articles and authors (Durán-Sánchez et al., 2020; Gusenbauer & Haddaway, 2020). In addition, the quotation evaluation capabilities supplied permit the research of quotation styles, assessment of effect metrics, and identity of pivotal guides inside the discipline (Aksnes et al., 2019; De Rijcke et al., 2016). The seek parameters hired on this research included: ("on line radio" OR "on line broadcast" OR "streaming radio"). The seek manner become executed making use of the Title, Abstract, and Keywords. This complete seek inquiry encompasses lots of phrases for Online Radio. Utilising lexically interchangeable expressions ensures an extended scope of scholarly literature exploration regarding the investigated subject matter that incites the scholarly interest of the pupils (Abdullah et al., 2023; Nkhata et al., 2019) In addition, the hunt encompasses literature that permits a complete evaluation of worldwide literary works (Aziz et al., 2022; Buell et al., 2011). Datasets regarding online radio alternate had been procured from each Scopus and Web of Science (WoS) and carefully tested with the useful resource of ScientoPy and VOSviewer. ScientoPy, an esteemed Phyton software program tool, is handy in bibliometric analyses while VOSviewer is a systematic visualisation instrument (Ninglasari, 2021; Sánchez et al., 2024). The most important goal at the back of the evaluation become to comprehensively appraise international online radio on broadcasting in digital age alternate literature, as archived in Scopus and WoS.

4. **Result**

This section comprehensively analyses bibliometric datasets related to online radio research, guided by research questions 1 to 6. A bibliometric analysis should gbe conducted based on a clear research goal to ensure the study is focused, relevant, and capable of yielding meaningful insights (Klarin, 2024). The current study's publication overview elucidates the integration of datasets from the Scopus and WoS databases. The removal of duplicates is clarified by sorting methods using ScientoPy software. ScientoPy, a specialized software, integrates Scopus and WoS datasets via a field tags correlation table and finds and removes duplicate papers (Ruiz-Rosero et al., 2017; Vazquez et al., 2021). The datasets acquired from both databases included 317 publications. The inclusion criteria targeted document types including articles, reviews, proceedings, book chapters, and conference papers, yielding 293 publications for examination, comprising 168 in Scopus and 125 in WoS. The removal of duplicates yielded 202 datasets, comprising 77 from Scopus and 125 from WoS. Consequently, 115 duplicate manuscripts were omitted from the analysis. The framework of the database and registry searches in the present study is illustrated in Figure 1, adhering to the processes outlined by Page et al. 2021This study's publication summary elucidates the integration of datasets from the Scopus and WoS databases. The removal of duplicates is clarified by sorting methods using ScientoPy software. ScientoPy, a specialized software, integrates Scopus and WoS datasets via a field tags correlation table and detects and removes duplicate papers (Moral-muñoz et al., 2020). The datasets acquired from both databases contained 317 publications. The inclusion criteria targeted document types including articles, reviews, proceedings, book chapters, and conference papers, yielding 293 publications for examination, comprising 168 in Scopus and 125 in WoS. The removal of duplicates yielded 202 datasets, comprising 77 from Scopus and 125 from WoS. Consequently, 115 duplicate manuscripts were omitted from the analysis. The organization of the database and registry searches in the present investigation is illustrated in Picture 1, adhering to the methodology suggested by Page (Page et al., 2021)

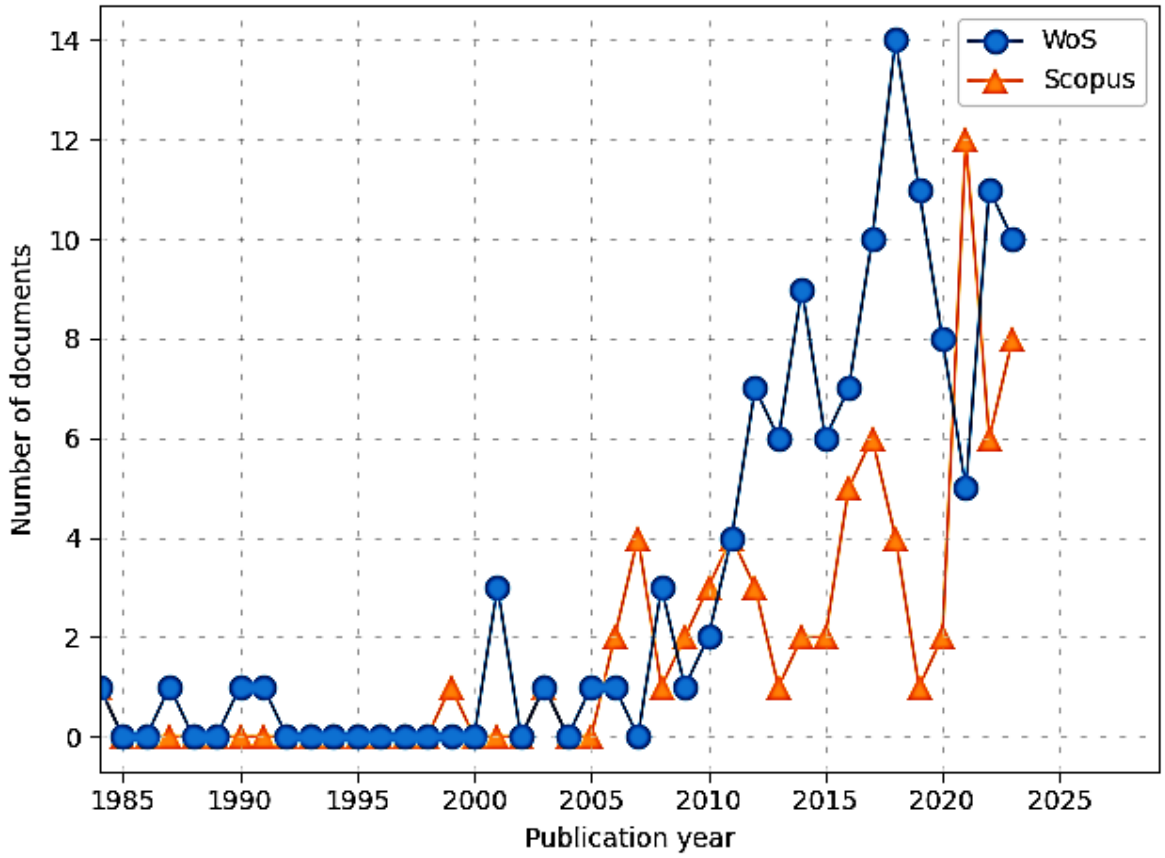


Picture 1. Flow diagram of searches of databases and registers

4.1 The evolution of publications (RQ1)

Picture 2 illustrates the quantity of publications in the Scopus and WoS databases from 1985 to 2023. The graph depicts the yearly trend of publications about online radio from the mid-1980s to 2025, utilizing data sourced from the Web of Science (WoS) and Scopus databases. The graph illustrates the increasing academic interest and publications on internet radio and broadcasting in the digital age throughout time. Beginning 2005, a distinct rising trajectory in publications is evident. The quantity of documents in the WoS and Scopus databases has risen, signifying an increasing scholarly interest in the evolution of traditional broadcasting inside the digital realm. The interval between 2015 to 2020 was the apex of increase, with WoS data indicating a greater volume of publications compared to Scopus during 2018–2019. Nevertheless, it underwent a significant decline in 2021, although it witnessed a

modest increase once more in 2022. During the period from 2005 to 2020, Scopus saw fluctuations. Despite a gradual rise in 2021 and 2022, Scopus exhibited a notable surge in publication numbers over this timeframe, with several peaks surpassing those recorded in the WoS data. Until the conclusion of 2023, research on internet radio was mostly governed by the Wos journal, thereafter followed by Scopus. The graph indicates sustained interest in internet radio research from 2020 onward, with publication numbers in both databases consistently elevated.

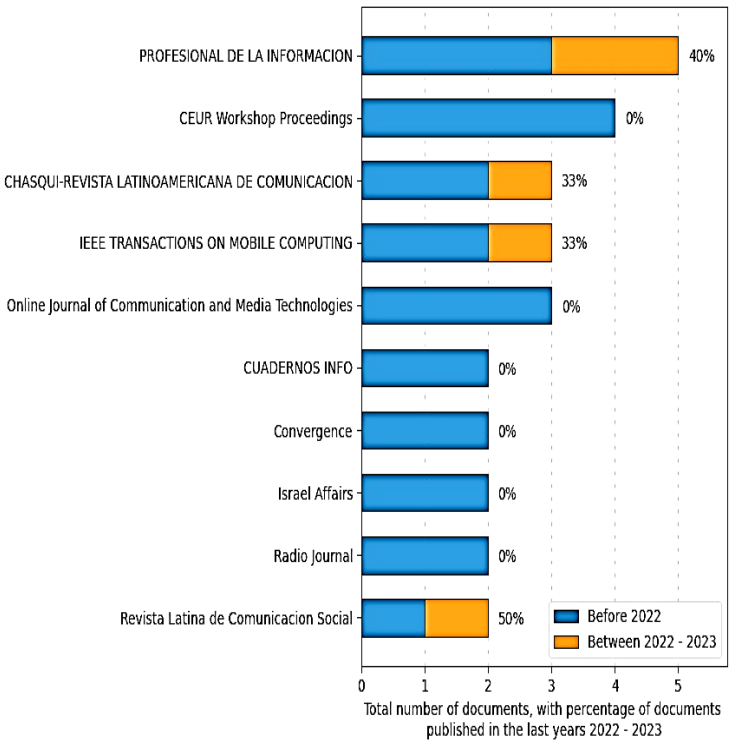


Picture 2 : Publication growth

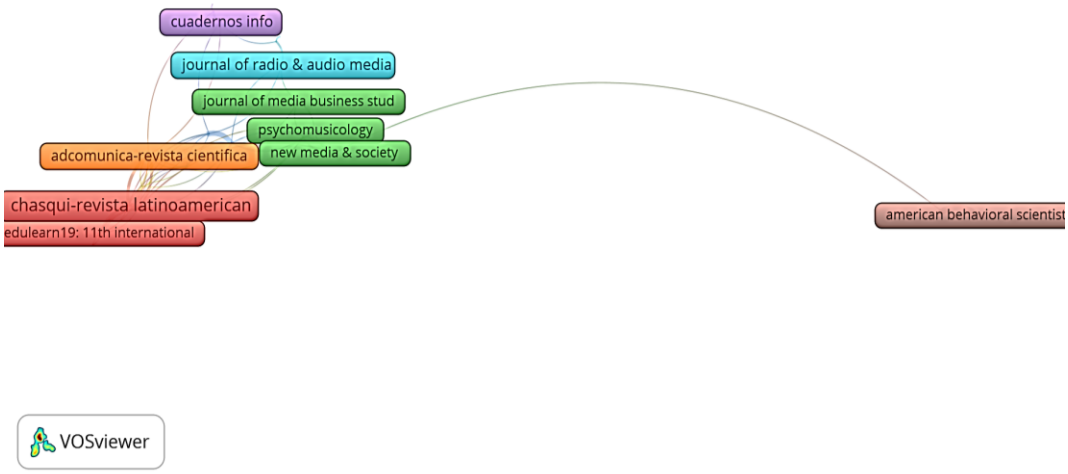
4.2 Productive source titles (RQ2)

Picture 3, the bar graph depicts the distribution of publications concerning Broadcasting in the Digital Age across different journals and proceedings, highlighting the publication timeline. The x-axis denotes the total count of documents, whereas the y-axis enumerates the titles of journals and conference proceedings. The colors in each bar represent the proportion of documents published prior to 2022 (blue) and those published between 2022 and 2023 (orange). The primary contributions originate from Profesional De La Informacion and Revista Latina de Comunicacion Social, which collectively published a considerable proportion of the documents. Profesional De La Informacion has 40% of its

documents published between 2022-2023, whereas "Revista Latina de Comunicacion Social" exhibits a higher percentage of recent publications at 50%. This reflects an increasing focus on digital broadcasting research within these journals in recent years. Additional sources, including Chasqui-Revista Latinoamericana De Comunicacion and Ieee Transactions On Mobile Computing, exhibit notable activity, with each reporting that 33% of their documents were published between 2022 and 2023. Conversely, several other journals, such as CEUR Workshop Proceedings, Communication and Media Technologies, Cuadernos Info, Convergence, Israel Affairs, and Radio Journal, have not published any articles on this topic in the recent time frame. This trend indicates that certain journals, especially those dedicated to communication, information, and Latin American studies, are more actively publishing research on digital broadcasting, while others exhibit minimal to no recent contributions. This distribution may indicate the differing emphasis and priority assigned to the topic across various academic disciplines and geographical areas.



Picture 3. Productive source titles

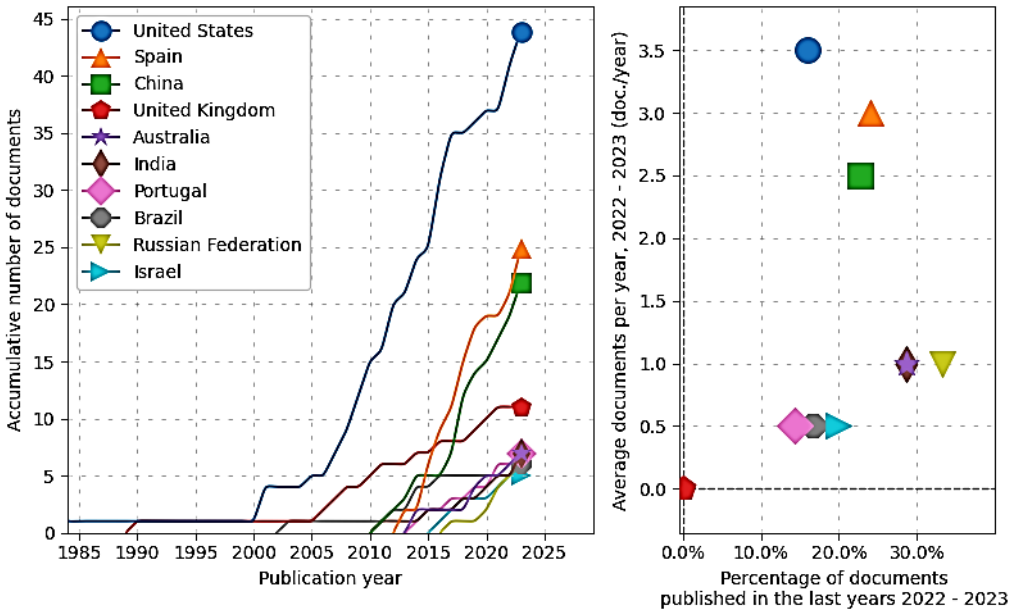


Picture 4. Vos viewers image of productive source titles

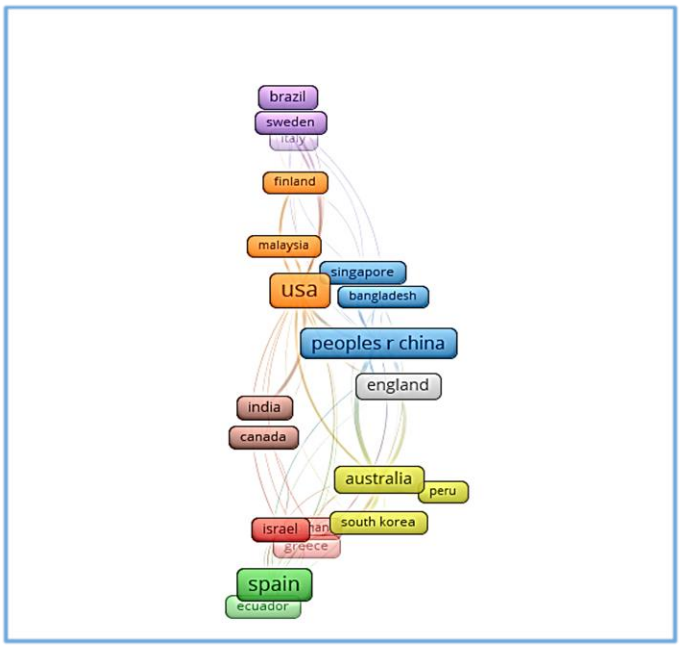
4.3 Productive countries (RQ3)

In Picture 5, India, Portugal, Brazil, the Russian Federation, and Israel, have fewer publications overall, but they show some growth in recent years, indicating a more recent engagement with the topic. The right panel the two-part graph provides insights into the evolution of research publications related to Broadcasting in the Digital Age, particularly online radio, across different countries over time. The left panel tracks the cumulative number of documents published from 1985 to 2025, with each line representing a different country. The United States leads significantly, with over 40 publications, showing a steady growth trajectory, especially from the 2000s onward. This dominance indicates the country's prominent role in driving research on digital broadcasting. Spain, China, and the United Kingdom also exhibit a rising trend in publication numbers, especially post-2010, suggesting an increasing scholarly interest in these regions. Other countries, including Australia, plots the average number of documents published per year between 2022 and 2023 (y-axis) against the percentage of documents published in the same period (x-axis). The United States is positioned highest, with an average of about 3.5 documents per year in the last two years, indicating a sustained and high level of recent research output. Spain and China follow, with slightly lower averages, showing substantial activity in recent years. Countries like India, Israel, and Brazil have lower averages but are clustered with a higher percentage of recent documents, reflecting a more recent but growing interest in the field. The data collectively suggest that while the United States has been a longstanding leader in research on digital broadcasting, other countries like Spain and China are rapidly catching up, and emerging contributors from various regions are beginning to make their presence felt in this research area. This

trend underlines the global nature of the topic and its increasing relevance across different parts of the world.



Picture 5. Productive countries



Picture 6. Vos Viewers Image for Productive countries

5. Discussion

This article examines various critical aspects of the evolution of radio broadcasting in the digital era. ScientoPy and VOSviewer are bibliometric tools employed to delineate research trends, depict co-authorship networks, and ascertain the most significant themes in the discipline. The essay examines how digital technologies, including streaming and podcasting, have facilitated the transition of traditional radio to online platforms. This transition facilitates on-demand access and broadens the scope of radio broadcasts beyond traditional frequencies. The analysis reveals that technological innovation is a primary research topic, examining the effects of internet streaming, mobile applications, and multi-platform distribution on radio usage (Ikeme et al., 2023; Telkmann, 2021). The evolution of audience involvement in the digital era is a primary focus. The analysis indicates that research has progressively focused on how digital platforms enhance interactive listener experiences via social media integration and live feedback mechanisms. VOSviewer facilitates the visualization of clusters of research pertaining to audience behavior, indicating an increasing interest in comprehending the evolving consumption habits influenced by the accessibility of tailored and on-demand audio content (Dima et al., 2023; Shri et al., 2023). The bibliometric research indicates a tendency towards content diversification, as online radio platforms provide an increasing array of specialized and specialist programs. Research frequently examines the utilization of personalization algorithms, facilitated by digital technologies, to customize material according to individual tastes. This subject is sometimes co-cited alongside podcasting and on-demand radio, indicating a confluence of traditional radio with other digital media forms. This article addresses the issues encountered by traditional radio in sustaining its relevance in the face of competition from streaming services and digital-only platforms. Bibliometric tools indicate that research on digital monetization options, including digital audio advertising, subscription models, and content syndication, has gained prominence. This underscores the necessity for broadcasters to adjust to changing business models to sustain financial viability in the digital environment. The post employs ScientoPy and VOSviewer to visually depict the temporal evolution of online radio research trends (Ruiz-Rosero et al., 2019). The tools facilitate the identification of seminal publications, prevalent keywords, and significant research clusters, highlighting regions of heightened academic interest. The research indicates a consistent rise of articles concerning digital broadcasting from the early 2000s, with notable peaks coinciding with significant technological advancements, like the emergence of podcasting and streaming technologies (Perks et al., 2019) . The paper provides a thorough examination of the impact of digital innovations on the evolution of radio broadcasting and delineates the academic landscape of online radio study through bibliometric analysis.

6. Conclusion

The study reveals a significant rise in scholarly interest and publications concerning online radio, especially in the last twenty years. This expansion corresponds with developments in internet technologies, the spread of digital devices, and the increasing popularity of on-demand audio content like podcasts. The trend indicates that online radio has emerged as a significant study domain, highlighting its changing function within the wider media environment. Technological improvements have been essential in the digital transition of radio broadcasting. The transition from conventional, frequency-based radio to internet streaming and podcasting has broadened the audience and diversified content options. Researchers have thoroughly investigated how digital platforms and streaming technology have facilitated novel content delivery methods and transformed audience consumption of audio media. The paper emphasizes a transition in study emphasis towards comprehending audience engagement and behavior in the digital era. The interaction and personalization enabled by online radio platforms have transformed the conventional one-way broadcasting approach. Research increasingly examines the effects of social media integration, user-generated content, and tailored listening experiences on audience loyalty and consumption patterns. Digital platforms have generated new opportunities, although they have also posed obstacles for conventional radio broadcasters. The review highlights research on digital monetization options, including online advertising, subscription models, and content licensing, as crucial for maintaining the financial sustainability of radio in the digital environment. This indicates a necessity for broadcasters to adjust to novel business models to maintain competitiveness. The work used ScientoPy and VOSviewer to delineate the academic terrain of internet radio research, pinpointing significant publications, prominent academics, and key research groups. The tools indicate that, although notable advancements have been made in specific domains, including technical adoption and audience analysis, deficiencies persist in research about the long-term effects on the radio industry and regulatory challenges in the digital age. The study continues by proposing future research avenues, such as the examination of legal frameworks for digital broadcasting, the societal implications of internet radio, and the incorporation of artificial intelligence in content distribution and personalization. These domains are essential for comprehending the current digital change and for formulating strategies to improve the sustainability of online radio. The study presents a comprehensive examination of the digital transformation of radio broadcasting, while the bibliometric analysis utilizing ScientoPy and VOSviewer yields significant insights into research trends and prospective developments in the domain. The results emphasize the evolving character of broadcasting in the digital era and the necessity of adjusting to technical advancements and audience demands.

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