Artificial Intelligence in Media and Journalism. Systematic Review on Spain and Latin America in Scopus and Web of Science Databases (2018–2022)

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Received: 09/11/2023
Accepted by peers: 15/02/2024
Submitted to peers: 06/12/2023
Approved: 20/03/2024

DOI: 10.5294/pacla.2024.27.4.1

Para citar este artículo / to reference this article / para citar este artigo
Trejos-Gil, C. A., & Gómez-Monsalve, W. D. (2024). Artificial Intelligence in Media and Journalism. Systematic Review on Spain and Latin America in Scopus and Web of Science Databases (2018–2022). *Palabra Clave*, *27*(4), e2741. https://doi.org/10.5294/pacla.2024.27.4.1

Abstract

Artificial, automated, and algorithmic journalism is a current trend that brings about skills and challenges that newsrooms must face. The automation of journalistic tasks such as the writing of texts and the generation of audiovisuals, podcasts, and other resources to tell stories is mediated by artificial intelligence. Therefore, thinking about journalistic work prospectively offers an alternative to focus on the dynamics that will be a trend in the future. This research aims to conduct a systematic review in the Scopus and Web of Science ($N = 627$) databases on the scientific production of Spain and Latin America, where artificial intelligence, social communication, and journalism converge. Data mining and web scrapping were used, and the PRISMA declaration methodology was implemented to define inclusion and exclusion criteria for academic production ($n = 43$), integrating

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bibliometric analysis techniques in collaboration networks and strengths of links between authors, journals, and countries. Finally, we provide information on search trends, the authors who most developed the topic in question and other metrics of interest. In both databases, Spain has the best performance in scientific collaboration networks.

Keywords

Latin America; artificial intelligence; mass media; journalism; social communication; data mining; bibliometric analysis.

Inteligencia artificial en los medios y el periodismo. Revisión sistemática sobre España y Latinoamérica en las bases de datos Scopus y Web of Science (2018-2022)

Resumen

El periodismo artificial, automatizado y con algoritmos es una tendencia actual que viene acompañada de habilidades y retos que deben enfrentar las salas de redacción. La automatización de tareas periodísticas como la redacción de textos y la generación de audiovisuales, podcast y otros recursos para contar historias está mediada por la inteligencia artificial. Por lo tanto, pensar la labor periodística en prospectiva ofrece una alternativa para enfocar las dinámicas que serán tendencia en el futuro, así como las redes de colaboración en investigación científica que se han creado entorno a la IA y el periodismo. El objetivo de esta investigación es hacer una revisión sistemática en las bases de datos Scopus y Web of Science ($N = 627$) sobre la producción científica desarrollada en España y América Latina, donde converja la inteligencia artificial, la comunicación social y el periodismo. Se utilizó la minería de datos y el *web scrapping* y se implementó la metodología de la declaración PRISMA para definir criterios de inclusión y exclusión de la producción académica ($n = 43$), junto con técnicas de análisis bibliométrico en redes de colaboración y fortalezas de vínculos entre autores, revistas y países. Por último, se puede encontrar información sobre las tendencias de búsqueda, los autores que más desarrollaron el tema en cuestión y algunas métricas más de interés. En ambas bases de datos, España es el país que mejor desempeño tuvo en redes de colaboración científica.

Palabras clave

América Latina; inteligencia artificial; medios de comunicación masiva; periodismo; comunicación social; minería de datos; análisis bibliométrico.

Inteligência artificial na mídia e no jornalismo. Revisão sistemática sobre Espanha e América Latina nos bancos de dados Scopus e Web of Science (2018-2022)

Resumo

O jornalismo artificial, automatizado e orientado por algoritmos é uma tendência atual que traz consigo habilidades e desafios que as redações devem enfrentar. A automação de tarefas jornalísticas, como a redação e a geração de recursos audiovisuais, podcasts e outros recursos de narrativa, é mediada pela inteligência artificial. Portanto, pensar no trabalho jornalístico em perspectiva oferece uma alternativa para focar na dinâmica que será tendência no futuro, bem como nas redes de colaboração em pesquisa científica que foram criadas em torno da inteligência artificial e do jornalismo. O objetivo desta pesquisa é realizar uma revisão sistemática nas bases de dados Scopus e Web of Science (N = 627) da produção científica desenvolvida na Espanha e na América Latina, onde convergem a inteligência artificial, a comunicação social e o jornalismo. Foram utilizadas a mineração de dados e a web scraping, e a metodologia da declaração Prisma foi implementada para definir os critérios de inclusão e exclusão da produção acadêmica (n = 43), juntamente com técnicas de análise bibliométrica sobre redes de colaboração e forças de vínculos entre autores, periódicos e países. Por fim, é possível encontrar informações sobre tendências de pesquisa, sobre os autores que mais desenvolveram o tópico em questão e sobre outras métricas de interesse. Em ambos os bancos de dados, a Espanha é o país com o melhor desempenho em redes de colaboração científica.

Palavras-chave

América Latina; inteligência artificial; meios de comunicação de massa; jornalismo; comunicação social; mineração de dados; análise bibliométrica.

Introduction

Artificial intelligence (AI) is a field of computer science that seeks to develop algorithms and systems capable of performing tasks that typically require human intelligence, such as learning, reasoning, and language understanding. The emergence of AI dates back to the 1950s when the first computer programs capable of performing simple tasks that could previously only be done by humans were developed. Specifically, AI emerged in the 1950s, when the term 'artificial intelligence' was coined at the famous Dartmouth Conference (Hardy, 2001, p. 4; Marín, 2019, p. 5; Mohammed et al., 2023; Moor, 2006; Oliver, 2020, p. 47; Porcelli, 2020; Russell & Norvig, 2016, p. 17). Since then, the term has been periodically discussed, but never as much as today.

The popularity of AI has surged with the introduction of the ChatGPT application, which has caught the attention of the academic community by presenting an open-access web application that can emulate human thinking. This has led to the resurgence of various challenges in different areas of knowledge, as these technologies have the ability to generate tasks, learn, process information, establish relationships, propose, and create narratives based on large volumes of data in seconds (Porcelli, 2020; Túñez López & Tejedor Calvo, 2019; Túñez López et al., 2022). AI is defined as the implementation of computer mechanisms that perform tasks previously carried out by humans using algorithms (Barrat, 2013; Rivas-de-Roca, 2021). Similarly, it is deduced that technologies have impacted the content of what is defined as news (Pavlik, 2000).

The growing prominence of AI is creating a noticeable trend in terms of its potential to optimize processes and enhance skills related to writing, sound production, audiovisuals, and journalism (Van der Kaa & Krahmer, 2014). This poses a significant possibility and challenge for the journalistic work, which cannot ignore its responsibility toward others. For example, three levels of analysis can be distinguished: society, news organization, and the individual journalist (McQuail, 2013), as it triggers a series of questions that have arisen with the intrusion of disruptive technology into a profession that has traditionally been based on the use of computers (Túñez

López & Tejedor Calvo, 2019). Sergio Marín (2019, p. 12) proposes five applications of AI according to the industry and sector that demonstrate different levels of usage, such as automated vehicles, voice recognition, autonomous planning, computer vision, and machine learning. Meanwhile, in her book *Inteligencia artificial, naturalmente,* Nuria Oliver (2020) suggests seven foundational issues to reflect on how AI can be ethically integrated into and benefit society: Computational capacity; Language; Abstraction capacity in neural networks; Is this way of solving the problem efficient?; Surpassing oneself; Abstract thinking; Randomness and creativity.

AI presents a landscape of possibilities and opportunities for Communication and Journalism. However, alongside these promising prospects, challenges and uncertainties arise, particularly the need to develop skills to address AI's operational challenges in journalistic practices, such as content robotization (Murcia Verdú et al., 2022; Sandoval-Martín et al., 2019). It is crucial to understand the use and purpose of this technology in journalism and learn to harness the available tools to strengthen newsroom workflow. In recent years, there has been a growing interest in exploring new techniques for journalistic practice, especially in an environment characterized by the dominant presence of 'high technologies' (López-García & Vizoso, 2021, p. 3).

In integrating AI with journalism, theoretically constructed concepts such as automation, robotization, and machine learning are proposed (Díaz Noci, 2023; Pérez-Seijo et al., 2020; Trapova & Mezei, 2021). "More and more media outlets are incorporating these practices into their strategies to streamline, simplify, and make their production processes more effective" (López-García & Vizoso, 2021, p. 5).

The art of testing and evaluating in journalistic production are standard and specific practices in this stage of work mediated by automation, referred to as 'Automated Journalism or Robot Journalism' (Díaz Noci, 2023; Pérez-Seijo et al., 2020; Túñez-López et al., 2019; Valdiviezo-Abad & Bonini, 2019). The possibilities of expanding audiences and formats are predictive, but the methodology is still uncertain. "The intersection be-

tween technology and the creation of journalistic content has become, in recent years, a field of experimentation where automation systems, algorithms, and virtual reality coexist" (López-García & Vizoso, 2021, p. 3).

Journalism based on AI stands out for its transdisciplinary characteristic, as it becomes an exercise that integrates different areas of knowledge and generates a new dynamic in information processing and dissemination (Ufarte Ruiz, Calvo Rubio, & Murcia Verdú, 2020; Ufarte Ruiz, Fieiras-Ceide, & Túñez-López, 2020). In this scenario, digital professionals coin terms to describe new phenomena that emerge in contrast and are driven by AI. A clear example is 'deep fakes' or 'synthetic content,' which generally employs deep neural networks to transform communication and shape public opinion (Vizoso et al., 2021). In some cases, audiovisual products are used where the impersonation of a person takes place using AI in the post-production stages (Cerdán Martínez et al., 2020; Oliver, 2020, p. 79). Such practices are currently considered a threat to good journalistic practices, leading to more profound debates concerning professional ethics than about impersonating or substituting individuals with machines (Túñez López et al., 2022). Naturally, there are also potential risks, such as job destruction, manipulation, security and vulnerability, the transformation of human relationships, erosion of civil society, and specific dangers like accountability, explainability, impartiality, and privacy.

Numerous studies demonstrate the positive and negative relationship between AI and journalism/media. The positive aspects include hybridity, automatic responses, content moderation, audience engagement, media influence measurement, piece translation, news production and aggregation, process automation, and flexibility. The negative aspects comprise defamation or misinformation, labor substitution, discrimination, lack of ethics in data processing, threats, and journalistic site production (Barredo-Ibáñez et al., 2021; Calvo-Rubio & Ufarte-Ruiz, 2020; Canavilhas, 2022; de Lara, 2022; Díaz Noci, 2023; Dörr, 2016; Hansen et al., 2017; López Hidalgo et al., 2022; Murcia Verdú et al., 2022; Salazar, 2018; Túñez López et al., 2022; Ufarte Ruiz & Manfredi Sánchez, 2019; Ufarte Ruiz et al., 2019; Valdiviezo-Abad & Bonini, 2019). Furthermore, the challenge of content

automation is highlighted, which involves algorithmic processing whereby data is transformed into narrative and informative texts with little or no human intervention like the initial programming (Barrat, 2013; Bunz, 2010; Harcup, 2014).

AI in journalism carries various implications: It hinders citizen participation in the cybersphere (Barredo-Ibáñez et al., 2021); it does not harm the journalistic labor market (Calvo-Rubio & Ufarte-Ruiz, 2020); it can facilitate specific activities in news production (Canavilhas, 2022); articles on AI are often superficial (de Lara, 2022); it can be perceived as a threat to journalists (Díaz Noci, 2023); there is low technological appropriation in immersion (López Hidalgo et al., 2022); chronicles generated by AI lack quality (Murcia Verdú et al., 2022); the survival of journalism depends on its technological adoption (Túñez López et al., 2022); AI still does not generate complex texts (Ufarte Ruiz & Manfredi Sánchez, 2019); and AI is transforming journalism (Valdiviezo-Abad & Bonini, 2019).

News organizations are using AI to enhance automated journalism in their newsrooms; algorithmic journalism is a new discipline that impacts tasks previously carried out by journalists, transforming them into a collaborative process between humans and computers in the newsroom (Jamil, 2023; Pérez-Seijo et al., 2023; Thäsler-Kordonouri, & Barling, 2023). Recent studies such as Beckett and Yaseen's (2023) demonstrate the adoption of AI and present differences between the global north and south regarding the depth and usefulness of its use. This study utilizes the geographical relationship to compare scientific and collaborative production between the global north (including Spain) and the global south (Latin American countries).

Other studies agree that AI poses new challenges in journalism, leading to new dimensions, practices, methodologies, increased production, communicative formulas, and learning (Murcia Verdú et al., 2022; Noain-Sánchez, 2022; Pérez-Seijo et al., 2020; Ufarte Ruiz & Manfredi Sánchez, 2019); for this reason, it is important to apply new methods of analysis to systematic reviews to evidence new findings in the last five years about collaborative networks, according to geographical location, quality, and other novel aspects.

Consequently, to analyze the performance of research on AI and journalism, it is necessary to understand the connections in recent years of the authors who have conducted the most research in the area of interest. Various studies propose bibliometric analysis on collaboration networks, structural holes, and strengths of their scientific links (Barrios-Hernández et al., 2021; Burt, 1995; Duffett et al., 2020; Gómez Velasco et al., 2021; Grisales et al., 2023; Waltman et al., 2020; Wu et al., 2019; Yang et al., 2022). Structural holes are areas where the connection between individuals is limited or nonexistent, affecting the flow of information and knowledge; likewise, they suggest the presence of isolated subgroups in the collaboration network, with scarce or null interactions (Barrios-Hernández et al., 2021; Wang et al., 2023). Link strengths determine the quality and intensity of connections between nodes (Gómez Velasco et al., 2021).

Social networks are a technique for exploring scientific collaboration networks. They quantify, analyze, and visualize relationships within a specific community, identifying leaders and evaluating collaboration structures (Fares et al., 2021) in specific areas.

In this regard, Ronald Burt (1995) proposes the theory of structural holes in collaboration networks that provide competitive advantages, creativity, and innovation, among others. Some research on collaboration networks in other disciplines has identified that structural gaps or holes generate more innovative and disruptive research and reduce the individual effort of researchers to maintain collaborations in complex social environments (Bojanowski & Czerniawska, 2020; Wang et al., 2023).

A systematic literature review research is pertinent due to its bibliometric and exploratory value, addressing the scientific gaps faced in the 21st century; therefore, it is necessary to answer the question, Which studies focus on AI and journalism? In attempting to find the answer, one will likely discover the most significant authors, the level of existing collaboration networks, the strengths of links between countries, and the journals and geographical areas specifically focusing on AI and journalism.

The landscape presents different perspectives highlighting the positive and negative aspects of automated journalistic practice by a machine. Hence, this short article aims to systematically review the Scopus and Web of Science databases regarding scientific production in Spain and Latin America, mainly concerning AI as contemplated by Social Communication and Journalism. It identifies the most important collaboration networks along with the structural gaps and strengths of their links to reflect on the future of journalistic work amid numerous tasks mediated by machines and tools permeated by process optimization.

Method

Different researchers have conducted systematic literature reviews from the two most representative databases in academic studies as both databases complement each other, risking the possibility of duplicate studies. However, it is possible to rigorously select studies from each database without repetition (Calvo-Rubio & Ufarte-Ruiz, 2021; Hentzen et al., 2022; Pérez-Seijo et al., 2020; Robledo et al., 2023; Trejos & Peláez, 2023; Trejos Gil et al., 2024). Initially, both databases were consulted to track the documents that correspond to the subject matter, following the search equation in both databases, the keywords, and the data processing in the spreadsheet as detailed below. The records of the studies and the references of each relevant study were analyzed.

The query strategy or equation involved using keywords and phrases combined with the Boolean operators AND, OR, and AND NOT (Table 1). The studies were selected under the rigorous supervision of a working group composed 'of two PhD professionals in digital communication, a research assistant pursuing master's studies in advertising, and a communication professional.

Table 1 presents the overall results of the general tracking of the two mentioned databases. Of 627 studies, 42.9 % of the Web of Science (WOS) database onwards was systematized, and the remaining 57.1 % were from Scopus. Both quantitative and qualitative studies were primarily detected in the research area, which is of great relevance in scientific production in Latin America and Spain.

Table 1. Parameters Used for Literature Search on AI and Journalism

Parameters	Web of Science	Scopus
Range	2018–2022	
Date of inquiry	March 8, 2023	
Document type	Published finalized articles	
Search field	Telecommunications or Communication	Communication
Keywords and phrases	Relevant terms related to AI: "Artificial Intelligence," "AI," "Machine Learning," "Deep Learning," "Natural Language Processing," "NLP," etc. Terms related to journalism: "Journalism," "Media," "News," "Reporting," "Journalistic Practices," "Media Industry," etc. Combination of AI and journalism terms: "AI in Journalism," "Impact of AI on Media," "AI-powered Journalism," "AI and News Production"	
Subarea	Open access	
Language	English (f = 85.5 %) Spanish (f = 14.5 %)	English and Spanish (f = 2.2 %) Spanish (f = 26.8 %) English (f = 70.1 %) English and Portuguese (f = 0.6 %) English, Catalan, and Spanish (f = l0.3 %)
Results	269	358
Total (WoS+Scopus)	627	

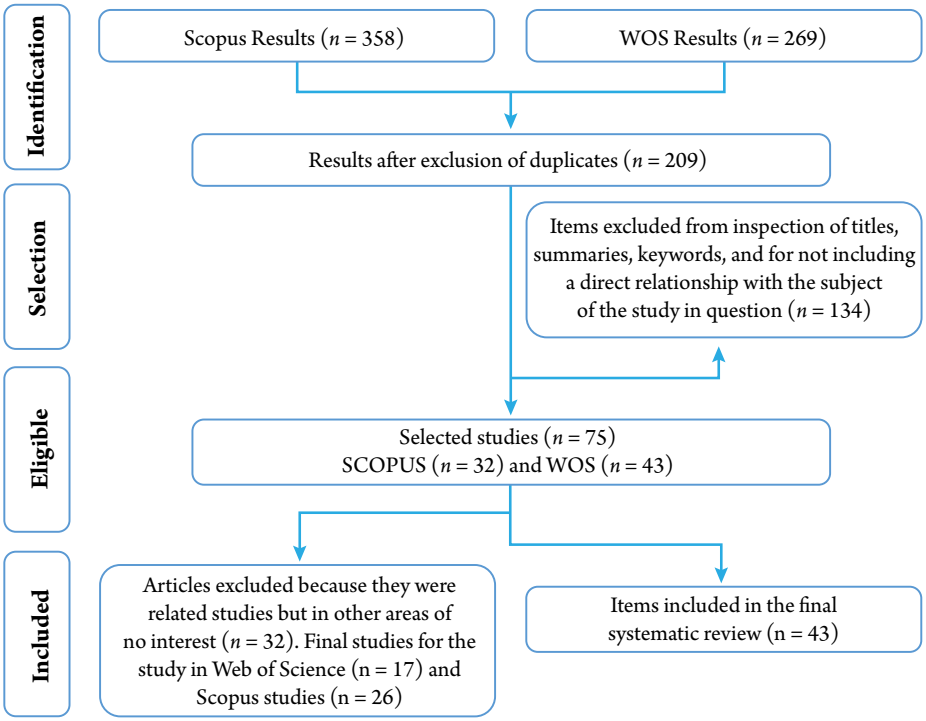
Source: Own elaboration.

Using a data mining and web scraping process, we implemented the PRISMA statement methodology (Figure 1), ensuring compliance with aspects 1–9, 11, 13, 14, 16–18, 20, 23–27 of the checklist (Moher et al., 2009; Page et al., 2021; Trejos-Gil & Peláez, 2023). Eligibility aspects were defined as inclusion and exclusion criteria, allowing us to reach the results presented in Table 1 (f = 627).

The inclusion criteria directly impacted the samples or the geographical location of the subject matter. The criteria included academic articles with specified keywords in their article titles, as detailed in Table 1, published between 2018 and 2022, written in English and Spanish, and edited in Latin America and Spain. The exclusion criteria were manuscripts or research studies published in journals not included in the WoS and Scopus databases, academic articles offering mixed methods perspectives, and those published in languages other than English and Spanish.

A portion of the data processing was systematized in an Excel file with four sheets, which was then submitted to the GitHub repository (March 10, 2023). This file became the main input for analyzing scientific production based on DOI, countries, authors, year of publication, publishing journals, abstract, keywords, publication title, impact (citations), and more, completing specific information across 23 columns for each article. This exercise demonstrated detailed, categorized, systematic, and organized data processing to avoid researcher bias.

Figure 1. PRISMA Diagram



Source: Own elaboration.

The articles were reduced one by one following strict eligibility criteria, ensuring they belonged to the specific area of interest by carefully reading their abstracts, study objectives, and methodological procedures. Conducted in April and May, this process involved the entire research team, including two research assistants and two doctoral students. Initially, 418 duplicate documents were eliminated, focusing on studies written in their

original language and disregarding translations or articles found in both databases. Titles, abstracts, and keywords were then checked for direct relevance to the study's theme, excluding 134 manuscripts. Finally, out of the remaining 75 studies, 32 were excluded for belonging to other areas within journalism and AI, such as political speeches captured on social networks using AI or mining activities using AI covered in news articles, among others.

Results

The screened documents reveal a limited scientific production in the area of interest in Latin America, with the majority of studies from Spain compared to Latin American studies. However, it is noteworthy that Brazil has the most studies related to AI and journalism ($f = 6$) in Latin America. Spain reports 26 out of the 43 screened, with ten studies of mixed character (Spain and Latin America) with different methodologies. Regarding Latin America, the most cited study in this field is from Argentina (Lima-Santos & Salaverría, 2021), with 96 citations, followed by a Brazilian journalism study (Essenfelder et al., 2019) with 42 citations. In contrast, compared to Spanish studies ($f = 26$), the study with the second highest citation is (Calvo-Rubio & Ufarte-Ruiz, 2020). This study analyzes the perception of professionals and academics regarding AI and journalism.

Out of the 358 documents published in the last five years in the Scopus database, most works were published in 2021 with a frequency ($f =$ 32.7 %) higher than in the other years (Table 2).

Table 2. Publication Descriptives for the Last 5 Years in Scopus (Sc = 358)

Year	Ƒ	%	Proportion	Citat	%	Prop
2018	23	6.4		295	11.2	
2019	31	8.7		728	27.6	
2020	71	19.8		721	27.4	
2021	117	32.7		714	27.1	
2022	100	27.9		175	6.6	
	358	100		26,38	100	

Language	*f*	%	Proportion
English and Spanish	8	2.2	
Spanish	96	26.8	
English	251	70.1	
English and Portuguese	2	0.6	
English, Catalan, Spanish	1	0.3	
English and Spanish	8	2.2	
	358	100	

Source: Own elaboration.

However, in 2020 and 2019, the highest number of citations were obtained (f = 29.1 % and f = 28.1 %, respectively). This is a natural behavior considering the number of articles in 2021 that cited publications from the two immediately preceding years. From this database, articles from three different years that surpassed the 100-citation mark were identified: Nguyen et al. (2019) with 296 citations, Bentéjac et al. (2021) with 199 citations, and Janssen et al. (2020) with 113 citations. As of the date of this review, 132 documents have not been cited.

In the studies consulted in the WoS database, most works were published in 2021 (f = 29 %) (Table 3).

Table 3. Publication Descriptives for the Last 5 Years in Scopus (Sc = 358)

Year	Ƒ	%	Proportion	Citat	%	Prop		Language	Ƒ	%	Proportion
2018	23	6.4		295	11.2			English and Spanish	8	2.2	
2019	31	8.7		728	27.6			Spanish	96	26.8	
2020	71	19.8		721	27.4			English	251	70.1	
2021	117	32.7		714	27.1			English and Portuguese	2	0.6	
2022	100	27.9		175	6.6			English, Catalan, Spanish	1	0.3	
2023	16	4,5		5	0.2			English and Spanish	8	2.2	
	358	100		15,685	100				358	100	

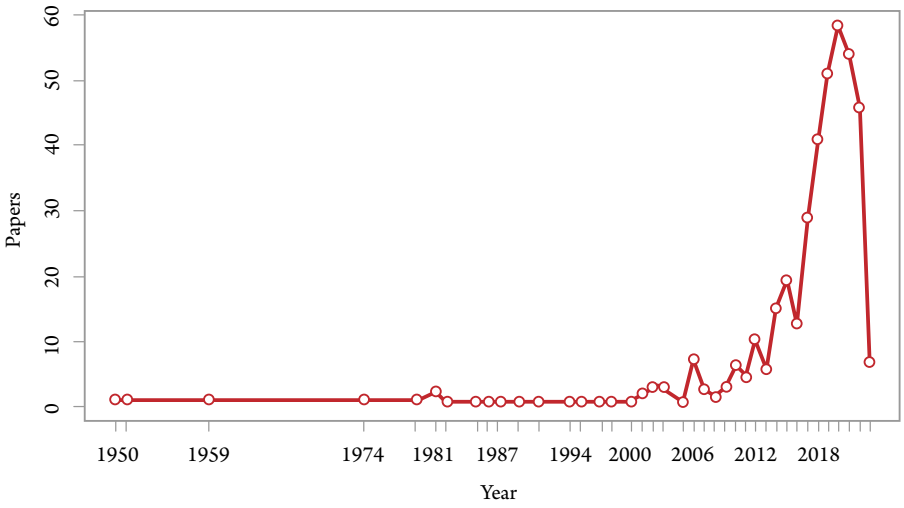
Source: Own elaboration.

The quantity of publications follows an ascending trend compared to previous years. The highest number of citations was obtained from 2018 to 2021, with the latter year receiving the least amount of citations for the works (f = 23.5 %, f = 28.2 %, f = 27.5 %, and f = 18 %, respectively). Four articles (Chen et al., 2018; Chen et al., 2019; Loyola-González, 2019; Rafique & Velasco, 2018) surpassed the 100-citation mark (f = 100, f = 104, f = 119, and f = 153, respectively), and one study (Mata et al., 2018) exceeded 200 citations (f = 205). Compared to the Scopus database, these results indicate that WoS is a database where AI-related works have been more cited in the last five years (Sc = 2,638; WoS = 2,802).

The analysis of references from all Scopus studies shows that the first articles were published between 1950 and 2000, and the number of publications did not exceed five manuscripts per year despite the concept of AI

already being known (Figure 2). After 2000, publications per year began to increase slowly, with a substantial increase from 2012 onwards and an upward curve of approximately 15 % annually. It doubled yearly in 2014 and 2015, tripled in 2017, quadrupled in 2018, and peaked in 2020. This indicates the current relevance of the topic, high academic interest, novelty, and research opportunities in information production, AI, data journalism, and big data, among others (Calvo-Rubio & Ufarte-Ruiz, 2021).

Figure 2. Annual Scientific Production in Scopus



Source: Own elaboration.

From the data obtained from WoS (Table 4), it is evident that the highest link strength is in Spain, Ecuador, and Brazil (f = 2,634, f = 1,364, and f = 1,003, respectively), indicating that they have the highest intensity of connection with other countries. However, the strongest link is between Spain and Ecuador (f = 946). Argentina has the least strengthened links with other countries (f = 314). Only six Latin American countries in this period have generated collaboration networks and strengthened links between AI and journalism.

On the other hand, the majority of citations focus on the years 2018 to 2020, during which quantitative and qualitative studies significantly increased their citation impact (Calvo-Rubio & Ufarte-Ruiz, 2020, 2021; Lima-Santos & Salaverría, 2021; Murcia Verdú et al., 2022; Noain-Sánchez, 2022; Salazar, 2018; Tuñez-López et al., 2021; Ufarte Ruiz & Manfredi Sánchez,

2019; Ufarte Ruiz et al., Calvo Rubio, & Murcia Verdú, 2020; Valdiviezo-Abad & Bonini, 2019). Together, they generated 14.5 % of the total citations obtained from the 270 references in the study ($f = 15{,}648$). Articles from 2019 to 2020 performed better in citations, accounting for 81 % of this 14.5 %.

Table 4. Strength of the Link between Latin American Countries and Spain - WoS (WoS = 269)

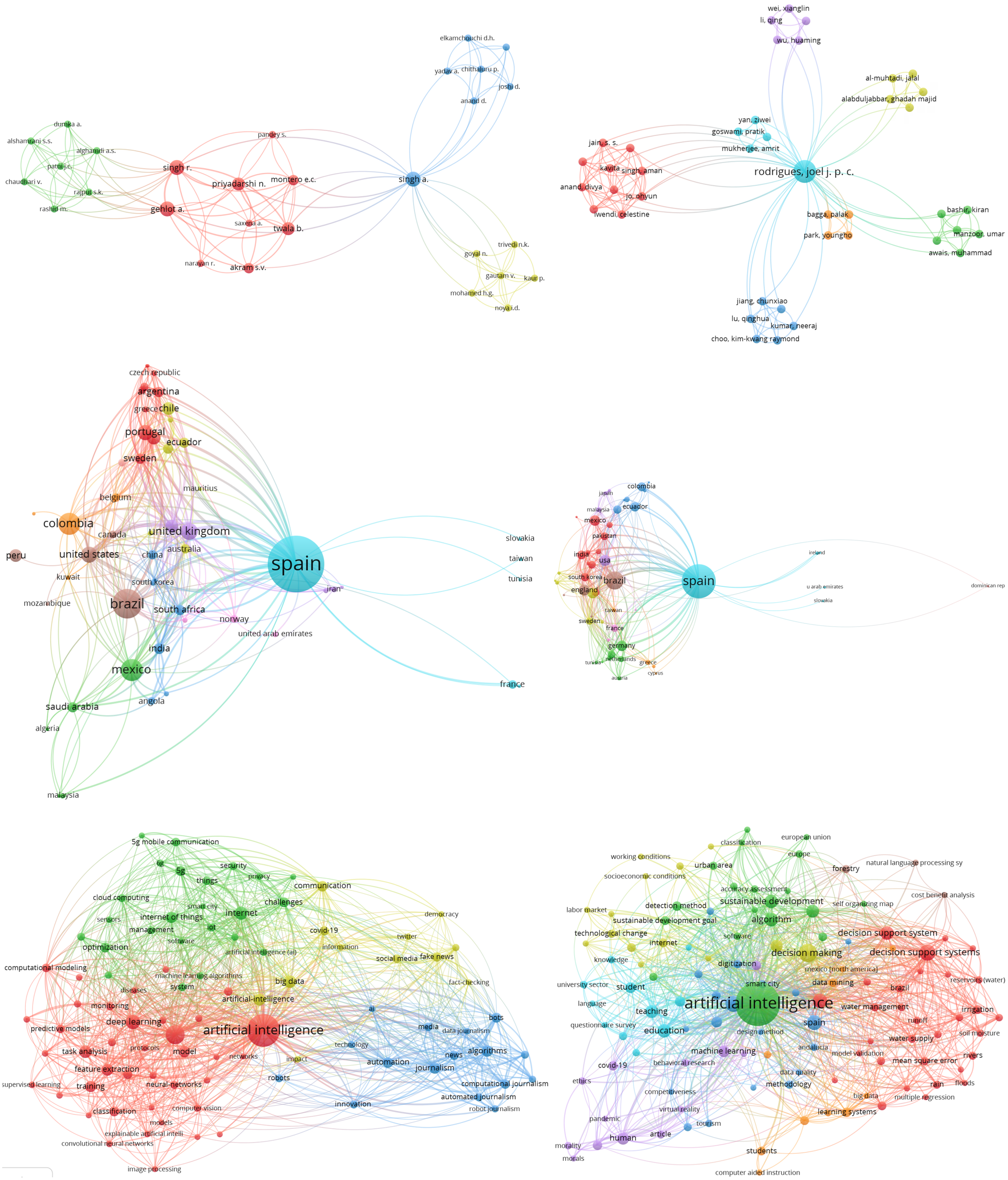
Country	Docs	Cita	total link strength	Link	Cluster	Arg	Br	Chile	Col	Ecu	Mex	Spain
Argentina	5	3	314	5	1	-	44	44	-	45	44	137
Brazil	53	54	1003	6	1	44	-	69	68	84	92	646
Chile	11	434	455	6	1	44	69	-	11	87	50	194
Colombia	13	29	756	5	2	-	68	11	-	153	74	450
Ecuador	14	136	1363	6	2	45	84	87	153	-	48	946
Mexico	18	147	569	6	1	44	92	50	74	48	-	261
Spain	182	108	2634	6	2	137	64	194	450	946	261	-
Total	296	911	7094			62.8	16	75.8	151.2	227	94.83	439

Source: Own elaboration.

Figure 3 illustrates the different collaboration networks among the Scopus (left) and WoS (right) databases. The first contrast of the figure (A and B) indicates the formation of four solid collaborative networks with a total link strength of 142, 116 links or connections, and four groups involving only 29 authors. The size of each circle indicates the proportion of citations, and the 116 links represent the number of articles published at least between two authors in the field of AI out of the total studies ($f = 358$). The participation of Singh is highlighted, actively involved in three of the four collaborative groups. In contrast, the results from WoS ($f = 269$) show a higher number of collaborative groups, 7, with a higher link strength of 147 among 49 authors. Author Joel Rodrígues is notable for having a broad collaborative network in AI, participating in six collaborative groups.

Regarding collaboration networks (CyD) between countries, both databases clearly show that Spain has the highest performance in collaboration with other countries. In the case of Scopus, Brazil, Colombia, and Mexico are shown as second, third, and fourth, respectively. The United Kingdom is in fifth place. For the works in the WOS database, Brazil ranks second, followed by Mexico, England, and Germany in third, fourth, and fifth places, respectively.

Figure 3. Collaboration between Authors and Countries and Connection Networks among Keywords (Scopus = 358; WoS= 269)



(AyB) Author collaboration networks, (CyD) Collaboration among countries, and (EyF) Connection among keywords. Source: Own elaboration using Vosviewer.

With respect to the connection networks between the keywords used in the studies (EyF), there are a total of 2,041 links in the case of Scopus and 2,201 links in WOS, indicating a stronger link strength in the WOS database than in Scopus (f = 120), despite having fewer studies (f = 91). However, Scopus has a greater number of links (f = 1,233) and a higher number of keyword groups (f = 8) compared to WOS, which has only (f = 1,153) links in four groups. The group directly related to the topic of interest in this work (f = 16) has 16 nodes marked in blue, placing it in third position regarding cluster size.

In Table 5, the authors who have published most frequently in the last five years are evident (Túñez-López et al., 2021; Túñez-López et al., 2018; Túñez-López et al., 2019; Ufarte Ruiz, Fieiras-Ceide, & Túñez-López, 2020; Ufarte Ruiz et al., 2019). Although their publications have not been in large quantities, Túñez-López stands out with a citation level (f = 72), while Ufarte Ruiz has a moderate citation level (f = 14).

Table 5. Publication Frequency of the Top 10 Authors and Journals

Author	Freq
Túñez-López, M.	3
Ufarte Ruiz, M. J.	3
Yigitcanlar, T.	3
Acemoglu, D.	2
Allam, Z.	2
Alonso, S.	2
Burrell, J.	2
Cotino, L.	2
Diakopoulos, N.	2
Dörr, K.	2

Journal	Freq
Sustainability	34
Digital Journalism	20
Water	12
Doxa Comunicación	8
Agriculture Water Manager	7
Government Information Quarterly	7
International Journal of Educational Technology in Higher Education	7
Revista Latina de Comunicación Social	6
Revista Venezolana en Gerencia	6
Computers In Human Behavior	5

Source: Own elaboration.

The journals that stand out in publishing this topic in communications are 'Sustainability,' 'Digital Journalism,' and 'Water,' which account for 59 % of the publications. The first ten works that laid the theoretical foundations of AI have been concentrated in only five journals. Seven publications are in just two journals, with four manuscripts in ' 'Journalism Practice' and three in 'Digital Journalism.'

According to the theoretical review, two of the most significant studies in the field of communications and journalism regarding AI is by Clerwall (2014). This article has garnered over 146 citations and 15,367 views. Its theme revolves around content generated by related software, like new digital journalism. This empirical study analyzed general quality, credibility, objectivity, and other aspects of software-generated content. Likewise, the reflective study by Carlson (2015) mentions 'automated journalism' as an emerging and potentially disruptive journalistic practice through the generation of algorithmic processes for transforming data into narrative informational texts. It posits that future news generation will surpass human journalistic capabilities.

Recent studies conceptually mention AI for journalistic purposes as a constant in media outlets worldwide, in building communities, unlimited capacity, the use of robotization, and the subscriber growth it generates. Its rise since 2015 has been apparent. Most of the documents have been published in recent years, as shown in the following word clouds from both databases (Figure 4).

Figure 4. Word Cloud of Keywords among the Selected studies from the Databases (Scopus = 26; WoS = 17)

Source: Own elaboration.

The analysis of keywords provides indispensable information about the themes of scientific articles; therefore, analyzing them demonstrates the dominant focus of a research area and corroborates the visibility of scientific articles. Figure 3 presents the respective analysis. Similar but not identical results regarding the most notable keywords in the selected studies are demonstrated between both databases. On one hand, in Scopus, the words 'Artificial,' 'Journalism,' and 'Intelligence' are among the top 3 most referenced keywords in the studies and also align with the search equation used by the researchers, supporting the selection of the concepts employed in the search. In contrast, in the WoS database, 'Journalism,' 'Bots,' 'Algorithms,' and 'Fake' are the top 4 referenced keywords. There is a strong relationship with the keyword 'Journalism' and, secondarily, with 'Artificial Intelligence.'

Overall, the keywords indicate a strong connection between journalistic media and AI (e.g., 'Fake,' 'Media,' 'New,' 'Technology,' 'Journalism,' 'Automated,' 'Deepfake,' 'Virtual perceptions,' 'Disinformation,' 'Deep,' 'Information,' 'Audiovisual,' 'Journalists,' 'Communication,' 'Algorithm,' 'Post'). It is also noteworthy that the keywords are related to other peripheral media or areas (e.g., 'Data,' 'Machine,' 'Robot,' 'Learning,' 'Radio,' 'Press,' 'Language,' 'Control,' 'Text,' 'Audio,' 'Sound,' 'Computer,' 'Production,' 'Libraries,' 'Forms,' 'Reality,' 'Drone,' 'Documentation,' 'Podcast,' 'Archives,' 'Narrative,' 'Social,' 'Public,' 'Innovation').

Discussion

The literature review of scientific production on AI in journalism between 2018 and 2022 has fulfilled the initially proposed objectives. The study reveals that Spain is the country with the most collaboration in publications on the subject concerned. On the other hand, the increase in publications on the topic is notable, given its relevance and timeliness in recent years. Figure 2 reflects an inflection point starting in 2016, initiating a steep upward curve due to the applicability and materialization of AI in journalistic media.

The growth in published works in this area indicates a surge in research, pertinence, and relevance for current scientific and academic affairs. Although the number of works decreases slightly for 2022, there is

no cause for concern or deductions of waning interest in the subject. On the contrary, recent studies suggest that research in technology and AI will progress even more rapidly due to the current state, reach, ease of use, and importance of these technologies (Bryson, 2018; García-Orosa, 2023; Gómez-Diago, 2022) for the media, especially journalism.

Decreased scientific production could limit collaborations, reduce scientific networks, and impact researchers' visibility and impact. This reduction may also cause fewer citations, recognition, and funding opportunities, raising concerns among researchers. Agility and practicality in generating relevant and immediate content are increasingly necessary for a society that consumes information all the time and everywhere (Barredo-Ibáñez et al., 2021; Calvo-Rubio & Ufarte-Ruiz, 2021; García-Orosa et al., 2023; Gómez-Diago, 2022).

These behaviors denote that the closely connected collaboration networks and their link strengths are more robust in Spain, a European country with primarily Latin American countries. Sub-structures among foreign researchers mark alliances established in concordance with the study by Gómez Velasco et al. (2021), albeit in a different domain or area of knowledge.

Currently, there is low tolerance for AI failures and adherence to strict regulatory and ethical requirements, given that these systems increasingly make decisions that have consequences for people (Janssen et al., 2020). This is due to the lack of regulation by current governments and, consequently, the lack of training on the part of journalists and citizens who violate ethical principles not only in journalism but also in AI.

Studies indicate that this metamorphosis promised by AI with intelligent automation, algorithms, bots, and automation in news creation directly impacts the journalistic profession that humans have dominated since its inception; this study encourages Latin American countries to establish new research collaboration networks and make use of existing ones to educate, train, and coordinate efforts. The aim is to ensure that the impact of AI on journalism does not have a negative effect, to modernize current pro-

cedures, optimize resources, and improve quality, leading to a positive future where AI serves as a complement to journalism rather than a substitute. The influence of AI on the journalism profession, whether as a substitution for journalists or as a transformation into a less operational profile, avoids routines and cognitively contributes to informational production without being imitated by such technological advancements (Fieiras-Ceide et al., 2022; Túñez-López et al., 2021; Túñez-López et al., 2018; Túñez-López et al., 2019; Valdiviezo-Abad & Bonini, 2019).

The study's limitations determine that the results depend primarily on the quality and comprehensiveness of the databases (WoS and Scopus) and the search strategies employed. Despite efforts to minimize bias in the selection of studies, it is possible that some relevant works were omitted. In addition, the inclusion and exclusion criteria may have influenced the results, as they determine which studies are included in the analysis. Moreover, the search equations established must be broad enough to capture all relevant literature but specific enough to avoid including irrelevant studies. It is important to mention that the filters and combinations used may vary depending on the database and the nature of the study, which can affect the reproducibility of the results. It appears that few methods, forms, and dynamics can be standardized, as stated by Vállez and Codina (2018), who argue that no clear line limits the scope of studies in this specific area, AI and journalism. Also, there seems to be an uncontrolled race to increasingly automate processes that require human processing and execution to reduce costs and increase content production. Another limitation is the inclusion of manuscripts only in Spanish and English; studies in other languages have been excluded.

Conclusions

The study is significant for its methodological approach, technical rigor, and timeliness. It conducts a systematic review of scientific production on AI, focusing on studies related to social communication and journalism. The methodology allows for a detailed review of scientific production related to Spain and Latin America regarding scientific collaboration, ci-

tation levels, strength of links, and keywords in countries of Latin America and Spain.

The journals that concentrate the highest number of publications on AI in relation to journalism suggest, in a sense, a specialization in the topic. It could also have been a special issue in which authors disseminate their studies and findings in these scientific journals. In this regard, the standout journals are *Profesional de la Información* Q1 (f = 10), *Doxa Comunicación* Q3, and *Revista Latina de Comunicación Social* Q1 (f = 4 each), followed by *Index Comunicación* Q2 (f = 3). Journals with only two publications include *Estudios Sobre el Mensaje Periodístico* Q2, *Icono 14* Q, *Communication and Society* Q2, and *Brazilian Journalism Research* Q3.

It can be concluded that the relevance of this study lies in its methodological nature, technical rigor, and timeliness due to its ability to identify key trends and gaps in knowledge; it benefits academic disciplines by facilitating collaboration, informing research agendas, and supporting decision-making related to funding and policy development. Additionally, it provides a comprehensive overview of existing literature and promotes the advancement of knowledge within the academic community in the context of AI and journalism. The two databases, Scopus and Web of Science, are the most reliable and consulted databases in recent decades. However, future studies could include research published in other databases. Out of the total 627 screened studies and after discriminating only the relevant ones (43), a variety of terminology was found to refer to this type of research, author collaboration networks in studies from both databases, scientific journals with a greater presence in the thematic area, authors with the highest publication frequency, and the proportion of publication in the last five years. This allows the scientific community to receive relevant inputs for qualitative and quantitative studies.

Studies conducted in Latin America are scarce, although authorship in the production of studies is present in countries such as Brazil, Colombia, Chile, and Argentina, among others. On the other hand, studies on the media with empirical methodology are lacking, and such studies would

significantly contribute to the scientific community. This study answers the research question posed despite the mentioned limitations. It opens the possibility of generating future research on the subject. Peripheral studies can be included to provide a deeper understanding of thematic trends, adding value to the field of knowledge.

Ethical Considerations of the Study

The research adhered to the ethical principles of UNESCO's (2021) "Ethics of Artificial Intelligence," focusing on multidisciplinary and pluralistic dialogue concerning ethical issues related to AI in fields such as education, science, culture, communication, and information.

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