Revista Mediterránea de Comunicación
Mediterranean Journal of Communication

Revista Mediterránea de Comunicación (RMC)
Mediterranean Journal of Communication (MJC)
ISSN: 1989-872X

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Spanish media coverage of journalistic artificial intelligence: relevance, topics and framing

Cobertura mediática de la inteligencia artificial periodística en España: relevancia, temas y framing

Deadlines | Received: 13/05/2023 - Reviewed: 05/10/2023 - Accepted: 08/10/2023 - Published: 01/07/2024

Abstract
Artificial intelligence (AI) has become a much-discussed topic due to its implementation in many areas, including journalism. This article examines the coverage of journalistic AI in Spanish written media, in particular the relevance allocated to it, the topics that are addressed, and the framing from which it is approached. Quantitative content analysis and statistical analysis were used. Although journalistic AI only appears as the main topic in a third of cases, it is increasingly present, it is distributed across more sections, and it mostly appears in self-written articles. Despite informative texts prevailing, journalists author the majority of interpretative and practically all opinion pieces, thus increasing knowledge and promoting public debate. They deal largely with the most widespread application of AI, which is news automation, ranking well above the issues of job loss and ethics. Although journalistic AI is generally framed from a perspective of its benefits rather than from its risks, some recent changes are observed: growing concern about its dangers and its ethical implications; the detection of numerous pieces with a Personal Frame, where journalists reflect on their profession and the use of ChatGPT; and the growing relevance of the Episodic Frame as specific AI products develop. This study could have examined all types of media, although that approach would have gone beyond the exploratory nature of this pioneering research. With this work we extend scientific production on journalistic AI in Spain, where this perspective has not been analysed.

Keywords
Artificial intelligence; framing: journalism; media; media coverage; Spain.

Resumen
La inteligencia artificial (IA) se ha convertido en un tema muy discutido debido a su implementación en muchas áreas, incluida la periodística. Se examina la cobertura de la IA periodística en medios escritos españoles, particularmente la relevancia otorgada, los temas tratados y el encuadre desde el que se aborda, mediante un análisis de contenido cuantitativo y un análisis estadístico. La IA periodística solo aparece como tema principal en un tercio de los casos, está cada vez más presente, se distribuye en más secciones y aparece principalmente en piezas escritas por periodistas de los medios. Predominan los textos informativos, pero son los periodistas quienes escriben la mayoría de los interpretativos y prácticamente todos los opinativos, promoviendo así el conocimiento y el debate público. Se ocupan principalmente de la aplicación más extendida de la IA, que es la automatización, muy por encima de los problemas laborales y éticos. La IA periodística suele enmarcarse más desde sus beneficios que de sus riesgos, pero recientemente se observan algunos cambios: una creciente preocupación por sus peligros e implicaciones éticas; la detección de abundantes piezas con encuadre personal, donde los periodistas hablan de su profesión y del uso de ChatGPT; y una creciente relevancia del encuadre episódico con el desarrollo de productos de IA. Este estudio podría haber examinado todo tipo de medios, aunque habría ido más allá de la naturaleza exploratoria de esta investigación pionera. Con este trabajo ampliamos la producción científica sobre IA periodística en España, donde esta perspectiva no ha sido analizada.

Palabras clave
Cobertura mediática; España; framing; inteligencia artificial; medios de comunicación; periodismo.

Parratt-Fernández, S., Chaparro-Domínguez, M. Á., & Martín-Sánchez, I. M. (2024). Spanish media coverage of journalistic artificial intelligence: relevance, topics and framing [Cobertura mediática de la inteligencia artificial periodística en España: relevancia, temas y framing]. *Revista Mediterránea de Comunicación/Mediterranean Journal of Communication, 15*(2), e25169. https://www.doi.org/10.14198/MEDCOM.25169

1. Introduction

As a basic definition, artificial intelligence (AI) generally refers to computational solutions that use statistical principles, algorithms, and data analysis to create non-human decision-making and recommendation systems (Nguyen & Hekman, 2022a). Many companies are using AI in many products and services such as social media content curation and news production (Brennen, 2018: 2). AI implementation has become a much-discussed topic publicly (Hansen, 2022), largely because information and arguments presented in the news media affect public knowledge and the acceptance of emerging developments (Chuan, Tsai & Cho, 2019; Brantner & Saurwein, 2021). In fact, AI technologies and their implications for society are becoming so relevant that *The Financial Times* recently announced the creation of a new role, the AI editor, to head up the coverage of AI stories (Financial Times, 2023). Media coverage "provides an important basis for the public discussion of AI, and as the issues surrounding these technologies grow ever more important, it is worth considering how its journalistic treatment might evolve" (Brennen, 2018: 9). Ultimately, "studying media discussion of AI helps elucidate what AI is and what it could be" (Brennen, 2018: 2).

A study on how the UK media cover AI notes that they are focusing on the wrong topics and ultimately, that they disagree over which are the topics that should conform AI as a public issue. As their articles deal with the sensational threats of AI taking over society, "they are unable to participate in a more grounded and useful conversation to address the more pressing dangers or issues" (Brennen, 2018: 9). The study also shows that nearly 60% of news articles are focused on new AI products for industry and initiatives that include AI, and these are often portrayed as the solution to a wide variety of public problems. Journalists or commentators rarely question whether AI-containing technologies are the best solutions to such problems or acknowledge the ongoing debates concerning AI's potential effects (Brennen, 2018: 1).

Media coverage of AI has been widely approached academically from the context of many fields, but not from that of journalism. Meta-journalistic studies, on how journalists cover the application of AI to journalism, are practically non-existent. Spain is no exception to this trend, even though the implementation of AI in the field of communication in general and journalism in particular has aroused great academic interest in this country. Spain is second only to the United States in its scientific production on AI and communication (García-Orosa, Canavilhas & Vázquez-Herrero, 2023) and third after the US and Germany in the number of publications on automated journalism (Xu & Lan, 2020). This article aims to expand this production to include a perspective that has not been analysed in this country: Spanish media coverage of AI used in the field of journalism. We will call this journalistic AI. This will allow us to understand what journalists are transmitting about something that not only affects their work, but which also indirectly affects the public, as consumers of information.

2. Literature review

2.1. The application of artificial intelligence to journalism

AI technologies are fast becoming a core part of modern news operations at every level: from the gathering of news, its evaluation, verification, composition, and presentation, right through to its distribution (Newman, 2022: 35). Or, in a broad sense, gathering, production and distribution of news (Beckett, 2019: 20). Computational news gathering and evaluation uses tools that find and filter newsworthy information from social media platforms and large volumes of digital data. Computational news composition and presentation can make use of natural language generation and AI to generate written and audio-visual news texts, often from data-feeds. As for distribution, examples include automated news personalisation —where stories are chosen and prioritised according to individual users' preferences— and news aggregation sites and apps (Thurman, 2019: 180).

Other typologies that cover AI´s increasing variety of uses in journalism are those outlined by Chan-Olmsted (2019), these being audience content recommendations/discovery, audience engagement, increased audience experience, message optimization, content management, content creation, audience insights, and operational automation; and also by Parratt, Mayoral & Mera (2021), who include news detection, automated news verification and fact-checking, robotic writing, data journalism, ethical issues, the impact of AI on the textual part of the news, and the incorporation of AI into journalism education. Also, the use of AI in the optimisation of images JournalismAI (2022), speech recognition and transcription, automated translation, predictive analytics, and media monitoring.

These developments raise issues around bias, ethics, and regulation. If algorithms are employed for public interest journalism, concerns arise as to whether we can trust them when providing checks and balances, identifying important issues, establishing an agenda for public opinion formation and, ultimately, taking over journalism's role as a watchdog (Graefe, 2016: 47). Therefore, research needs to answer important questions about the social roles of journalism as a facilitator of public knowledge (Ziegler, 2015) through media coverage.

2.2. Media coverage of journalistic AI

The role of news media is assumed to be "to synthesise and connect different expert views to general audiences that are affected by and, directly or indirectly, contribute to their adoption of new technologies as citizens and consumers/users" (Nguyen & Hekman, 2022b). "Scientists, economic actors, politicians, regulators, and ordinary citizens are all trying to have a voice in the public discussion" (Gurr & Metag, 2023: 239) about the development and implementation of emerging technologies. Therefore, they try to reach the audience through media coverage".

As mentioned above, there is an increasing amount of academic literature that deals with media coverage of AI technology and its implementation in different areas of society. It does so from many perspectives, such as risks and responsibility (Brantner & Saurwein, 2021); framing (Nguyen & Hekman, 2022a; Suerdem & Akkilic, 2021; Cools, Van Gorp & Opgenhaffen, 2022); news framing and public discourses (Nguyen & Hekman, 2022b); frames and topics (Albarrán, Molina & Gijón, 2021); sources and topics (Martín-Holguín, 2018); rigor and clarity (De-Lara, 2022); and coverage in British (Brennen, 2018; Brennen, Howard & Nielsen, 2022), US (Chuan, Tsai & Cho, 2019) and Danish (Hansen, 2022) newspapers and magazines, and in Australian mainstream news outlets (Lupton, 2021). Journalism is rarely mentioned (e.g., Schnizlein & Steinlechner, 2016; and Brantner & Saurwein, 2021) in this literature.

An online survey conducted in China found out that the audiences are rather familiar with the application of AI technology in journalism, although they do not reveal where they get the information from (Sun, Hu & Wu, 2022). Conversely, Owsley & Greenwood (2022) reveal that, when compared to an understanding of the use of AI in medical operations, assistance at work, assistance for the elderly or infirm, and autonomous vehicles, the awareness of AI operationalized for journalism (e.g., reading a news article written by AI) and broadcast news in the US was the lowest, at 29%. This leads us to believe that the media may not be focusing on the use of journalistic AI technology.

While there is relevant academic discussion about the implementation of AI in newsrooms, research on the coverage of journalistic AI is scarce. Moran & Jawaid (2022) partially fill this gap by analysing thematically media coverage of AI's application in journalism in US and UK media outlets —although they do not specify which— between 2016 and 2020. This analysis shows "how journalists are publicly dealing with an uptake in automated technologies in their own field and how frank they are willing to be about AI's role in journalism" when writing for a public readership. Although assurances are supplied that "this meta journalistic conversation is increasing", this has not been proved to be the case in Spain. Some studies on journalistic AI in this country —such as Túñez, Toural & Cacheiro, 2018; Calvo-Rubio & Ufarte-Ruiz, 2020— explore how journalists perceive the irruption of this technology in their work, but not how they inform their readership —if they actually do so— about it.

In addition to informing the readership about their use of AI through direct media coverage, journalists can also let readers know about it by making authorship visible in automated texts generated by AI. According to Grimme (2021: 9), "in terms of transparency, there is no consensus about how to label automated content". Some state that most journalists prefer transparent labelling (Thurman, Dörr & Kunert, 2017), whereas others voice opposing positions that range from advocating no labelling at all to full transparency (Diakopoulos & Koliska, 2017; Thurman, Dörr & Kunert, 2017). The identification of these texts is more frequent in countries such as the United States —e.g., the Associated Press adds to their texts a line indicating they were generated by AI— than in Spain, where newspapers choose to avoid this identification, and therefore indirectly contribute to the public's ignorance about it.

2.3. Theoretical framework

According to Dearing & Rogers (1996), salience is the extent to which issues relating to the media's agenda are considered important by a news outlet. Research based on this principle examines how relevant an issue —in this case, the use of AI in journalism— is for media outlets. This is done by focusing on three aspects of their coverage: volume, referring to the amount of news articles; frequency, meaning the timing of news; and location, understood as the outlet where the issue is published and its place within this. Nguyen & Hekman (2022a) argue that considering AI's versatility and plurality, news reporting is likely to cover its impact across diverse news sections —e.g., business, politics, technology, and culture. Brennen, however, claims that specialty reporting —like technology and science journalism— "has been especially impacted by integrating AI because of pressures and challenges that complicate reporting on such a new and technically complex topic" (2018: 2). Many outlets have reduced their science and/or technology desks, which means that these stories are covered less frequently, and by non-specialist reporters who are given less resources to cover them effectively (Dunwoody, 2014; Schäfer, 2017).

Another aspect that accounts for the relevance that media organisations give to issues is whether what they publish about these is written by their own journalists or if, conversely, they excessively use news agencies as providers of news content (Parratt, Chaparro & Gilbert, 2022). Picard (2004) points out that a high presence of self-produced content is one of the main indicators of good news coverage.

Brennen further states that research has shown "how financial pressures have encouraged organisations to cut back specialty desks and undercut the financial resources needed to publish in-depth articles. Consequently, many outlets therefore often rely on press releases for many technology and science news stories" (2018: 8).

Consideration must also be given to the "theory of informative and explanatory communication" raised by Rowan (2003) and supported by Kovach and Rosenstiel (2001), which states that breaking news discourse ought to be strengthened by more interpretive stories. Opinion journalists also "provide the evaluation, explanation, analysis, and contextualization that many journalists often are not able to provide" due to time and space constraints (Salgado & Strömbäck, 2012), and point citizens to a deeper understanding of what is really important (Jacobs & Townsley, 2011). The influence of news commentary on public opinion (Thomas, 2018) can reflect "a climate of opinion or an emerging national consensus on an issue, which may weigh heavily with citizens as they form their own opinions" (Page, Shapiro & Dempsey, 1987). The prevalence of opinion is defended by those who argue that it is not a causal factor in the decline of journalistic quality, but a democracy-enhancer and stimulator of public debate and civic engagement (Kreiss, 2016).

When examining the coverage of an issue, the way in which it is approached or framed should also be taken into account. Framing was defined by Entman as "selecting some aspects of a perceived reality and making them more salient in a communicating text, in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation to the item described" (1993: 52). Chuan, Tsai & Cho (2019) identify three types of framing in the coverage of emerging technologies. First, *Risk and Benefit Framing*, understanding as *risks* "the loss of jobs, embedded bias, privacy concern, misuse, unforeseeable risk, ethical concerns, and the shortcomings of AI; and *benefits* including economic benefit, improving human life and well-being, and reducing human bias or social inequality" (2019: 341). Secondly, *Societal versus Personal Impact Framing*. *Personal framing* "presents the news story by focusing on individuals' opinions, experiences, or the consequences of incidents" (2019: 341). By contrast, *Societal Framing* "addresses the overall consequences, or broader societal decisions such as policy or public opinion". Finally, *Thematic versus Episodic Issue Framing*. *Episodic framing* "presents an issue by offering a specific example, case study, or event-oriented report (e.g., a press conference for an AI-related product)", whereas *Thematic framing* "discusses the technology in a broader context, such as how AI is changing various industries" (2019: 342).

Accordingly, this study seeks to examine the coverage of AI as applied to the field of journalism in the Spanish written digital media and provide an insight into how this emerging technology is portrayed. To this end, the following research questions are posed:

RQ1: How relevant is journalistic AI in Spanish media coverage?

RQ2: What topics are most prevalent in Spanish media coverage of journalistic AI?

RQ3: How is journalistic AI framed in Spanish media coverage?

3. Methods

Quantitative content analysis and statistical analysis were used. These are the most appropriate methods to answer the RQ, that is, the examination of Spanish written media coverage of journalistic AI. To this end, the MyNews database was used to search through all Spanish written media, online or on their webpages (newspapers, magazines, news agencies, radio stations, media outlets, news platforms, and others) with no time limit [1]. As for the selection of the analysis units, three previously trained codifiers detected all texts containing these keywords combinations: "artificial intelligence" AND "journalism"; and "artificial intelligence" AND "journalism" AND "robot" [2]. 621 units were detected and extracted, starting in 2010 and continuing to the end of January 2023. After discarding the ones that were repeated or did not refer directly to journalistic AI, we obtained a final corpus of 588 units.

The codebook contains 23 variables that address the RQ we posed and that are based mostly on studies that we mentioned previously (table 1).

Table 1: Main variables related to RQ and their literature sources

RQ	Codebook variable	Literature sources
1. Relevance	Amount of news pieces	Dearing & Rogers (1996)
	Frequency of publication	
	Location (media type)	
	Location (section)	
	Authorship	Picard (2004); Parratt, Chaparro & Gilbert (2022)
	Type of text	Kowach & Rosenstiel (2001); Rowan (2003)
2. Topics	Main topic	Chan-Olmsted (2019); Parratt, Mayoral & Mera (2021); JournalismAI (2022)
3. Frames	Risk versus Benefit	Chuan, Tsai & Cho (2019)
	Societal versus Personal impact	
	Thematic versus Episodic issue	

Source: prepared by the authors

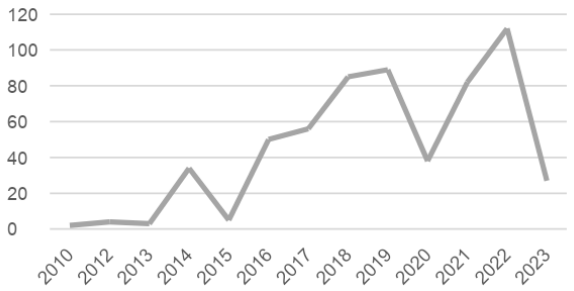
Coding was carried out after a pre-test in which disagreements were resolved by three coders working together to reach a consensus. Cohen's Kappa coefficient was used to measure the degree of agreement between coders in a sample of 20% of the units. We achieved Kappa ≥ 0.8 (1 meaning complete agreement) in all tests and variables, indicating very good agreement between the coders and an acceptable concordance. Descriptive statistical analyses were performed on the data, followed by examining dependency in the relationships between variables through Pearson's Chi-square test. Version 28 of the SPSS statistical analysis software was used.

4. Results and discussion

4.1. Relevance (RQ1)

Graph 1 shows how the coverage of AI journalism in the analysed media has evolved quantitatively. In 2010, only two pieces on the subject were published, and from then on there was a steady increase in the numbers of articles until 2014. That year, many media outlets reported on the IX International Seminar on Language and Journalism, where a round table on the application of AI in journalism was held. Subsequently, coverage increased until 2020, at which time there was a significant drop-off - coinciding with the covid-19 crisis —which recovered again in 2021 until the numbers rose again significantly in 2022. In January of 2023 alone, 27 pieces were published, almost a quarter of the number that had been published in the previous year. This not only confirms that Spain is following a similar trend to the United States and the United Kingdom, where Moran & Jawaid (2022) found that this metajournalistic coverage has been growing. Everything also points to the fact that it will experience a significant boom in 2023, coinciding with the emergence of the latest version of ChatGPT, its multiple applications and, above all, the ethical debate that is being generated around its use.

Graphic 1: Temporal distribution of AI coverage



Source: prepared by the authors. The search was done until January 31, 2023, so the data for this year correspond to this month.

In terms of where the pieces on AI journalism are published, the press accounts for the largest share (62%), followed at a considerable distance by magazines (24%) and, to a much lesser extent, audio-visual media websites (4.60%), news agencies (4.4%) and news platforms (1.9%). This trend has remained almost unchanged over time. In the early years, when coverage was scarce, almost all the information was concentrated in a few sections (Culture in 2010, Television and Opinion in 2011, Television and Technology in 2013), until in 2014 it began to diversify as the number of pieces increased. After a sharp decline in 2015, when the little that was published appeared in the Economy and Local sections, as 2022 approached, stories dealing with AI were spread across more sections. At the same time, the number of pieces that were published in the Technology section decreased, and in 2022 these pieces were surpassed by those published in the Opinion, Local, Society and, to an even greater extent, the Television sections. In other words, there is a tendency for journalistic AI not to be restricted only to specialised sections, in line with the findings of Nguyen & Hekman (2022a).

From the previous results, referring to the aspects (number of pieces, frequency of publication and location in media and sections) taken as indicators of the relevance that a media outlet gives to a topic (Dearing & Rogers, 1996), it is clear that journalistic AI is receiving increasing attention from all the media analysed. Contrary to the findings of Dunwoody (2014), Schäfer (2017) and Brennen, Howard & Nielsen (2022), it seems that, especially recently, this increased attention is not being affected by economic factors such as the reduction of specialised journalists in newsrooms. In fact, the rise of AI across a wide range of fields, including journalism, could be producing the opposite effect, which is the proliferation of journalists trained in this growing and increasingly cross-cutting subject area.

Regarding the authorship of the pieces, 38.6% were authored by journalists and 29.7% by the media outlet's editorial staff, while the remaining 31.3% came from news agencies. In other words, more than two thirds of the output was produced by the media outlets themselves. In terms of the evolution of AI coverage over time, news agencies did not start publishing pieces on journalistic AI until 2013. After that, the numbers developed irregularly, at some points even occupying first place, and appearing more there than in any other locations. Since the covid-19 crisis, there has been an increase in the number of pieces written by journalists, while the numbers of those produced by news agencies are much lower. This high level of self-produced content to the detriment of information coming from agencies is not only evidence of good journalistic coverage (as Picard, 2004), but also of the fact that the Spanish media are paying more attention, and attaching more importance, to journalistic AI.

Regarding the types of texts published, there is a clear predominance of informative texts (63.9%) as opposed to interpretative (27.9%) and opinion pieces (8.2%). The latter have increased significantly to the point that in January 2023 they were almost on a par with interpretative texts. The others have remained practically stable over time, which at first sight does not seem to be in line with the findings of Rowan (2003) and Kovach & Rosenstiel (2001), who state that more interpretative pieces enrich the news discourse. However, when cross-referencing the variables of authorship and type of text (table 1), it can be seen that, although journalists write more informative texts than agencies (28.3%), they author the vast majority of interpretative texts and practically all opinion pieces too (table 2). As already indicated, opinion texts provide contextualisation, analysis and assessment (Salgado & Strömbäck, 2012), and their influence in generating public debate on an issue is unquestionable (Thomas, 2018; Kreiss, 2016).

Table 2: Types of text used according to authorship

			Type of text			Total
			Informative	Interpretative	Opinion	
Author	Journalist/s	Count	202	147	45	394
		Expected freq.	251.7	110.1	32.2	394.0
		% of total	34.4%	25.0%	7.7%	67.1%
	Agency (or journalist from an agency)	Count	166	14	0	180
		Expected freq.	115.0	50.3	14.7	180.0
		% of total	28.3%	2.4%	0.0%	30.7%
	Others	Count	7	3	3	13
		Expected freq.	8.3	3.6	1.1	13.0
		% of total	1.2%	0.5%	0.5%	2.2%
Total		Count	375	164	48	587
		Expected freq.	375.0	164.0	48.0	587.0
		% of total	63.9%	27.9%	8.2%	100.0%

Source: prepared by the authors

To examine the relationship of dependence between authorship and type of text, Pearson's Chi-square was used, obtaining a p-value of 0.000 (<0.05), which means that there is a relationship between them, i.e. the type of text is conditioned by the author of the text. This explains why the interpretative texts are mostly authored by journalists, as has been pointed out. Likewise, the variable `type of text' is also related to the type of media outlet that publishes the text (p-value: 0.001 (<0.05).

4.2. Topics (RQ2)

As seen above, journalistic AI is increasingly present in the media. However, it is a main topic only in 37.3% of cases and then usually in pieces that deal mostly with text automation (43%), which is the most widespread AI application. Far behind are verification (15.5%), job loss (11.1%) and ethical issues (10.6%). The latter is in line with the findings of Brennen (2018), who states not only that journalists and commentators hardly question whether AI technology in general is the solution to certain problems, but that neither do they address the problems or dangers associated with its use. In the case of journalistic AI, it does not seem to be —at present— a priority for the Spanish media to inform the public about the possible repercussions of these technological advances, either in the journalistic profession or in society as a whole.

Furthermore, 41.4% of the pieces deal with the launch of new products by AI service providers, a trend that only experienced a considerable —and understandable— decline during the covid-19 crisis. However, more recently, Brennen (2018) found that in the British press almost 60% of the texts dealing more generally with AI also put the focus on new products. This fact, as Brennen himself points out, is not overly desirable from a journalistic point of view. To some extent though, it is to be expected that a place will be sought in the media by the promoters of these products, as has already been observed by Gurr & Metag (2023) and also that the media will necessarily cover the emergence of new technologies that will have an impact on society.

When cross referencing the main topic of the piece with the type of text in which it appears (table 3), it can be seen that automation of content, as the topic which is most frequently dealt with in journalistic AI, appears most in informative and interpretative texts. In contrast, ethical, educational, and labour issues have a greater presence in opinion texts when compared to other topics. This is not surprising if we take into account that, even if —as previously mentioned— these issues are not a priority for journalists, they are still issues that generate increased debate and controversy due to concerns about the possible repercussions of journalistic AI on journalists' own future employment and on their profession as a whole.

Table 3: Topics according to types of text

			Main topic				
			News detection and verification	Automated news production	Ethical, educational, and labour issues	Relationships with audience and others	Total
Type of text	Informative	Count	23	50	32	18	123
		Expected freq.	21.4	57.0	30.3	14.3	123.0
		% of total	11.1%	24.2%	15.5%	8.7%	59.4%
	Interpretative	Count	11	42	7	6	66
		Expected freq.	11.5	30.6	16.3	7.7	66.0
		% of total	5.3%	20.3%	3.4%	2.9%	31.9%
	Opinion	Count	2	4	12	0	18
		Expected freq.	3.1	8.3	4.4	2.1	18.0
		% of total	1.0%	1.9%	5.8%	0.0%	8.7%
Total		Count	36	96	51	24	207
		Expected freq.	36.0	96.0	51.0	24.0	207.0
		% of total	17.4%	46.4%	24.6%	11.6%	100%

Source: prepared by the authors

On the other hand, Pearson's Chi-square shows a dependency relationship between the main topic and the authorship of the texts (p-value: 0.005 (<0.05)). In other words, whether the main topic is one subject, or another depends on the type of author of the published text.

4.3. Framing (RQ3)

As previously mentioned, the way in which an issue is approached or framed should also be taken into consideration when examining its coverage. Following the classification proposed by Chuan, Tsai & Cho (2019) in the coverage of emerging technologies, we can see (table 4) that almost half of the pieces are approached from the *Risk versus Benefit* frame, followed by the *Thematic versus Episodic* issue frame and, lastly, *Social versus Personal impact*. In the first case, the texts focus more on the benefits of journalistic AI than on the risks.

Table 4: Types and distribution of frames used in coverage of journalistic AI

Frames	% of news pieces	Distribution
Risk versus Benefit	48.5%	*Risk*: 10.9% *Benefit*: 37.6%
Social versus Personal impact	7.6%	*Societal*: 5.7% *Personal*: 1.8%
Thematic versus Episodic issue	38.1%	*Thematic*: 14.4% *Episodic*: 23.6%

Source: prepared by the authors

When examining the temporal evolution of the framing, we see that *Benefit* rose relative to *Risk* during the crisis but so far in 2023, *Benefit* has fallen below *Risk*. Thus, the boom in journalistic AI coverage may go hand in hand with growing concerns about the potential risks and ethical implications of these new technological developments. Bucking the previous trend, it is also evident that in 2023 the *Personal* frame is overtaking the *Societal*. This is in line with the evidence of abundant pieces at this time, in which journalists discuss their profession, the potential use of ChatGPT, and the possibility of robots writing

journalistic texts. In other words, "(they present) the news story by focusing on individuals' opinions, experiences, or consequences of incidents" (Chuan, Tsai & Cho, 2019). As for *Episodic* referring to event-oriented reports such as press conferences for AI-related products, according to Chuan, Tsai & Cho, 2019, until 2015 this frame hardly existed, but from then on it has become more prevalent, in line with the development of more specific AI journalistic products.

Cross-referencing the most frequent topics and frames, we find that news detection and verification are almost always addressed from the *Benefit* and *Episodic* frames (tables 5 and 6), although to a lesser extent, content automation receives similar treatment. That is to say, especially in the case of *benefit*, these issues are dealt with from the point of view of their benefits and with a focus towards specific cases, such as the appearance of technological innovations, rather than from a viewpoint encompassing broader contexts. Conversely, ethical, educational, and labour issues —when they are addressed from the *Risk versus Benefit* and *Thematic versus Episodic* frames— are dealt with more from the *Risk* and the *Thematic* frames. This is to be expected for issues that are widely debated in the journalistic profession.

Table 5: *Risk versus Benefit* Frame according to topics

			Frame *Risk/Benefit*			Total
			Neither	***Risk***	***Benefit***	
Main topic	News detection and verification	Count	4	0	32	36
		Expected freq.	9.2	5.4	21.4	36.0
		% of total	1.9%	0.0%	15.5%	17.4%
	Automated news production	Count	17	16	63	96
		Expected freq.	24.6	14.4	57.0	96.0
		% of total	8.2%	7.7%	30.4%	46.4%
	Ethical, educational, and labour issues	Count	25	15	11	51
		Expected freq.	13.1	7.6	30.3	51.0
		% of total	12.1%	7.2%	5.3%	24.6%
	Others	Count	7	0	17	24
		Expected freq.	6.1	3.6	14.3	24.0
		% of total	3.4%	0.0%	8.2%	11.6%
Total		Count	53	31	123	207
		Expected freq.	53.0	31.0	123.0	207.0
		% of total	25.6%	15.0%	59.4%	100.0%

Source: prepared by the authors

Table 6: *Thematic versus Episodic Frame* according to topics

			Frame Thematic/Episodic			Total
			Neither	Thematic	Episodic	
Main topic	News detection and verification	Count	5	1	30	36
		Expected freq.	11.3	8.9	15.8	36.0
		% of total	2.4%	0.5%	14.5%	17.4%
	Automated news production	Count	31	24	41	96
		Expected freq.	30.1	23.7	42.2	96.0
		% of total	15.0%	11.6%	19.8%	46.4%
	Ethical, educational, and labour issues	Count	17	26	8	51
		Expected freq.	16.0	12.6	22.4	51.0
		% of total	8.2%	12.6%	3.9%	24.6%
	Others	Count	12	0	12	24
		Expected freq.	7.5	5.9	10.6	24.0
		% of total	5.8%	0.0%	5.8%	11.6%
Total		Count	65	51	91	207
		Expected freq.	65.0	51.0	91.0	207.0
		% of total	31.4%	24.6%	44.0%	100.0%

Source: prepared by the authors

Similarly, the dependence that may exist between the different types of frames and the main topic of the text has also been examined. The application of Pearson's Chi-square shows that the main topic of the piece conditions both the use of the *Risk versus Benefit frame* (p-value: 0.000 (<0.05) and the *Thematic versus Episodic frame* (p-value: 0.000 (<0.05). This explains, for example, why content automation is most often approached from the positive aspects it could bring to the media.

5. Conclusions

This article aims at expanding the scientific production on AI used in the field of journalism —what we call journalistic AI— to a perspective that has not been analysed, which is its coverage by the Spanish written media. In particular, the relevance given to journalistic AI, the topics that are covered within this issue, and the frames from which it is approached. Media coverage of journalistic is not only a new topic in Spanish academic production, but worldwide, since there is only one study that partially addresses it in the United States and the United Kingdom.

Coverage of journalistic AI in the media analysed has been increasing since the first pieces appeared in 2010 until the present day, and it seems that in 2023 this coverage will grow even more, coinciding with the rise of ChatGPT and the controversy this is generating. The press accounts for most of what is published —and it stays that way over time— followed by magazines and then, to a much lesser extent, audio-visual media websites, agencies, and news platforms. Initially, almost all AI news was concentrated in only a few sections, but there is an increasing tendency for journalistic AI not to be restricted to specialised sections and for its presence to be more spread out.

Contrary to what some authors have pointed out, it does not seem that, especially in recent times, this media attention is being affected by economic restrictions such as the reduction of specialised journalists. On the contrary, due to the boom in AI across different fields, including journalism, there is a proliferation of editors trained in this emerging and increasingly transversal subject.

The high presence of self-written content about journalistic AI (more than two thirds) as opposed to information produced by news agencies, is also an indicator of good coverage of this topic by the Spanish media, as well as evidence that they are attaching more importance to it (RQ1).

In terms of the types of texts that address journalistic AI, informative texts predominate over interpretative and opinion pieces, something which, at first glance, would not seem to contribute to enriching the coverage. However, it is media journalists who author most of the interpretative pieces and practically all of the opinion pieces. Furthermore, these pieces increased a lot recently and play a relevant role in the generation of public discourse on the subject.

However, the growing media presence of journalistic AI needs to be qualified, as it only appears as the main topic of the articles in just over a third of all cases. These mainly deal with the most widespread application, which is the automation of texts, far above pieces dealing with the loss of work and ethical aspects (RQ2). It seems, therefore, that the media do not prioritise the dissemination of information concerning the effects that these technological advances may have on both the journalistic profession and society. However, when these subjects are raised, it is mainly in opinion texts, with the consequent debate that usually arises as a result.

Finally, while journalistic AI in general has been framed more from the point of view of its benefits rather than its risks, in January 2023 the opposite is true, suggesting that the increase in coverage could be accompanied by a growing concern about the dangers and ethical implications of these technological advances (RQ3). Furthermore, and bucking the trend which had been followed until now, in 2023 the *Personal frame* is overtaking the *Societal frame*, coinciding with the detection of abundant texts in which journalists discuss their profession and the possible journalistic uses of ChatGPT. The *Episodic frame* has also become more important as specific journalistic AI products have been developed.

In short, this study not only contributes to academic literature on journalism and AI by adopting a new angle. It also lays the foundations for reflecting on an aspect scarcely considered in academia, which is media's contribution to knowledge and understanding of a meta journalistic issue such as journalistic AI. It should not be forgotten that the effects of these technological advances affect the journalistic profession, but also society and, therefore, the generation of public discourse about them.

As for the limitations of this study, the coverage of journalistic AI across all types of media could have been examined —i.e., audio and audio-visual media as well as print media— but this would have gone far beyond the exploratory scope of this pioneering research. Future work could compare this journalistic AI coverage with that of AI as applied to other fields. Similarly, it would be interesting to replicate this study at the end of 2023, as the results obtained in January point to some recent changes in trends worthy of further analysis.

6. Contributions

Contributions	Authors
Research design	Author 1 and 2
Documentary search	Author 1
Data collection	Author 1, 2 and 3
Critical data analysis and interpretation	Author 1 and 2
Review and approval of versions	Author 1, 2 and 3

7. Acknowledgement

Translator: authors.

8. Funding

This article is part of the project PR3/23-30837 funded by the Complutense University of Madrid.

This paper is part of the special issue "Communication, social innovation and sustainability" belonging to the R+D+I Project "Innovation ecosystems in the communication industry: players, technologies and configurations for the emergence of innovation in media and communication" (INNOVACOM), with reference PID2020-114007RB-I00. It was funded by the Ministry of Science, Innovation and Universities, AEI/10.13039/501100011033.

Proyecto *INNOVACOM* ***PID2020-114007RB-I00*** financiado por:

MINISTERIO DE CIENCIA E INNOVACIÓN

AGENCIA ESTATAL DE INVESTIGACIÓN

9. Conflict of Interest Statement

The authors declare that no conflict of interest exists.

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Notes

1. The search in MyNews was carried out since 1996, the first year in which this newspaper library has indexed content from written media in Spain. However, the first result does not appear in the MyNews archives until 2010.

2. Translated from the Spanish words used in the search: "inteligencia artificial" Y "periodismo"; and "inteligencia artificial" Y "periodismo" Y "robot".