Profiles and training needs of fact-checkers in the Iberian Peninsula: impact of AI

Perfiles y necesidades formativas de los fact-checkers de la Península Ibérica: impacto de la IA

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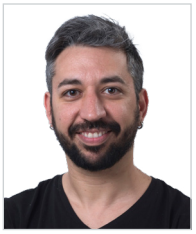

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Abstract:

This article analyses the needs and challenges of fact-checkers in the Iberian Peninsula, in the framework of the IBERIFIER project. This study focuses on the identification and evaluation of technological tools based on artificial intelligence (AI) used in the fight against disinformation in Spain and Portugal. It highlights verifier profiles, current tools and workflows, as well as specific training needs. Preliminary observations of the work dynamics in four verification newsrooms in Spain are included, highlighting organizational and methodological differences between entities. In addition, the limitations and opportunities of implementing AI solutions in this field are addressed. The results show that, although various technological tools are available, their efficiency and effectiveness depend mostly on the integration of the human factor in the verification process. Finally, guidelines and best practices are proposed to improve fact-checking using advanced technologies, underlining the importance of continuous training and collaboration between different actors to effectively address disinformation.

Keywords:

Artificial intelligence; fact-checking; disinformation; digital media; Iberian Peninsula; Spain; Portugal.

Resumen:

El presente artículo analiza las necesidades y desafíos de los verificadores de hechos en la Península Ibérica, en el marco del proyecto IBERIFIER. Este estudio se centra en la identificación y evaluación de herramientas tecnológicas basadas en inteligencia artificial (IA) utilizadas en la lucha contra la desinformación en España y Portugal. Se destacan los perfiles de los verificadores, las herramientas y flujos de trabajo actuales, así como las necesidades de formación específicas. Se incluyen observaciones preliminares de la dinámica laboral en cuatro redacciones de verificación en España, subrayando las diferencias organizativas y metodológicas entre las entidades. Además, se abordan las limitaciones y oportunidades que presenta la implementación de soluciones de IA en este ámbito. Los resultados muestran que, aunque existen diversas herramientas tecnológicas, la eficiencia y efectividad de estas dependen en gran medida de la integración del factor humano en el proceso de verificación. Finalmente, se proponen directrices y mejores prácticas para mejorar la verificación de hechos mediante el uso de tecnologías avanzadas, subrayando la importancia de la formación continua y la colaboración entre diferentes actores para enfrentar la desinformación de manera efectiva.

Palabras clave:

Inteligencia artificial; verificación de hechos; desinformación; medios digitales; Península Ibérica; España; Portugal.

1. Introduction

The digital transformation of the media has generated new professional profiles and competences in the field of journalism, especially in fact-checking. Fact-checking journalists have become key players in the fight against disinformation, requiring advanced skills in the use of artificial intelligence (AI) technologies and a deep understanding of the dynamics of digital information. The increasing complexity of disinformation in the digital age demands that these professionals not only master technological tools, but also understand user behaviour and the psychology behind the spread of false information (Agarwal et al., 2023; Santos, 2023; Slapakova, 2021).

In this scenario, artificial intelligence (AI) emerges as a promising tool for both the creation and detection of disinformation. AI enables the automation of complex tasks that previously required human intervention, facilitating the generation and dissemination of false content, known as deepfakes or ultra-fakes, which include texts, images, audios and videos manipulated with a high degree of realism (Bontridder & Poullet, 2021). However, the same technology that amplifies disinformation can also be harnessed to combat it. AI-based solutions offer the possibility of detecting false information more accurately and efficiently, overcoming the limitations of traditional manual methods (Montoro-Montarroso et al., 2023).

Fact-checkers in the Iberian Peninsula, within the IBERIFIER project, face specific challenges that require a combination of advanced digital competences and a robust ethical approach. Recent studies have highlighted the importance of developing technological skills and new professional competences in journalism to effectively address disinformation (López-García et al., 2017; Martín-Antoranz et al., 2019). These new professional profiles must be able to use AI technologies to automate and improve the accuracy of fact-checking, while maintaining critical and ethical judgement in the evaluation of information (Cifuentes Arias & Sixto-García, 2022; Lazo et al., 2020).

The fight against disinformation has become crucially important in the current context, marked by the proliferation of information on digital platforms and social networks. Disinformation, defined by the European Commission as 'false, inaccurate or misleading information designed, presented and promoted to cause public harm or economic gain' (European Commission, 2018), has proven to have severe consequences on public perception of critical issues, from politics to public health. Notable examples include the rapid spread of misinformation during the COVID-19 pandemic, underlining the need for reliable, fact-based information for informed decision-making and the maintenance of democracy.

In addition, the digitisation of journalism has changed the relationship between journalists and their audience, making the need for transparency and trust in the information provided more evident (Arcila et al., 2020). In this context, verifying journalists must play an active role not only in detecting disinformation, but also in educating the audience about the importance of consuming verified and reliable information.

This work is also part of the IBERIFIER[1] project, simultaneously part of the European Digital Media Observatory (EDMO), which aims to analyse the digital media ecosystem in the Iberian Peninsula and address the problem of disinformation through research, fact-checking and the development of advanced technological tools, through the association of various entities in a multidisciplinary consortium.

This article, which is the result of the work of this project, focuses on identifying and evaluating the AI-based technological tools used in Spain and Portugal, as well as on highlighting the profiles of fact-checkers and their training needs. Through this study, we seek to provide a comprehensive understanding of the challenges and opportunities presented by the implementation of AI solutions in the fight against disinformation, exploring how the integration of AI technologies can improve the practices of fact-checkers in the Iberian Peninsula and address the current challenges of disinformation (Berganza et al., 2017; Sánchez-García et al., 2023).

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This study poses the following research questions to guide the analysis:

1. What are the main training needs of fact-checkers in the Iberian Peninsula in relation to the use of artificial intelligence tools?
2. Which technological tools are used by fact-checkers in Spain and Portugal, and how do they influence their verification practices?
3. What are the main limitations and opportunities in the implementation of AI technologies in fact-checking in the Iberian region?

The specific objectives of this study can be found below:

- To identify the AI-based technological tools used by fact-checking organisations in Spain and Portugal.
- To assess the training needs of fact-checkers in the Iberian Peninsula.
- To explore the role of AI in improving fact-checking practices.
- To develop guidelines and best practices for the use of AI technologies in fact-checking.
- To contribute to the strategic analysis of the impact of disinformation.

This article is structured in several sections that comprehensively address the issue of fact-checking in the Iberian Peninsula, with a focus on the use of technological tools and artificial intelligence. After an introduction that has contextualised the importance of fact-checking in the current environment of disinformation, the article presents a theoretical framework that reviews the existing literature on disinformation and verification tools. It then details the methodology employed in the study, which combines qualitative and quantitative techniques to collect and analyse data. The results of this research are then presented, followed by a discussion that interprets the findings and suggests practical implications. Finally, conclusions, limitations of the study and proposals for future research and improvements in the field of fact-checking are presented.

2. Theoretical framework

Disinformation, defined as the deliberate dissemination of false information for the purpose of misleading, has increased its presence in the global media ecosystem, significantly affecting public trust in the media and the perception of reality (Fernández-Barrero et al., 2024). In the Iberian Peninsula, disinformation has had a notable impact in various fields, from politics to public health, exacerbated by the COVID-19 pandemic. Disinformation not only undermines the credibility of institutions, but also alters public perception and can influence critical decisions. The proliferation of social media and digital platforms has facilitated the rapid spread of false content, making it difficult for traditional media and fact-checkers to counter these misleading narratives (Rodríguez Pérez, 2020). In Spain and Portugal, this situation has generated an urgent need to develop effective fact-checking strategies.

On the other hand, technological tools play a crucial role in the fight against disinformation. These tools include artificial intelligence (AI) algorithms for the automatic detection of fake news, collaborative verification platforms and OSINT or open-source intelligence techniques (Esteban-Navarro et al., 2021). AI has been highlighted for its capacity, not only for journalism

in general (Cantón-Correa et al., 2024), but also for analysing large volumes of data and detecting patterns indicative of disinformation (Cantón-Correa, 2023), although its implementation poses ethical and technical challenges that require human oversight to ensure accuracy and proper context of information (Montoro-Montarroso et al., 2023). In addition, OSINT techniques allow fact-checkers to collect and analyse information from a variety of open sources, such as social networks and public databases. These techniques are essential for tracing the source of disinformation and understanding its spread, thus improving the effectiveness of verification processes (Vizoso & Vázquez-Herrero, 2019).

In the Iberian Peninsula, several local initiatives have emerged to address disinformation. Organisations such as Maldita.es, Newtral in Spain, or Polígrafo in Portugal, have stood out for their efforts in fact-checking and media education. These organisations use advanced technological tools and promote collaboration between journalists and the public to combat disinformation (Lotero-Echeverri et al., 2018). Despite technological advances, fact-checkers face multiple challenges. The lack of specialised tools for social network analysis and monitoring new platforms such as TikTok is a significant limitation (Herrero & Herrera-Damas, 2021). In addition, there is an urgent need for continuous training in the use of advanced technologies and in understanding the dynamics of disinformation (Rodríguez Martínez et al., 2021).

The literature also highlights the importance of collaboration between different actors, including the media, fact-checking organisations and the public, to create a united front against disinformation (Alfonso et al., 2021). This implies not only the development of technological tools, but also the promotion of media literacy so that citizens can effectively identify and reject disinformation (Ufarte-Ruiz et al., 2018).

In this paper, we will conceptualise disinformation as the deliberate dissemination of false information with the aim of misleading or manipulating public opinion. A phenomenon that has been exacerbated using social networks and other digital platforms, which allow for a rapid spread of false content (Echevarría, 2016). On the other hand, we will understand fact-checking as the process of verifying the veracity of published information, especially in the media and social networks. This process includes the identification of verifiable facts, the search for evidence and the publication of the verification results (Lotero-Echeverri et al., 2018). In this way, journalists specifically dedicated to the task of fact-checking (which is an integral part of journalism itself) are what we commonly known as fact-checkers.

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The literature review shows that disinformation is a significant challenge in the Iberian Peninsula, which requires the use of advanced technological tools and close collaboration between various actors to be effectively combated. Continuous training and media literacy are essential to improve the capacities of fact-checkers and society's resilience in the face of disinformation.

While there are outstanding initiatives in the Iberian region, such as Maldita.es, Newtral or Polígrafo, it is crucial to consider the global fact-checking landscape. In the United States, organisations such as FactCheck.org and PolitiFact have developed advanced methodologies for fact-checking, integrating technological tools and citizen collaboration. In Latin America, Chequeado has implemented innovative collaborative fact-checking strategies. These international approaches reveal common challenges, such as the need to develop specialised tools for emerging platforms and the management of large volumes of data, as well as contextual differences, especially in the use and acceptance of artificial intelligence technologies in different cultural and regulatory environments (Das et al., 2023). Comparing these initiatives allows identifying good practices and adapting effective strategies in the Iberian context.

This comparative perspective also shows that, although there are universal challenges in the fight against disinformation, such as the implementation of AI and the need for inter-institutional collaboration, significant differences are also identified in each context. In the Iberian Peninsula, barriers to the adoption of these technologies include limitations in resources and specialised training (Herrero & Herrera-Damas, 2021; Santos, 2023). On the other hand, in regions such as the United States and Latin America, the use of automated tools is more established, but they face challenges related to public distrust and the ethical implications of using AI in fact-checking (Zhou & Zafarani, 2021). Comparing these contexts would thus allow for an assessment of whether the obstacles faced by fact-checkers in the Peninsula are specific to the region or reflect structural problems present in other parts of the world. Such an analysis would also suggest the need to adapt international best practices to the cultural and operational particularities of the Iberian environment.

3. Methodology

To develop this work, a triangulated combination of qualitative and quantitative methods was used to collect and analyse data (Bericat, 1998; Flick, 2012, 2015). These methods included participant observation, online surveys and semi-structured interviews, which allowed for a comprehensive and detailed insight into the needs and challenges of fact-checkers in the Iberian Peninsula.

3.1. Participant observation

Participant observation was used in an exploratory way in this study, with the aim of gaining a preliminary insight into the working environment of fact-checkers in the Iberian Peninsula. Although this qualitative technique allows researchers to immerse themselves in the environment of the community under study and gain an in-depth understanding of its practices and dynamics, its proper implementation requires time and successive visits to comprehensively capture the routines and variations of the context under investigation (Angrosino, 2012). In this case, lack of time and resources prevented an adequate number of visits, limiting the ability to obtain a comprehensive and detailed view of the daily practices of fact-checkers.

Visits were made to four newsrooms (Maldita, Newtral, EFE Verifica and VerificaRTVE) in Spain, where interactions and workflows were observed. This exploration, carried out over the course of a week in October 2022, provided a valuable window into the internal operations of these four leading newsrooms. During these visits, there was an opportunity to observe first-hand the different workflows and realities of each entity, which gave an insight into the specific methodologies and work dynamics that characterise each organisation. This first-hand experience provided an in-depth and diverse perspective of the information verification landscape in the current context.

However, it was not possible to access Portuguese fact-checkers' editorial offices, which further limited the perspective of the Iberian fact-checking ecosystem. These circumstances, together with the exploratory nature of the technique used, restricted the depth and scope of the analysis. Therefore, the findings should be interpreted as preliminary approximations and not as conclusive results. These initial findings, although exploratory, provide an essential starting point for developing more detailed and comprehensive fact-checking studies in the region.

Despite the exploratory nature of participant observation, the results obtained offer a first insight into the specific dynamics and practices of fact-checking newsrooms in Spain. In previous studies, this technique has proven useful to understand everyday practices and discrepancies between what is reported and what happens in journalistic contexts (Emerson et al., 2011; Hammersley & Atkinson, 2019; Quian, 2021; Spradley, 1980). Despite the limitations, the preliminary findings are valuable to better contextualise the results obtained with the other techniques used in this study. This exploratory approach also allows for the identification of key areas for future research, where a more systematic and prolonged approach is recommended, including successive visits and access to additional newsrooms, such as those in Portugal, which could not be studied on this occasion.

3.2. Online surveys

To obtain a quantitative overview and to cover a wider sample, an online survey was designed for verification professionals in different regions. The survey was conducted through the Google Forms tool and is available in the annex of the report. It was sent by email to 205 journalists working in verification within specialised organisations in Ibero-America (a list of 217 verification journalists from Spain, Portugal and Latin America was located and compiled). A total of 21 responses were obtained, which represents about 10% of the surveyed population.

This low response rate introduces a non-response bias that may affect the external validity of the results (Groves, 2006). This bias is due to several factors, such as fact-checkers' work overload and lack of time to participate in the research. The list of journalists was compiled from data available on the websites of their respective organisations and from publicly accessible information. The survey was sent out at different times or waves, trying to improve the response rate, but without significant success. This may be due to the workload associated with fact-checking, which requires constant attention to current events, leaving little time to engage in external research. In addition, other factors such as the perceived relevance of the study or the absence of incentives to respond may have influenced low participation.

To mitigate this bias and improve representativeness in future research, it is recommended to implement additional strategies, such as personalised reminders, complementary short interviews or the combination of qualitative and quantitative methods.

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It would also be useful to have the active engagement of fact-checking organisations from the planning phase of the study, ensuring their collaboration to motivate the participation of their journalists. Finally, offering incentives that recognise the time and effort put in by participants could increase the response rate and, consequently, the validity of the findings.

The survey design was designed to identify the technological tools used, training needs and specific challenges faced by verification professionals in their daily work. The survey consisted of 30 questions, divided into three main sections:

- Professional profile and experience: Questions on the fact-checkers' work history were included, such as years of experience in the field, type of training received and perception of their professional competence.
- Tools and workflows: This section explored the technological tools that fact-checkers commonly use, as well as the main challenges they face in their use. Questions were asked, for example, about the use of specific tools for searching and archiving information and about the platforms they consider most relevant for their work.
- Training needs and challenges: Data were collected on fact-checkers' perceptions of their training needs and the difficulties they encounter in their work. It included open questions on training needs and challenges in the use of technological tools for fact-checking.

Although the analysis of the data obtained made it possible to identify patterns and trends among the fact-checkers who participated in the survey, the low response rate (10%) significantly limits the ability to generalise these results to the entire population of verification journalists in the Iberian Peninsula and Ibero-America. This non-response bias suggests that the findings should be interpreted with caution, as respondents may not adequately reflect the diversity and needs of the entire population. Still, the results provide useful preliminary insights that contribute to understanding the dynamics and challenges of the field but cannot be considered representative or conclusive.

To address these limitations in future research, it is recommended to implement strategies to increase the response rate, such as the use of personalised reminders and the active involvement of fact-checkers. In addition, comparative analyses between the characteristics of respondents and non-respondents would be beneficial to assess possible biases and improve data interpretation.

The surveys included closed and open-ended questions to collect both quantitative and qualitative data, allowing for an in-depth exploration of the technological tools used, workflows, training needs and specific challenges faced by fact-checkers in their daily work. Although this type of survey was selected for its efficiency in obtaining information from many participants (D'Ancona, 1996), the low response rate obtained (10%) limits the ability to generalise the results to the entire population of fact-checkers in the region. The findings provide a preliminary insight into the trends and needs of the field, but they should be interpreted with caution, as they cannot be assured to represent the full reality of the field.

Despite these limitations, the information collected provides a valuable starting point for future research and the development of training strategies. It is important to note that the data obtained is available upon request and under conditions that ensure its responsible and justified use for research purposes. In future studies, it is recommended to consider additional methodologies and direct collaboration with the verification bodies to increase participation and obtain more representative and robust results.

3.3. Semi-structured interviews

As a complement to the previous techniques, semi-structured interviews were conducted with the heads of different verification entities, as well as with various journalists dedicated to research tasks within these entities. Semi-structured interviews are a qualitative research method that combines elements of structured and unstructured interviews. They allow the researcher to address specific questions and, at the same time, offer sufficient flexibility for the interviewee to respond in detail and share additional information that may arise during the conversation (Kvale, 2012). They offer the following methodological advantages:

- Depth of information: Semi-structured interviews offer the opportunity to obtain more detailed and contextualised responses than, for example, surveys. In addition, they allow interviewers to probe and probe more deeply into specific aspects.
- Flexibility: In contrast to fully structured interviews, semi-structured interviews allow questions to be adapted and adjusted according to the interviewee's answers and the dynamics of the conversation.
- Personal connection: These interviews allow for a more direct and personal dialogue, which can lead to greater openness and sincerity on the part of the interviewee.
- Contextual adaptability: Depending on the profile of the interviewee, researchers can adapt the interview to maximise the relevance and pertinence of the exchange.
- Complementary to other methodologies: While participant observation and surveys provide general and specific insights, semi-structured interviews allow for a deeper focus on individual perspectives.

The interviews were conducted between September and December 2022, with 10 key representatives from different verification entities, namely Verificat, Maldita, EFE Verifica, Newtral and VerificaRTVE in Spain, and Lusa and Poligrafo in Portugal. Each interview was designed considering the profile and responsibilities of the interviewees, thus ensuring that relevant and detailed data was obtained from each entity. The combination of quantitative and qualitative techniques guarantees a holistic and detailed view of the current situation of the fact-checkers.

3.4. Methodological combination

The combination of qualitative and quantitative methods was selected to ensure a comprehensive and nuanced understanding of the challenges and needs of the fact-checkers. Participant observation provided, even with the limitations, a practical and contextual insight into the workflows and tools used, while online surveys allowed for efficient data collection from a broad group of participants. Semi-structured interviews complemented these methods by offering additional depth and the opportunity to explore emerging issues in greater detail.

These combined methods ensured robust and comprehensive data collection, enabling researchers to develop recommendations informed by a wide range of perspectives and experiences.

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4. Results

4.1. Preliminary results of participant observation in verification editorial offices

The participant observation carried out in four verification offices in Spain provided a preliminary insight into the dynamics and methodologies employed in each organisation. Although it was an exploratory analysis with time and scope limitations, the results allow us to identify relevant patterns and differences between the organisations studied.

EFE Verifica is characterised by its public service-oriented approach and editorial independence. Despite having a solid organisational structure, it faces challenges related to resource management and the need to respond quickly to issues of high virality, which may limit the depth of the verifications carried out.

Maldita.es stands out for its ability to innovate in the use of technological tools and its focus on collaboration with citizens. The entity has developed effective strategies to interact with its audience through platforms such as WhatsApp, which allows it to identify and respond to rumours and disinformation in real time. However, prioritising issues that are not necessarily viral but socially relevant remains a constant challenge.

Newtral presents a team highly specialised in the use of data and emerging technologies. Its organisational structure favours collaboration between its research and production teams, facilitating the integration of advanced methodologies into its workflows. However, the adoption of new tools and the management of large volumes of information in real time continue to be areas for improvement.

VerificaRTVE, being part of a public service entity with access to mass dissemination resources and platforms, has a significant capacity to address relevant and current issues. However, its hierarchical structure and the need to coordinate with other internal areas slow down the speed of response and publication of verifications, which may impact the effectiveness of its work.

These observations reflect the diversity of approaches and challenges in the fact-checking ecosystem in Spain, highlighting the need for specific technological and organisational adaptations to optimise the response to disinformation. Although the results obtained should be interpreted with caution due to their exploratory nature, they offer a starting point for future more in-depth and systematic research in this field.

4.2. Survey on the status and technology needs of information fact-checkers

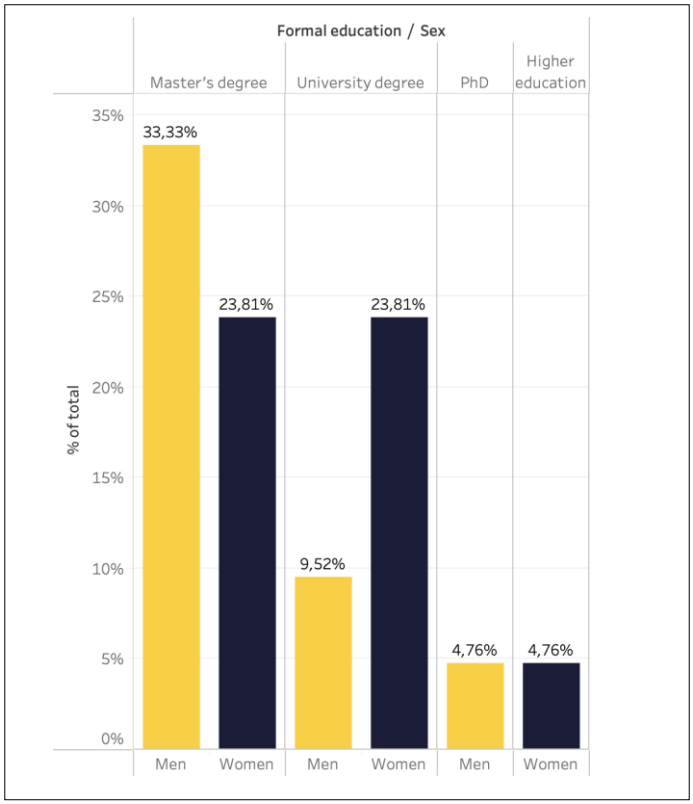
The main results obtained from the surveys and interviews with fact-checkers in Spain and Portugal are presented. Firstly, the data collected from the surveys are analysed. Subsequently, the findings derived from the semi-structured interviews are detailed.

The first block of questions in the survey was aimed at finding out the profile of age, gender and education. The average age of the fact-checkers who participated in the survey shows significant differences according to gender. Male fact-checkers have a greater variability in age, ranging from 26 to 65 years, with a median age of 37.5 years. In contrast, the median age of women

is 28, with the majority being under thirty. This suggests that many male journalists have specialised in fact-checking at some point in their careers, while many women have entered journalism directly through fact-checking.

The educational level of the fact-checkers surveyed (Figure 1) is high: 95% have some kind of university degree, 57% have a specialised Master's degree and 33% have a university certificate. There is a gender difference: more men (33%) have a Master's degree than women (24%), and more women (24%) have a university degree than men (9.5%). Many fact-checkers (43%) have between 1 and 2 years of experience, suggesting that information verification is a growing profession, driven by increasing demand, training programmes and the availability of verification tools.

Figure 1. Highest educational attainment of fact-checkers, by gender



Source: own elaboration

By gender, it is observed that men tend to be more experienced than women, consistent with the initial age and gender distribution. 24% of men have more than 3 years of experience, twice as many as the 9.5% of women with such experience.

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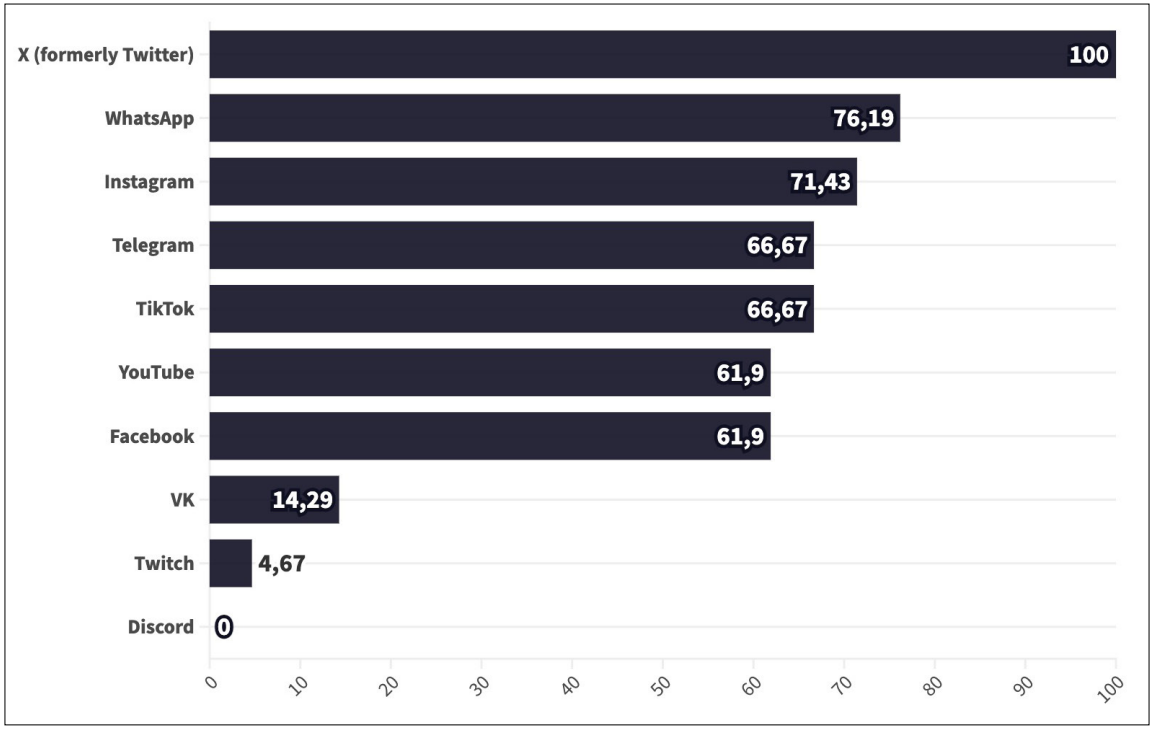
In contrast, 43% of women have 2 years or less experience, compared to 24% of men. Many respondents (48%) consider themselves to be professional fact-checkers, while 24% do not consider themselves to be professionals despite having sufficient experience, and 5% consider themselves to be beginners. This suggests a high level of confidence in their skills and knowledge, possibly due to the training and experience acquired.

On the tools and workflows specific to journalist fact-checkers, the survey revealed that the most important social networks for fact-checkers in their work (Figure 2) are X (formerly known as Twitter), WhatsApp and Instagram. X is the most used by all respondents, followed by WhatsApp (76%) and Instagram (71%). Telegram and TikTok (66% each), and YouTube and Facebook (62% each) are also mentioned. The least important are VK (14%) and Twitch (4.6%).

Figure 2. Digital platforms important for fact-checkers (multiple answer)



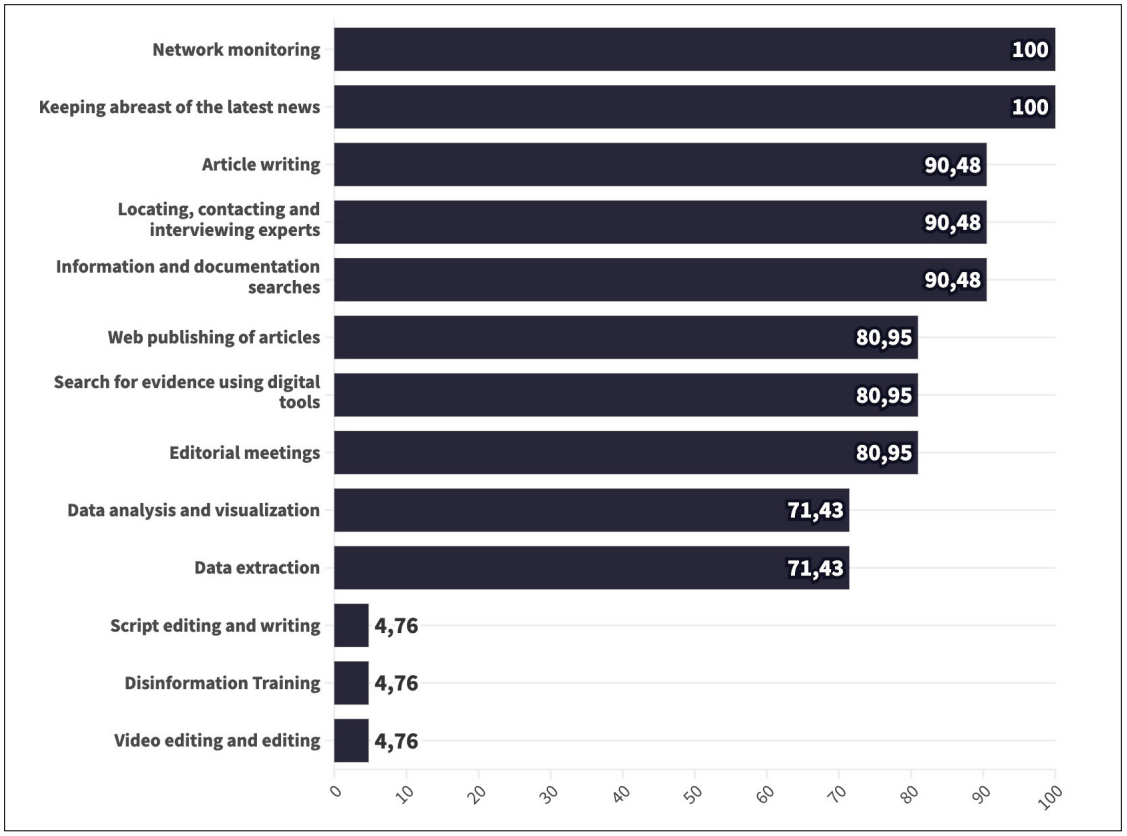
Source: own elaboration

Fact-checkers face several challenges in detecting disinformation on different platforms. WhatsApp and Telegram present difficulties due to the private nature of communications, making it difficult to trace the source of disinformation. TikTok is

also difficult to monitor due to its opacity and limitations in advanced search tools. Some fact-checkers do not have significant problems on more common platforms, but encounter difficulties on less well-known digital media.

The main tasks of information fact-checkers include monitoring social networks and keeping up with current news (Figure 3). Approximately 91% conduct information and documentation searches, contact and interview experts, and write articles. Around 81% participate in editorial meetings and use digital tools to search for evidence and publish articles. Only 5% engage in video editing and training on disinformation, suggesting specialisation in these areas.

Figure 3. Work tasks carried out for the verification of information (multiple answer)



Source: own elaboration

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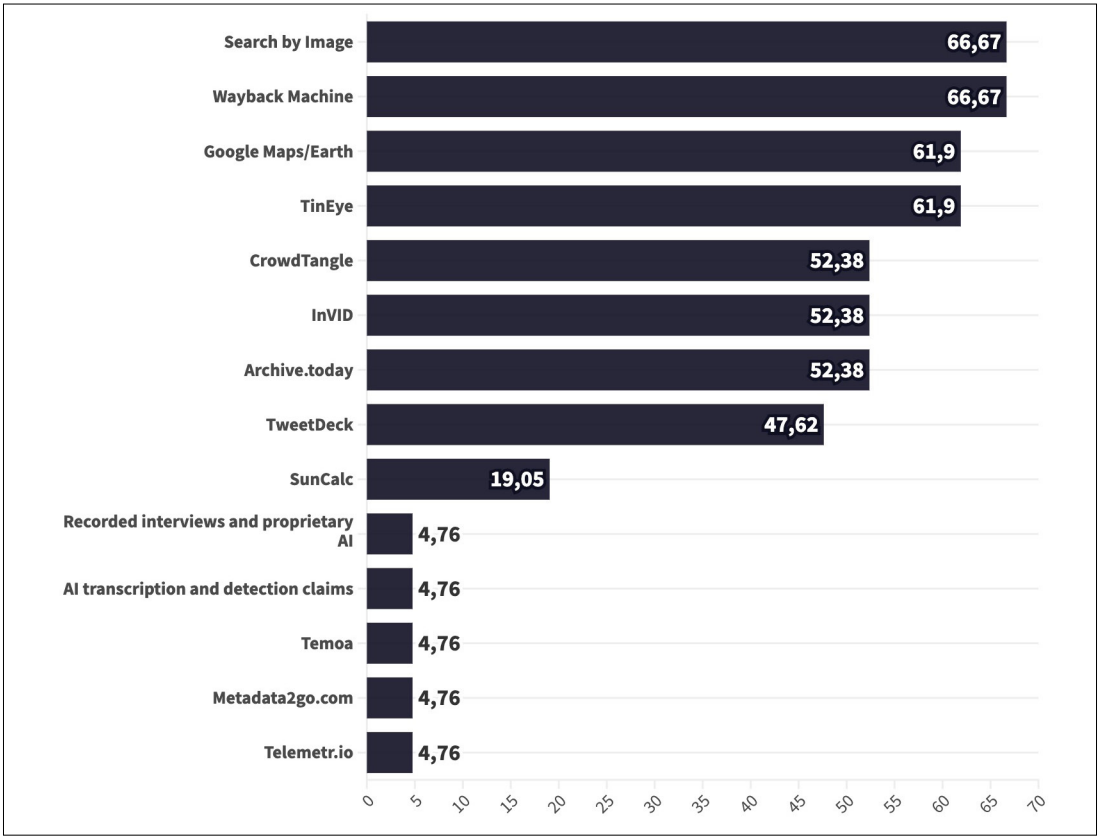
WhatsApp is the most used internal communication tool (71%), followed by email (52%). Other tools such as Slack, Signal, Teams, Telegram and Google Meet are used less frequently. The preference for WhatsApp is due to its ease of use and accessibility, while Signal stands out for its security and privacy. The adoption of tools such as Slack could be better integrated into organisational communication.

Fact-checkers prefer specialised web-based information search and archiving tools (Figure 4), such as Wayback Machine and Search by Image (67% each). TinEye and Google Maps/Earth are also popular (62%). Tools such as Archive.today, InVID and CrowdTangle are used by 52% of fact-checkers, while TweetDeck is used by 48%. Tools related to artificial intelligence and other specific tools have significantly lower usage, indicating a need for more training and resources in these areas.

Figure 4. Digital work tools used in the verification of information (multiple answer)



Source: own elaboration

Fact-checkers rate the reliability of the tools they use (4.5 on average), followed by ease of use (4.3) and time efficiency (4.2). However, features such as privacy, learning curve and user interface receive lower scores. The lack of use of programming languages in fact-checking work stands out, except for 5% who use HTML and CSS for web layout.

Fact-checkers face a variety of difficulties in their work, according to responses to open-ended questions in the survey. The main challenging tasks include verifying sources, searching for claims on podcasts and YouTube, searching for official documents, and verifying videos and images, due to the time required. Managing and monitoring large volumes of data and information also prove to be cumbersome tasks, essential for real-time verification. In addition, specific challenges such as the automatic detection of claims in podcasts and the attractive presentation of information were mentioned, underlining the complexity and diversity of tasks in fact-checking.

To investigate the training needs of the fact-checkers, questions were asked in the survey about the tools and programming languages they use, as well as the difficulties they face in their work. 76% of the participants have received training in fact-checking and 100% expressed interest in further training in the future. Training is crucial to ensure accuracy and reliability in journalism. The results show a diversity in the sources and modalities of training, with formal offline and online education getting the same percentage (33%), and on-the-job training being the most popular (43%).

The last block of the survey contained questions about the training needs that the fact-checker journalists recognised. In this respect, only 5% have received training on fact-checking as part of their university degree, and 9.5% have taken a specific Master's degree on the subject. This reflects a lack of integration of fact-checking into traditional university curricula, although its importance is recognised at postgraduate level. Furthermore, 24% of respondents have self-trained through online resources and practical on-the-job training, while 19% have done so through offline resources such as books, highlighting the importance of individual initiative and adaptability in a constantly changing field.

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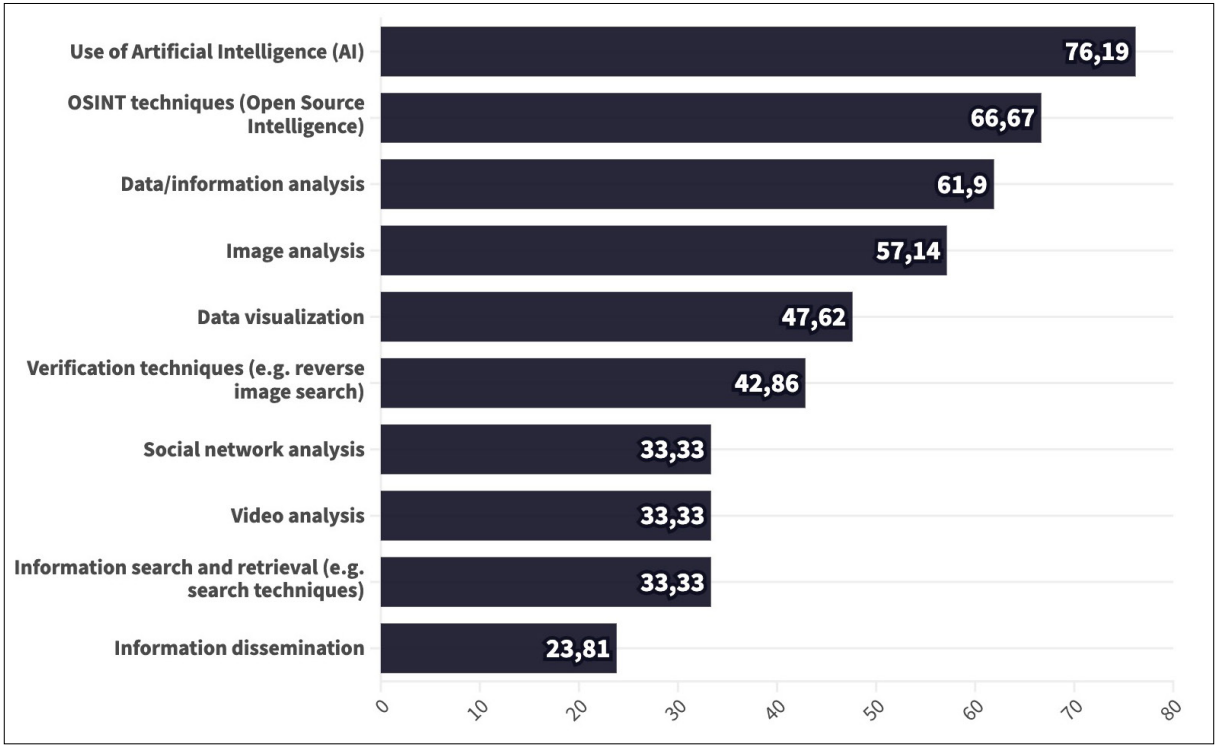
Figure 5. Training needs of Iberian fact-checkers (multiple answer)



Source: own elaboration

As shown in Figure 5, a remarkable 76% of respondents showed interest in being trained in Artificial Intelligence (AI) techniques, highlighting their growing relevance in information verification. 66% are interested in OSINT (open-source intelligence) techniques, and 62% want to go deeper into data and information analysis, using languages such as Python or R. In addition, 57% want training in image analysis, and 48% in data visualisation. They are also interested in specific fact-checker techniques (43%) and in information search and retrieval, video analysis and social media (33%). Finally, 24% expressed interest in improving their information dissemination skills, highlighting the need to manage social media platforms and digital marketing tools to maximise the impact of verified information.

In terms of the use of training in specific tools, fact-checkers have identified several key needs in the field of verification that are not being addressed. There is significant demand for specialised tools for social media, image and video analysis, as well as the use of artificial intelligence (AI). The need for tools to monitor TikTok was also highlighted, given its exponential growth and the video-centric nature of the platform. In addition, the importance of web scraping tools to extract data from various

online sources and easier access to official sources, preferably using AI, was mentioned. Finally, the need for an advanced video editor with animation features to produce engaging and effective content was expressed.

In terms of emerging trends in disinformation that respondents would like to address, the need for continuous monitoring of sources is highlighted, given that sources of disinformation are constantly changing and evolving. Also of concern is the diversification of channels through which disinformation is distributed, requiring fact-checkers to navigate and monitor multiple platforms. Another emerging issue is greenwashing, the practice of exaggerating the environmental credentials of an organisation, product or service. In addition, there is significant concern about artificial intelligence, including the limitations and future of AI, deep fakes and malicious use of AI, underscoring the need for a deep understanding and ability to counter these technological challenges.

Finally, respondents identified several unmet technical needs in newsrooms. One participant mentioned the absence of adequate fact-checker tools, indicating the need for more concrete, effective and efficient tools. The need for an accessible and reliable database of experts that fact-checkers can quickly consult was also identified. In addition, the need for specialised climate change editors and the importance of a robust and user-friendly video editor were mentioned. Finally, the need for better financial resources to support fact-checking work was highlighted, as this process can be resource intensive and without adequate funding, newsrooms may not be able to invest in the tools, training and staff needed to do this work effectively.

4.3. Individual interviews with fact-checker journalists

4.3.1. What is the status of the use of AI in the fight against disinformation?

Artificial intelligence (AI) has emerged as a promising tool in the fight against disinformation and the spread of fake news. The interviewees, experts and heads of fact-checkers, offer a diverse but complementary perspective on the role of AI in this fight. Overall, AI is recognised as having significant potential to improve efficiency and accuracy in detecting fake news, highlighting its ability to process large amounts of data and detect patterns that are difficult for a human to identify. 'AI has the potential to be a powerful tool, but we are still in the early stages of its implementation' (I1, p. 3). The importance of combining AI with human judgement is stressed, as technology alone cannot fully understand the context and subtleties of language. Some interviewees (I5, I6 and I7) mention the usefulness of AI-based tools for tracking and monitoring social networks and other media, but also point out that these tools still have room for improvement.

However, concerns and reservations are also expressed: although AI can help in detection, the final decision on whether a piece of content is disinformation or not still depends on human judgement (I5, I7). 'AI is a valuable tool, but it cannot replace human judgement and expertise' (I4, p. 5). Furthermore, several interviewees mention the ethical challenges and possible unintended consequences of relying too much on AI in news fact-checking: 'we need to be cautious and make sure that AI is not misused' (I3, p. 4). In conclusion, although AI is being used to some extent in the fight against disinformation, there is still much room to expand its use and improve its effectiveness. AI is seen as a valuable tool that can complement and enhance fact-checking efforts, but it is essential to approach it with caution and ensure its ethical and responsible use. Combining AI with human judgement seems to be the most effective approach in the fight against disinformation, as it is mentioned: 'AI is

ISSN: 1696-019X / e-ISSN: 2386-3978

a valuable tool, but it cannot replace human judgement and expertise' (I4, p. 5), or put another way: 'although AI can help in detection, the final decision on whether a content is disinformation or not still depends on human judgement' (I7, p. 5).

4.3.2. What role can AI play in the fight against disinformation?

Disinformation is a growing phenomenon that threatens the integrity of information and public trust in news sources. In this context, Artificial Intelligence (AI) emerges as a powerful tool to combat the spread of fake news and ensure that the information we consume is accurate and trustworthy. AI has a wide field to explore in task automation, especially in monitoring, where it can be more efficient than human supervision by crawling and analysing large amounts of data in real time, identifying potential hoaxes or disinformation before they become widely disseminated: 'AI allows us to monitor more efficiently, detecting hoaxes in real time' (I1, p. 2).

In addition, AI can cluster verifications, recognising recurring hoaxes and alerting fact-checkers about information already identified as false, enabling a faster and more efficient response. For example, hoaxes updated with new information but maintaining the same basic structure: 'AI helps us identify hoaxes that are repeated or slightly modified' (I1, p. 2). This 'matching' capability means that fact-checkers do not have to repeat the verification work every time they come across a similar claim: 'this tool will count our already published verifications and tell us that we have already verified it and it is false, and this politician has not been corrected or they keep repeating this myth, establishing the idea that it is true and you should attack it harder' (I3, p. 2). It can also help to detect and recognise disinformation strategies, identifying patterns in the dissemination of disinformation, especially when certain data, such as unemployment, are manipulated by different political actors: 'to detect strategies of deception, [...] which allows us to cluster it so we don't have to do the work of verification every time we receive one of these messages' (I3, p. 2). This ability to identify 'clusters' of disinformation is especially useful when different actors repeat the same disinformation.

4.3.3. What are the challenges in implementing automation through AI?

The implementation of automation through AI in the field of fact-checking and journalism presents several challenges. One of the main ones is the tension between automation and the need for human intervention. While AI can handle repetitive, high-volume tasks, human interpretation and judgement remain essential in many aspects of fact-checking, but one can try to reinterpret this symbiotic relationship: 'we have a lot of room to grow in the area of task automation, there is still too much human presence, [which] is easily solvable with existing technologies that we have not developed in the right way' (I1, p. 2). The ability to monitor and detect hoaxes or fake news in real time is essential, and AI can help in this process, although there is still room for improvement in terms of accuracy and scope: 'we have a lot of growing to do, especially in the area of monitoring' (I2, p. 2).

Moreover, differentiating between recurrent and new deceptions is a challenge. AI can help identify patterns, but the final interpretation often requires a human touch: 'it has to do with automated work, which [...] we do not attention to because we have already debunked it and people don't need to know that we have debunked it before' (I3, p. 2). Despite advances in AI, human supervision remains essential to ensure accuracy and quality of verification: 'we will always need some human

ISSN: 1696-019X / e-ISSN: 2386-3978

supervision', understanding verification 'never as something that could be fully automated' (I4, p. 2). Implementing AI solutions in practice can be challenging, especially when it comes to new or untested tools: '[there are] tools that due to their youth do not yet have [...] additional user involvement' (E5, p. 2). In addition, advanced AI tools often have a cost associated with them, which can be a barrier for organisations with limited resources: 'many of these tools are paid tools', for which OSINT tools can be a way out, but not the only way out, using 'the OSINT environment as an additional leg, but also entering fully into the world of paid tools' (I6, p. 4). These challenges reflect the considerations practitioners face when implementing AI solutions in the field of fact-checking and journalism. While AI offers significant opportunities to improve and automate processes, it also presents challenges that must be addressed to ensure its effectiveness and accuracy.

5. Discussion

The survey data reflect an interesting trend in fact-checking in Spain. The predominant youthfulness of female fact-checkers suggests a possible generational renewal in journalism, with women entering directly into specialised fact-checking roles. The high educational level of the fact-checkers indicates that this profession requires a solid academic background, which may contribute to the high level of confidence they have in their skills. In addition, the fact that fact-checking is an emerging profession, with many fact-checkers having little experience but already considering themselves professionals, suggests that the demand for these skills is driving rapid professionalisation of the field. This dynamic reflects a response by the journalism sector to growing concerns about disinformation and the critical need for fact-checking in the digital age.

Although participant observation was limited in time and scope, it provided relevant information about the internal dynamics of the newsrooms observed. Differences were observed in the organisation of teams and the use of technological tools among the entities visited. These findings, although preliminary, complement the interpretation of the quantitative and qualitative data and suggest the need to adapt the fact-checker strategies to the specific organisational characteristics of each entity.

On the other hand, fact-checkers in Spain and Portugal share similar objectives, although the media and socio-political contexts present significant differences. In Spain, high political polarisation (Torcal, 2023) and the proliferation of digital media demand a more reactive approach, while in Portugal, fact-checking faces resource constraints and the consolidation of traditional media. These differences suggest that fact-checker strategies need to be adapted to each context, which also explains variations in the use and effectiveness of technological tools.

In general, fact-checkers face specific challenges in the use of technological tools and in implementing efficient workflows. The survey revealed that the social networks most used by fact-checkers are X (formerly known as Twitter), WhatsApp and Instagram. However, platforms such as WhatsApp and Telegram present significant difficulties due to the private nature of communications, making it difficult to trace the source of disinformation. This problem highlights the need to develop more advanced tools that allow fact-checkers to access and analyse content on these platforms more effectively.

The main tasks of fact-checkers include monitoring social media, searching for information and documentation, and writing articles. It is notable that a considerable proportion of fact-checkers also participate in editorial meetings and use digital tools to search for evidence. However, a small fraction of them engages in video editing and disinformation training, suggesting potential areas of specialisation and professional development. The use of specialised tools such as Wayback Machine and

ISSN: 1696-019X / e-ISSN: 2386-3978

ISSN: 1696-019X / e-ISSN: 2386-3978

Search by Image is common among fact-checkers, but there is a clear need for more training and resources in the use of artificial intelligence and other advanced technologies. Reliability, ease of use and time efficiency are highly valued features of these tools, underlining the importance of designing solutions that are not only effective, but also accessible and easy to integrate into the daily workflows of fact-checkers.

The results also indicate a significant demand for additional training in AI techniques, OSINT (open-source intelligence), data analytics and data visualisation. This need for training reflects current gaps in the competencies of fact-checkers and highlights the importance of ongoing educational programmes that address these critical areas. Integrating these competencies will improve not only the accuracy and efficiency of fact-checking, but also the ability of fact-checkers to adapt to the evolving tactics of disinformation propagators.

While AI tools can facilitate the analysis and monitoring of large volumes of information, their implementation also presents significant challenges. In the US, PolitiFact has implemented natural language processing tools for automated detection of claims to verify, with mixed results due to difficulties in interpreting contextual nuances. In Latin America, Chequeado has developed machine learning algorithms to analyse information on platforms such as WhatsApp, facing challenges related to privacy and data access. These examples show that while AI can improve verification efficiency, its implementation requires context-specific and context-tailored approaches.

AI's ability to interpret cultural and linguistic nuances is limited (especially in languages other than English), and automated tools can have insurmountable difficulties in identifying disinformation in encrypted messages or on closed platforms. The lack of transparency in the algorithms used to detect misinformation and the risk of bias in the results also raise ethical and practical concerns. Therefore, in its current state, AI should be seen as a complementary tool to human work, and not as a substitute, in line with work that calls for human-in-the-loop approaches (Cantón-Correa, 2023; Das et al., 2023; Demartini et al., 2020; La Barbera et al., 2022, 2022; Quelle & Bovet, 2024; Shabani et al., 2021; Yang et al., 2021). To improve their effectiveness, it is crucial to develop technological solutions that can be more seamlessly integrated into the fact-checkers' workflows, while respecting privacy and legal regulations.

The data obtained show a complex and challenging picture for fact-checkers in the Iberian Peninsula. While technological tools are available, their effectiveness depends mostly on the integration of human resources and adequate training. Addressing the identified needs in terms of tools and training will be crucial to strengthen the capacities of information providers and improve the fight against disinformation in the region.

5.1. Limitations of the study

The present study has several limitations that should be considered when interpreting the results obtained. Firstly, the low response rate in the surveys, which was 10%, introduces a non-response bias that affects the external validity of the findings. This means that the results cannot be generalised to the entire population of fact-checkers in the Iberian Peninsula and Ibero-America, as respondents may not adequately reflect the diversity and needs of the entire population. Despite efforts to improve the participation rate, such as sending out surveys at different times and contacting fact-checkers through different platforms, workload and lack of time to participate in external research significantly limited data collection.

Another significant limitation is the exploratory nature of the participant observation conducted in the fact-checkers' newsrooms. Although this technique allowed for a preliminary insight into the internal dynamics and methodologies employed, time and access restrictions prevented a deeper and more systematic immersion. Furthermore, it was not possible to access the fact-checkers' offices in Portugal, which limited the ability to obtain a comprehensive perspective of the Iberian verification ecosystem. These circumstances reduced the ability to collect robust empirical data, and the findings derived from the observation should be interpreted as preliminary approximations and not as conclusive results.

Finally, limitations were identified in the implementation of artificial intelligence (AI) technologies in fact-checking. Although the available tools and their potential uses were explored, the effectiveness of these technologies is conditioned by factors such as the ability of fact-checkers to use such tools efficiently and the existence of a favourable regulatory and cultural environment for their adoption. Differences in the acceptance and use of AI in different contexts, as well as the ethical and technical challenges associated with its implementation, limit the applicability of the findings to other regions and suggest the need to adapt international best practices to local specificities.

In future research, it is recommended to expand the sample of participants to obtain more representative results and to deepen the use of participant observation with a more systematic and longitudinal approach. In addition, active collaboration with fact-checkers to improve participation in surveys and the development of comparative studies across different contexts can provide a more complete understanding of the challenges and opportunities in the use of advanced technologies in fact-checking.

ISSN: 1696-019X / e-ISSN: 2386-3978

6. Conclusions

This research has provided a detailed and comprehensive analysis of the needs and challenges faced by information verification professionals, also known as fact-checkers. Through a combination of quantitative and qualitative methodologies, the current state of these professionals, their tools, workflows and training needs have been explored. This in-depth analysis is essential to understand and address the training, technological and practical gaps faced by fact-checkers, enabling the development of more effective solutions tailored to their specific needs.

Survey responses reveal several key areas where fact-checkers need additional support or specialised tools. These include social media, image and video analysis and the use of artificial intelligence (AI). In addition, significant demand has been identified for training in the use of AI, open-source intelligence (OSINT) techniques, data and information analysis, image analysis and data visualisation. These findings underline the need to develop and provide access to specialised tools and training that address these specific aspects, thus facilitating the work of fact-checking.

In addition, the report highlights the importance of trust, ease of use and time efficiency as crucial features for the tools used by fact-checkers. While other aspects such as privacy, user interface and price are also important, they are not considered as crucial as the above. This finding suggests that, when using a tool, If users find it easy and effective, they will be willing to compromise on other aspects.

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The final considerations of this research highlight the need to address the gaps and challenges identified by developing tools and providing training that effectively meet the needs of fact-checkers. As disinformation continues to evolve and spread through various channels, it is imperative to equip fact-checkers with the necessary skills and tools to effectively combat this phenomenon. With a proactive approach and tailored responses, the fight against disinformation can be significantly strengthened, thus supporting the integrity and veracity of information in society.

6.1. Constraints and needs of fact-checkers

The survey responses highlight several important shortcomings and limitations in the work of fact-checkers. One of the main difficulties identified is the lack of specialised and efficient tools for the analysis of social networks, images and videos, as well as for the implementation of Artificial Intelligence (AI) techniques in the verification process (Montoro-Montarroso et al., 2023).

In addition, participants expressed the need for additional and specialised training in emerging and critical areas, such as the use of AI, open-source intelligence techniques (OSINT) and data and image analysis. The demand for training in these areas reflects a skills gap that, if properly addressed, can empower fact-checkers to navigate and analyse the information landscape more effectively and accurately. Training in these specialised skills will not only improve the quality of fact-checking work, but also strengthen the resilience of practitioners in the face of changing and sophisticated tactics employed by the propagators of disinformation.

Another identified constraint is the lack of access to reliable and rapid sources of information. Fact-checkers often have difficulty obtaining official data or responses from government entities and organisations, which delays and complicates the verification process. In addition, the need for an accessible and reliable database of experts who can provide quick information and clarification to facilitate the verification work was mentioned.

Finally, a lack in the number of editors specialising in specific topics, such as climate change, was noted. Subject-specific expertise is vital for understanding and analysing information and disinformation in these fields, underlining the need to invest in training and recruitment in specific subject areas. Overall, addressing these gaps and constraints will be critical to improve the effectiveness and efficiency of fact-checking work and ultimately to strengthen the fight against disinformation in society.

The needs of fact-checkers are multi-faceted and include advanced technological tools, ongoing specialised training, access to reliable sources of information and subject matter expertise. Addressing these needs is essential to empower fact-checkers in their fight against disinformation, enabling them to work more effectively and accurately in an increasingly complex and challenging digital environment.

6.2. Proposals and integrations

In view of the needs and gaps identified in the report, a few strategic initiatives are proposed to strengthen the professional field of verification. Firstly, it is imperative to develop advanced fact-checker tools and facilitate access to them. These tools must be able to effectively analyse social networks, images and videos, and integrate advanced Artificial Intelligence (AI)

techniques. The creation of integrated platforms that consolidate several fact-checker tools into a single workspace can also facilitate a smoother and more efficient verification process.

In addition, the implementation of continuous and specialised training programmes for fact-checkers is suggested. These programmes should cover key areas identified by practitioners, such as the use of AI, OSINT techniques, data and image analysis and data visualisation. Training should be flexible, accessible and in line with new trends and challenges in the field of information verification.

To cater for the need of a shared, fast and reliable access to information, we propose the creation of a centralised and accessible repository that includes:

– A database of fact-checkers already carried out by entities, including not only the reporting and publication of these, but also the original complaint, audio-visual materials and everything that has served to contextualise the research.
– A list of reliable sources of information, such as pages to official statistics and compilations of reports, classified by topic.
– A directory of experts in various fields, institutions and countries needed for fact-checkers.

This resource could act as a unified and useful quick-reference directory for fact-checkers, facilitating access to available and relevant knowledge in real time. Efforts that have been made in this direction, such as TrulyMedia, have not fully worked. In addition, it is also recommended that clear and effective protocols for data analysis be established to guide practitioners in the fact-checking process and help them navigate diverse and complex information sources.

Suggested proposals and integrations to improve the professional field of verification include design thinking workshops that directly involve fact-checkers. The aim of these workshops would be to co-create tools that fit their specific needs, drawing on their experience and direct knowledge of the field. The active collaboration of fact-checkers in the design process not only ensures that solutions are practical and relevant, but also encourages adoption and engagement with the tools developed. This practice will identify emerging trends and changes in the needs and preferences of the fact-checkers, as well as evaluate the effectiveness of the tools and training applied. This dynamic and adaptive approach ensures that fact-checker strategies keep up with the fast pace of disinformation and technological innovations in the field of fact-checking.

Finally, given the diversity of topics and the specialisation required in the fact-checking process, the incorporation and training of editors specialising in key areas is recommended. The implementation of these proposals and integrations will not only respond to the current needs of fact-checkers but will also strengthen the overall fact-checking infrastructure, making the process more robust, reliable and better equipped to face future challenges in the fight against disinformation.

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Methodology	Javier Cantón-Correa
Data collection and analysis	Javier Cantón-Correa
Discussion and conclusions	Javier Cantón-Correa, Juan Gómez-Romero and Miguel Molina-Solana
Drafting, formatting, version review and approval	Javier Cantón, Andrés Montoro- Montarroso, Juan Gómez-Romero and Miguel Molina-Solana

9. Conflict of interest

The authors declare that there is no conflict of interest contained in this article.

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